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**USE OF PERFORMANCE SUPPORT TOOLS DURING
UNSUPERVISED PRACTICE OF A COMPLEX COGNITIVE TASK**

VOLUME I

By

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A DISSERTATION

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ABSTRACT

USE OF PERFORMANCE SUPPORT TOOLS DURING UNSUPERVISED PRACTICE OF A COMPLEX COGNITIVE TASK

By

Deborah Alpert Sleight

The purpose of this study was to learn how performance support tools aid the acquisition of a cognitive skill during unsupervised practice. The participants were four graduate students in an instructional design class at Michigan State University. They used paper-based performance support tools while writing instructional goals and objectives. The tools were a Form, Checklist, Example and Annotations. I videotaped the three observation sessions, using verbal protocol.

I transcribed the videotapes, then categorized the occurrences of tool use. I identified four purposes for use of the tools: 1) prevent errors, 2) check for errors, 3) detect errors, and 4) detect/correct errors.

I identified 13 tasks accomplished with the tools:

1. Announce Part	2. Copy Wording	3. Derive Rules
4. Explain Checklist	5. Explain Example	6. Explain Feedback
7. Find Place	8. Gauge Writing	9. Guide Writing
10. Identify Component	11. Learn Extent	12. Paraphrase Wording
13. Use Tool		

The participants used all the tools provided and additional tools from the course pack, including examples, practice test, explanations and instructions. They used the tools extensively, and tool use generally increased in session #2 and decreased in session #3. The participants favor different tools, using them more frequently than the other participants did.

The participants used the tools before, during and after writing for orientation, guidance in writing, and to gauge their writing. They consulted multiple tools when resolving a problem and to understand feedback. The participants responded to six cues to use the tools: uncertainty, disagreement, encountering a problem, checking what they had written, correcting an error, and misunderstanding the instructor's feedback. The immediate result of using the tools was that the participants prevented, detected and corrected 50 errors.

Tool use differed in terms of frequency of use, tool favored, tasks done, and purpose. These differences seemed related to the domain of the participants' task, initial competence in tool use, perception of their own initial competence, and amount of time spent on task. The tools helped the participants learn by enhancing initial competency and by providing an informative task environment. The tools also saved the instructor time and effort.

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To my parents, Simon and Lucille Alpert, who encouraged me to begin the doctoral program. And to my husband, Bill Sleight, who encouraged me to finish and kept the home fires burning. Without you I would not have attempted nor accomplished it.

This dissertation is also dedicated to my four-year-old son Alan, who helped by doing his own dissertation beside me. And to my two-year-old daughter Emily, who made me hurry so she could play Baby Smash™ on the computer.

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CHAPTER 1

INTRODUCTION

STATEMENT OF THE PROBLEM

The goal of many instructional endeavors is to produce mastery in an effective and efficient manner. To do this, instructors and instructional designers interpret learning theory and apply instructional theory. In this study I interpreted a theory on learning from performance errors and studied its application through watching students use performance support tools to help them learn and perform a complex cognitive skill.

Learning a skill appears to be the result of eliminating errors in performance through successive practices. The more a person practices, the faster the errors are eliminated (Restle, 1955). Learners may practice with an expert supervising them, or they may practice without supervision. Practice is generally unsupervised when learners work on assignments outside of class. But unsupervised practice by novices, who by definition have little knowledge in an area, is not efficient because the practice requires them to detect and correct errors, to make appropriate decisions, to carry out those decisions by selecting appropriate actions from among many, and to interpret the results of those decisions, all of which require knowledge (Waern, 1993). Practice of complex cognitive skills can be especially inefficient because they are open-ended, meaning there is no one correct answer. They require flexible knowledge that can be applied to unfamiliar open-ended problem situations (Stark et al., 1998).

Practice and performance are two sides of a coin: both involve the performance of a skill, but for each there is a different target. The target of practice is to improve the performance of the skill; the target of performance is to achieve the real world goal. A model of the relationship between learning, practice and performance might look like Figure 1 below.

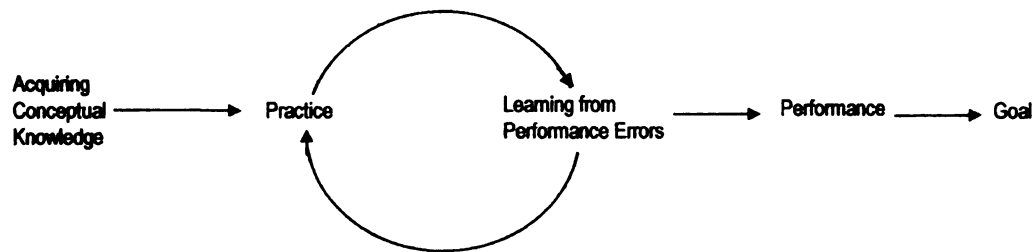


Figure 1: Relationship among Learning, Practice and Performance

In the case of a cognitive skill, such as writing instructional goals and objectives, learners usually must acquire some conceptual knowledge, also called declarative knowledge, before being able to practice the skill. They then learn practical knowledge about how to perform the skill as they practice it. According to Ohlsson (1996), practical knowledge of the skill helps learners decide what action to take, depending on the situation.

The errors learners make during practice provide them with informative feedback that allows them to correct the errors, until they make no more errors and have mastered the skill.

RATIONALE AND SIGNIFICANCE OF THE STUDY

If people learn skills best by practicing them, and if learning from unsupervised practice is not efficient, how can practice be made more efficient? Performance support tools may provide an answer.

Performance support tools (PSTs) are physical or cognitive tools such as book indexes, job aids, checklists, expert systems, decision aids, and flowcharts. PSTs have been shown to shorten the time it takes for novices to successfully perform tasks for which they have little knowledge or experience (Gery, 1991; Rossett & Gautier-Downes, 1991). It appears the reason for this shortened time to successful performance is that the tools provide the novices the expert information to detect and correct errors and make appropriate decisions they are lacking.

In addition, PSTs may help novices identify performance errors by showing them what a correctly done skill or a correctly finished product should look like. According to Ohlsson (1996), people detect errors when there is a conflict between what they perceive is true and what they believe ought to be true. The examples of correct processes or products provided by PSTs may help bring about this conflict, thus facilitating error detection.

Because PSTs can help novices perform skills, it seems likely that PSTs would be able to help novices practice skills as well. If PSTs can provide expert information to help novices perform, and facilitate error detection, PSTs should be helpful in making unsupervised practice more efficient in terms of using the minimum effort required with no

wasted effort. Some teachers fear, however, that students will use the tools as a crutch and will not learn to do the skill on their own.

There is little research on how PSTs help or what mental functions they support and if students do indeed use them as crutches. In the hope of shedding some light on how PSTs are used and why they are successful in facilitating performance, I studied how people use PSTs during practice of a complex cognitive skill, how the PSTs help them learn and perform, and whether people use them rather than learning the skill.

PURPOSE OF THE STUDY

The purpose of this study was to learn how performance support tools aid the acquisition of a cognitive skill during unsupervised practice. I wondered if PSTs improved performance by supporting the cognitive functions of preventing, detecting and correcting errors when performing a task. I also wondered if PSTs could enable novices to start practicing by providing initial competence or information about how to do the practice, enabling them to detect and correct errors. I also wondered if PSTs could help novices make appropriate decisions by providing an informative task environment or information about the task.

OVERVIEW OF THE STUDY

The participants in the study were asked to use performance support tools while practicing writing instructional goals and objectives for a unit of instruction. A goal

describes the real world performance or behavior that a graduate of the course or unit would be able to do. It contains conditions that describe the role the graduate would play in the world, the setting in which the real world performance would be done and the purpose of the behavior.

An objective describes the questions, tasks or items on the course or unit test and contains a description of the behaviors a student must exhibit, a set of conditions under which the behavior is performed, the criteria or standards for the behavior, and the lowest performance which will result in a passing grade. All these components have criteria for what must be included and how well it must be done. For example, the conditions, which should be as like real life as possible, include a description of the type of problem the student will solve, a specific example of the problem, the medium in which the test is to be given, the tools the student may use and the number of cases the student will be given to solve.

I used an observational case study design with a verbal protocol to unearth and capture details of how participants use PSTs, including some uses the participants may not have been conscious of making. The findings from this study should reveal how people use performance support tools to help them accomplish a complex cognitive skill, and if they use the tools as a crutch instead of learning to do the skill on their own.

BIASES OF THE RESEARCHER

I approached this study with some biases. I think performance support tools will prove useful in learning and performance. I attended CEP 808 as a student years earlier

and thought the tools provided in the class were helpful. I thought it was likely that the study would show that the participants used the tools to prevent, detect and correct errors and that they used the tools to help them do their assignment.

OVERVIEW OF THE DISSERTATION

The five chapters in this dissertation are described below.

Chapter 1: Introduction

Chapter 1 provides an overview of the study, states the problem the research addresses, and describes the purpose, rationale and significance of the study. It also defines the terms used in the dissertation.

Chapter 2: Literature Review

Chapter 2 reviews the literature pertinent to this study in order to answer questions about errors and skill acquisition, and to bring the reader up to date in those areas.

Chapter 3: Methodology

Chapter 3 describes the context of the study, including the participants, the research site, and the performance task to be studied. It also states the questions that guided the research, the design of the research, and the methods used for data collection and analysis.

Chapter 4: Findings

Chapter 4 states the findings of the research for the individual participants and compares the participants with each other.

Chapter 5: Discussion and Implications

Chapter 5 interprets the findings and discusses their implications for teachers and for future research in the area.

CHAPTER 2

LITERATURE REVIEW

The purpose of this literature review is twofold: 1) to bring the reader up-to-date on what is known about skill acquisition, errors, performance support tools and learning from performance errors, and 2) to answer some questions about those areas:

- How do people acquire skills?
- What kinds of errors do people make?
- What are performance support tools?
- How do people learn during practice of a performance?

The purpose of this study was to learn how performance support tools aid the acquisition of a cognitive skill. I analyzed transcripts of videotapes of the participants while they practiced writing instructional goals and objectives. I then organized the participants' tool use into categories.

SKILL ACQUISITION

I reviewed the literature on skill acquisition to learn how people acquire skills. A cognitive skill is one in which knowledge and mental processing rather than physical ability are determinants of success. Solving a mathematics problem, writing an essay, troubleshooting a machine are all types of cognitive skills.

According to VanLehn (1996), a skill—cognitive or otherwise—is acquired in three phases. In the first phase learners learn the domain knowledge, such as mathematics, associated with the skill. In the second phase learners practice applying that domain knowledge to a problem, such as a multiplication problem. They learn from the experience of practicing, identifying knowledge gaps, and correcting misconceptions. In the third phase, all conceptual errors have been removed and learners can perform the skill with mastery. They may still make unintended errors, but their performance for the most part has become faster and more accurate than in phase two.

VanLehn does not mention an additional type of knowledge which certain types of skill acquisition may require: task knowledge. Task knowledge is the knowledge of how to do the task using the domain knowledge. For example, if the domain knowledge is math, and the task is to write an instructional goal for math, the task knowledge would be how to write an instructional goal. Knowing math would not be enough to enable a person to write an instructional goal. Perhaps task knowledge is necessary only when the task is not part of the domain knowledge, much as how writing an instructional goal is not part of the domain knowledge of math.

In phase two, the practice phase, learners use their domain knowledge to help them decide what action to take next, that is, what production rule to select (Ohlsson, 1996; VanLehn, 1996). Production rules have two parts: a condition and an action, and take the form:

$G, S \longrightarrow A$

where G stands for goal, S for situation and A for action (Ohlsson, 1996, p. 243). The condition describes the goal of the action and the features of the situation in which the action is appropriate. The action is the behavior the person should take to accomplish the goal in the situation. For example, if the goal is to mow the lawn, and the situation is that the grass is tall, then the action is to raise the mower so as not to cut too much grass at once, which could possibly stop up the mower or destroy the lawn by ripping the grass out by its roots.

According to Ohlsson (1996), learning a skill involves making general production rules more specialized, that is, applicable only in specific situations and for specific goals. For example, here is a general production rule for writing a test: *When writing a test for a skill, include varied test items of the same type, such as varied multiplication problems, that the learner has never seen before.* This rule is too general because it seems to apply to both cognitive and motor skills, whereas it should apply only to cognitive skills. When applied to a motor skill, the rule would cause an error because motor skills do not have test “items”; learners perform the identical motor skill over and over to perfect it.

In order to specialize rules, the learner must first detect errors in terms of applying rules, then specialize the rule to apply to a more specific situation. The production rule above could be specialized by adding the word “cognitive”: *When writing a test for a cognitive skill, include varied test items of the same type, such as multiplication, that the learner has never seen before.* Now the rule will become activated only for cognitive skills. The learner has achieved mastery of the skill, which Ohlsson defines as applying each rule for a particular task only when it is appropriate.

As learning continues, the condition side of each rule becomes more and more specialized and the rule will consequently become active in fewer and fewer situations. Finally, the rule is activated only in those situations in which the action it evokes is the correct thing to do. When this is true of each and every rule in the method for a particular task, that task has been mastered (Ohlsson, 1996, p. 248).

In Ohlsson's theory, a method is a group of production rules for doing a task.

Methods may be general, making fewer assumptions about a task. Such general methods include analogical reasoning, heuristic search, and means-end analysis. The fewer assumptions that methods make means they may be more helpful in solving unfamiliar tasks because there will be fewer assumptions that might be incorrect when dealing with an unfamiliar task.

Methods may also be task-specific, making assumptions about the task and the situations in which it may be done, and applying only in narrowly defined task environments. A task environment describes the situation in which a task is to be performed, including the multiple options possible for each step. An informative task environment helps a novice judge whether situations are appropriate for the application of a rule. Through practice learners are able to specialize general methods more and more by identifying and correcting errors, and by identifying and remedying flaws in their knowledge about the skill.

Learning a skill from practice is made easier if a source of expertise is available to help the learner identify and correct errors. In my study I made the hypothesis that performance support tools could facilitate phase two of skill acquisition by acting as that source of expertise, thus aiding learners in error elimination during practice.

ERRORS

I reviewed the literature on errors to learn what kinds of errors people make, and what kinds of errors performance support tools might be able to help novices detect and correct. I learned of human and system error, then, within human error, of errors of performance of cognitive and motor skills. My search ultimately led me to displacement error as the kind of error performance support tools might be able to help people detect and correct. My search is outlined below, and described after that.

- I. Error
 - A. system
 - B. human
 - 1. motor
 - 2. cognitive
 - a. errors of automaticity
 - b. errors of insufficient knowledge
 - 1) displacement
 - 2) capture
 - 3) inappropriate analogies
 - 4) loss of information from working memory

There is disagreement in the literature not only on the definition of error, but even on its very existence (Senders & Moray, 1991). A definition of error was agreed upon at the Conference on the Nature and Source of Human Error of 1983: an error may be “an event within an actor that is not intended by the actor, or is not desired by an external observer or a set of rules, or that has led a task or system outside its acceptable limits” (Senders & Moray, 1991, p. 25). As this three-part definition shows, the definition of error depends on who makes and who judges the error, a human or a system.

In this study I was concerned with human error. Just as there is disagreement on the nature and definition of errors, there is also disagreement on a taxonomy of errors. To be useful, a taxonomy must be constructed according to what is being studied. For example, the kinds of errors made by humans operating complex industrial machinery will be different from the kinds of errors made by students writing instructional objectives. There seems to be general agreement on four categories of error, of which only the first two are made by people; the last two are made by systems:

- A mistake is an error in forming an intention, such as planning a mountain hike without survival gear.
- A slip is a good plan executed poorly, such as having a route marked correctly on a map but not following it.
- A fault is a problem in a system that is interacting with a person, such as a loose wire that shocks someone.
- An accident is something unexpected done by a system to a person, such as a tree falling onto a house.

Human error can be in the form of mistakes (poor planning) or slips (good plans poorly executed). People can make these types of errors while performing a motor skill or a cognitive skill. Errors in performance of motor skills include physiological errors such as turning a car steering wheel too far. Errors in performance of cognitive skills include cognitive errors such as using an inappropriate rule to decide on an action to take. In my study I was interested in errors in performance of cognitive skills.

Reason (1990) proposes a taxonomy of cognitive skill errors based on three psychological mechanisms: “strong associate substitutions, in which actions strongly related to the same memory may be substituted for one another, place-losing, in which steps of a sequence of action may be omitted or in the wrong order, and interference” (Senders & Moray, 1991, p. 48), in which simultaneous information processing activities cause blends or spoonerisms in speech.

Cognitive performance errors may be further divided into two categories, errors caused by insufficient knowledge, and errors caused by action that has become automatic, and so is done unconsciously. During learning, the former is more likely to happen, since learners do not yet have the knowledge they need. Cognitive performance errors caused by insufficient knowledge seem to be the kind of errors that performance support tools could help people detect and correct. Ohlsson describes four types of performance errors caused by insufficient knowledge:

- displacement of a correct decision by an incorrect decision, caused by having too general knowledge (Ohlsson, 1996),
- capture, caused by underspecification of cognitive operations (Reason, 1990),
- inappropriate analogies (Anderson, 1989), and
- loss of information from working memory (Anderson & Jeffries, 1985).

Ohlsson focuses on displacement errors in his theory of learning from performance errors. His theory is described later in this chapter.

PERFORMANCE SUPPORT TOOLS

I reviewed the literature on performance support tools to learn what they were and to bring the reader up-to-date. Performance support tools are aids that help people perform tasks. Performance support tools can take the form of checklists and flowcharts, decision-making help, advice, instruction, and opportunities to practice. Performance support tools are used during the practice or performance of a task, thus they must be relevant to the task they support, succinct, easy to use and easily available.

There is no question that performance support tools, also called job aids, can help people perform a task they could not do otherwise, or would have more difficulty performing (Gery, 1991). What is in question is just how performance support tools do aid performance. Referring to the three-phase model of skill acquisition described earlier, I hypothesized that PSTs can support the acquisition of domain knowledge in phase one by presenting organized summaries of domain knowledge, and can support the acquisition of task knowledge in phase two by providing examples of and criteria for correct performance and by presenting organized summaries of task knowledge. In phase three, when learners have mastered the skill, the need for and use of PSTs diminishes (Sleight, 1995), although they may use the PSTs to refresh their memory.

One of the features of PSTs is that they can help novices perform before they have learned the necessary domain knowledge (Rosset & Gautier-Downes, 1991). PSTs may make it possible for people to be able to perform without learning the necessary domain knowledge first by supplying the information needed to do the task.

There have been numerous studies showing the effectiveness and efficiency of PSTs (Gery, 1991; Rosset & Gautier-Downes, 1991), but apparently none on how performance support tools aid performance. Ohlsson's theory of learning from performance errors (Ohlsson, 1996) may provide an explanation of how performance support tools aid performance.

AN EXPLANATORY THEORY ON LEARNING FROM PERFORMANCE ERRORS

Dr. Stellan Ohlsson is a professor of psychology and chair of the Cognitive Division at the University of Illinois at Chicago. His theory of learning from performance errors is grounded in previous research on cognitive skill acquisition and the nature of errors. I will review the evidence as I introduce each principle of his theory.

Ohlsson focuses on learning from errors, a less common research perspective than learning from successful actions. Because his research is on production rules, he is able to test his theories by creating computer models that use the production rules. His theory of learning from performance errors "generates novel but testable predictions about error correction" (Ohlsson, 1996, p. 253), enabling him to design a computer model to implement the theory and test whether it is "a coherent, functioning system" (p. 250).

The theory is embodied in a computer model that can learn some cognitive skills that people acquire in ecologically valid settings. The core of the model is a set of mechanisms for the detection and correction of errors. (Ohlsson, 1996, p. 242).

Principles of the Theory

There are four main principles in Ohlsson's theory.

Principle #1 - Learners make errors because they use production rules that are too general for the task. A production rule is a situation and a goal that determine an action to take. An example of an overly general production rule is: "When writing an educational objective for a skill, include different test items of the same type that the learner has never seen before." In this rule the situation is too general because it specifies the same action for both cognitive and motor skills.

This principle of the task specificity of rules is supported by two lines of evidence, expert performance and transfer. Ohlsson (Ohlsson, 1996, p. 243) describes empirical studies of these lines:

...expert performance requires large amounts of knowledge about the particular task (Chi, Glaser & Farr, 1988; Erickson et al., 1993; Ericsson & Smith, 1991). Second, practical knowledge rarely transfers from one task to another (Cornier & Hagman, 1987; Detterman & Sternberg, 1993; Singley & Anderson, 1989). Both observations are consistent with the idea that what is learned during skill practice is a task-specific method.

Expert performance requires a large amount of knowledge because the rules are specialized to specific situations, unlike the general rules used by novices. Because the rules are specialized, it is difficult to transfer them to new situations. If the goals or the features of the situation differ at all from the original situation, then the rule would have to be specialized to the new task.

Principle #2 - Learners must already know enough about the skill to be able to tell when they are doing something wrong and how to correct it. This kind of knowledge is declarative knowledge, and it comprises the facts, principles and concepts related to the skill. Ohlsson (1996) contends that declarative knowledge is prescriptive rather than descriptive, meaning that it tells what ought to be done rather than describes what is done. Because it is prescriptive, its function is to support learners' judgment, allowing learners to evaluate the outcomes of their actions.

Thus, action and judgment are based on two distinct kinds of knowledge, declarative for judging correctness and practical to perform better. Learners frequently recognize errors in their performance when they perceive the outcomes. "They possess the (declarative) knowledge required to judge a performance as incorrect but lack the (practical) knowledge required to perform better" (Ohlsson, 1996, p. 246). Learners who have declarative knowledge about writing objectives would be able to determine why it is impossible to write a test that contains varied items of the same type for a motor skill.

Ohlsson (1996, p. 244) cites numerous studies that have shown that novices detect errors by having others tell them. These others may be:

- a tutor, either human or machine (Fox, 1990; Schoenfeld, 1987),
- peers in a collaborative environment (Seifert & Hutchins, 1991), or
- error-detecting software for programmers (Silverman, 1992).

In every case, the other who detects the errors has more knowledge than the novice. But how do learners who practice without supervision detect errors? This is less clear. Performance support tools or job aids may be able to provide enough information to

enable the novice to judge. As Ohlsson would say, “Prior knowledge about the task environment is the learner’s main resource for judging whether the situations he or she creates or encounters are promising or problematic” (Ohlsson, 1996, p. 245).

Principle #3 - Learners recognize errors when there is a conflict between what they perceive is true and what they believe ought to be true. For example, learners writing an instructional objective may believe they must provide different test items of the same type (based on the same ideas or knowledge) that the student has never seen before, such as two multiplication problems with different numbers, but when they perceive that it is impossible to write different test items for a motor skill, they recognize an error in their belief.

Findings from various studies have supported Ohlsson’s third principle. A hypothesis formed by Allwood (1984) based on his findings of problem solving research was that errors are detected when problem solvers notice a discrepancy between their actions and their expectations. Various theorists argue that failed expectations are important in cognitive development (Piaget, 1985; Popper in Berkson & Wettersten, 1984; Schank, 1986). The definition of an error supplied earlier is “an event within an actor that is not intended by the actor, or is not desired by an external observer or a set of rules, or that has led a task or system outside its acceptable limits” (Senders & Moray, 1991, p. 25). Errors point out erroneous conception or expectations, enabling them to be corrected.

Principle #4 - Learners correct errors by making general knowledge structures more specialized, that is, used only in appropriate situations. This is a corollary to Principle #1, that people make errors because the rules they are using are too general. To

continue the example, the writer of the objective would specialize the rule on writing tests to say that different test items of the same type that are new to the student should be provided in tests of cognitive skills, but not in tests of motor skills.

The findings in research in varied fields such as algebra (Matz, 1982), Newtonian mechanics (Priest & Roach, 1991), physics (VanLehn & Jones, 1993) and language acquisition (Mazurkewich & White, 1984) provide support for this principle.

Scope of the Theory

The scope of Ohlsson's theory is limited to the acquisition, during unsupervised practice, of complex, cognitive skills for which each step requires a choice among possible actions. Ohlsson limits the scope to complex cognitive tasks because it is these kinds of tasks that may generate displacement errors. Displacement errors are those caused by overly general practical knowledge being applied to an inappropriate task. "By being activated in a situation in which it should not have been, the incorrect action gets a chance to displace the correct action, and an error might result" (p. 247). In a simple task where there are only two possible actions, such as opening or closing a lid, there should be a lower probability of making errors because: 1) there would be fewer rules to possibly apply inappropriately, and 2) people may already have sufficiently specific knowledge for a simple task.

The scope of the theory is also limited to unsupervised tasks for the reason that learners will likely not to attempt to detect and correct errors themselves if there is an expert who can do it for them, as in supervised practice.

Cognitive Functions Involved in Learning from Performance Errors

The two main cognitive functions involved in learning from performance errors are error detection and error correction. To learn from errors, learners must be able to detect when they have made an error and know how to correct the error. But how do novices detect errors in – by definition – unfamiliar tasks, during unsupervised practice when no expert is available to help ? According to Ohlsson, they have to have enough domain knowledge to be able to detect errors. He calls this initial competence.

There are several sources for this initial competence. Learners may use a general method of problem solving, such as means-end: what is your goal, what actions should you take to get there, and what steps should you take to accomplish the actions. Other sources of initial competence include other people, instruction manuals, and performance support tools. Or learners may act in analogy with a task they already know how to do: If you have had experience writing test items, you may try to write an educational objective in the same way. Ohlsson did not include analogy as a way of providing initial competence in his theory because:

... an analogically derived solution to a problem is likely to be very specific right from the start. Hence, errors are not caused by overly general rules, and so cannot be cured via specialization, the main mechanism for correcting errors in my theory" (Ohlsson, personal correspondence, 1998).

Based on Ohlsson's theory of learning from performance errors, it seems likely that performance support tools could provide or enhance this initial competence. For example, a checklist of criteria for a finished product of the skill could provide a list of

components to be included in each part of the product, and a description of how good they must be.

In addition, if the probability of correct action increases when incorrect actions are discouraged or suppressed, as Thorndike (1913) proposed, then properly designed support tools could also constrain incorrect actions by describing correct actions, prescribing steps to take, and providing examples of correct and incorrect actions.

A visual model for the theory is shown below in Figure 2:

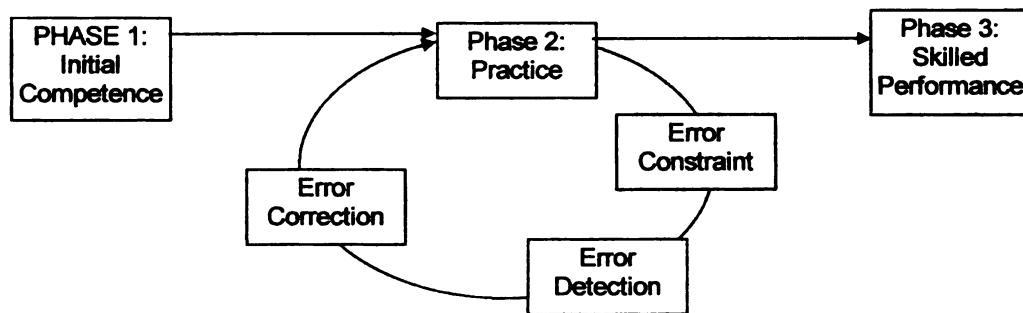


Figure 2: Visual Model of Ohlsson's Theory

Before practice begins, initial competence is acquired somehow (general methods, asking others, PSTs). During practice learners gain experience and practical knowledge of how to do the skill by detecting and correcting errors in their performance. The learners' initial competence aids them in constraining errors, and in detecting and correcting errors. Detecting and correcting errors is frequently an iterative task because in a complex cognitive task there may be many production rules to check and correct, and these may be detected only one or a few at a time. Others might be detected after a second practice. When learners have corrected all the errors, they can then perform the skill with mastery.

Ohlsson (1996) refers to the cognitive tasks of performance as constraining, detecting and correcting errors. Constraining errors means to apply a more specialized method or set of rules that describe and prescribe correct actions. In my study I am using the phrase “prevent errors” instead. This means two things: 1) learning how to do the task before actually doing it, and 2) resolving problems before writing them into the assignment. The problems are resolved, and hence errors prevented (or constrained), by using the tools to describe and prescribe correct actions.

Role of Performance Support Tools in Learning From Errors

If people learn from correcting errors during performance, then how might performance support tools aid performance and learning? Generally there are two ways PSTs can support learners: 1) by describing the steps of a skill or process or 2) by describing the final product of a skill. A recipe is an example of a skill or process support tool. A description, photo, and notes about the food produced by following the recipe is a product support tool if learners use it to help them create a product like it.

Another role PSTs can play in learning from performance errors is by providing information from which learners can attain or enhance initial competence (Ohlsson, personal correspondence, 1998). PSTs can provide the initial skill information the learners lack, which should help them detect errors in unfamiliar domains. In addition, if the probability of correct action increases when incorrect actions are discouraged or suppressed, as Thorndike proposed (Ohlsson, 1996, p. 241), then properly designed support tools could also constrain incorrect actions by describing correct actions,

prescribing steps to take, and providing examples of correct and incorrect actions. Perhaps tools such as checklists and annotated models can make errors more informative, thus facilitating learning from them. When learners explain to themselves how each part of an annotated model or solved example fits with the rest of the model or example, they learn more than those who just try to understand each part separately.

When learners begin to practice, their behavior is generated by general methods, which they usually construct themselves. (A method is a group of production rules.) Being general, these methods make few assumptions about the task environment, so errors are more likely. But an expert's specialized method (also called practical knowledge) could be provided in a performance support tool, such as a decision aid. This could speed learning by providing a specialized method that would constrain displacement errors caused by overly general practical knowledge.

Performance support tools could provide informative task environments. A task environment describes the situation in which a task is to be performed, including the multiple options possible for each step. An informative task environment could be a flowchart of the correct actions to take, which could enable learners to catch their errors as they occur. Such tools could also provide the declarative knowledge that will support judgment early in the practice, facilitating error detection and correction.

SUMMARY

People acquire skills, both cognitive and motor, in three phases: first learning the required domain knowledge, then practicing the skill, until in the phase three they have

mastered the skill. Errors people make when performing cognitive skills are usually caused by insufficient knowledge or doing the skill automatically. Performance support tools might be help people detect and correct errors of displacement, which are errors of insufficient knowledge in which learners apply rules that are too general for the task. Ohlsson's theory of learning from performance errors provides a description for how performance support tools might aid performance and learning and acts as a guide for the design of this study.

CHAPTER 3

METHODOLOGY

In this chapter I will describe the context of the study, including the participants, the research site, and the performance task to be observed. I will state the questions that guided the research, describe the data collection and analysis procedures, and discuss their limitations. I will list and define the terms used in the study. I will also talk about the biases and assumptions with which I approached the study.

THE PARTICIPANTS

The participants in this study were graduate students in an instructional design class, CEP 808, at Michigan State University. The students in CEP 808 were enrolled in masters or doctoral degree programs, and had diverse major fields of study (teacher education, educational psychology, nutrition, exercises science, and counseling). Participants were paid for their time in the study.

Before the class began students were sent a letter describing the study, what would be expected of them, the monetary incentive, and asking them if they would like to volunteer. Four students volunteered and were accepted into the study. Because this was a qualitative research design, in which I observed and interviewed each participant in depth, there was not enough time to observe additional participants.

The four participants were three women and one man, one an international student and the rest national students. Two of the women were math teachers, one teaching in

high school and one teaching in middle school. The other woman and the man were not teachers. The man was responsible for running technology classrooms and the woman was a full-time graduate student. Both of them were interested in computers and the Internet.

THE RESEARCH SITE: CEP 808

CEP 808 is the first in a series of three courses on instructional design at MSU. The series of courses teaches such instructional design tasks as writing objectives, organizing and sequencing content, delivering instruction, and evaluating programs and learners. Students participate in a combination of lecture and discussion, then practice the tasks on their own. Each course is a semester long.

The CEP 808 Projects

In CEP 808 students do two projects during the semester. Project #1 involves writing an educational plan and Project #2 involves performing a formative evaluation of instruction. Project #1 comprises four assignments that build to an educational plan. Figure 3 below shows an outline of the relationship of the projects in the course, the assignments of the projects, and the parts of the assignments. In this study I looked at how students do parts 1 through 6 of Assignment #1. The bold text shows the extent of this study.

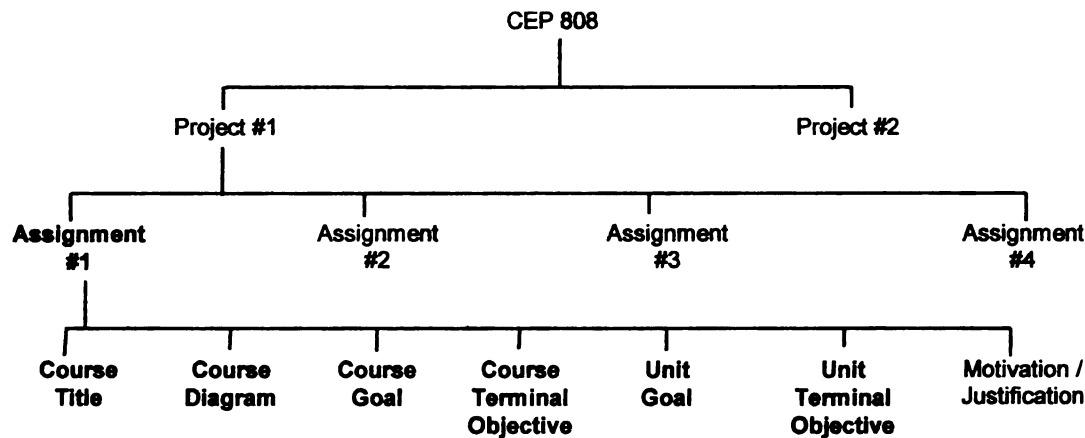


Figure 3: Relationship of CEP 808 Course Projects and Assignments

Assignment #1 has seven parts, each of which has its own components, which in turn have their own elements. Below is an outline showing the parts, components and elements of Assignment #1. Parts studied in this research are in bold print. The purpose of each part and how the part is written are described following the outline.

- I. CEP 808: Project #1 - Plan a unit of instruction
 - A. Assignment #1 - Writing Goals and Objectives**
 - 1. course title**
 - 2. course structure diagram**
 - a. course goal**
 - 1) verb
 - 2) object
 - b. major unit goals**
 - 1) verb
 - 2) object
 - c. unit goals**
 - 1) verb
 - 2) object
 - 3. course goal (general description of real world performance)**
 - a. condition statement**
 - 1) role
 - 2) setting
 - 3) purpose
 - b. behavior statement**
 - 1) "graduates"
 - 2) general verb of course skill
 - 3) object

4. **course terminal objective (specific description of course final exam)**
 - a. **condition statement**
 - 1) **givens**
 - 2) **medium**
 - 3) **skills from all units**
 - b. **behavior statement**
 - 1) **"students"**
 - 2) **specific observable verb of course test behaviors**
 - 3) **object**
 5. **unit goal (general description of real world performance)**
 - a. **condition statement**
 - 1) **role**
 - 2) **setting**
 - 3) **purpose**
 - b. **behavior statement**
 - 1) **"graduates"**
 - 2) **general verb of unit skill**
 - 3) **object**
 6. **unit terminal objective (specific description of unit final exam)**
 - a. **condition statement ("givens")**
 - 1) **number of cases or situations**
 - 2) **medium**
 - 3) **complete description of kinds of problems on test**
 - 4) **specific example of a test item ("such as")**
 - b. **behavior statement**
 - 1) **"students"**
 - 2) **specific observable verb of unit test behaviors**
 - 3) **object**
 - c. **criteria**
 - 1) **according to and/or so well that and/or time**
 - d. **lower limits**
 - 1) **number of repetitions (# times done on test)**
 - 2) **quality (# errors per repetition for passing grade)**
 7. **motivation/justification**
- B. Assignment #2 - Task Description
 C. Assignment #3 - Task Analysis
 D. Assignment #4 - Evaluation of Learning
- II. Project #2 - Plan and conduct an evaluation of instruction

For Assignment #1 students write a set of educational goals and objectives. For Assignment #2 students write a task description of the skills specified in Assignment #1. In Assignment #3 students analyze the task description from Assignment #2. And in Assignment #4 students write an evaluation plan based on the objective from Assignment #1. Figure 4 below shows how the assignments are related to each other.

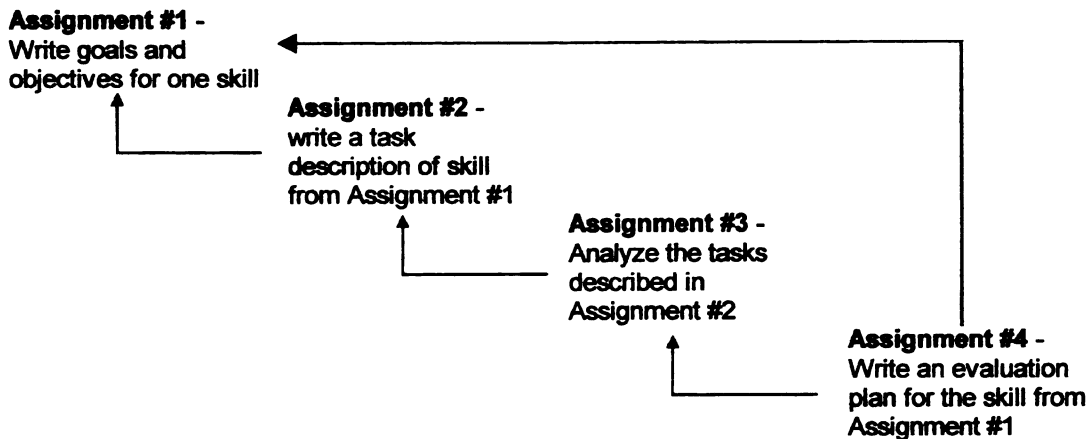


Figure 4: Relationship of CEP 808 Course Assignments

The CEP 808 Assignments

The students do each assignment twice, with different topics, once for practice and once as part of the graded project. They do the practice and project simultaneously. They receive feedback from the instructor on the practice, which they then apply to the project. The students do the assignments over the course of several weeks, turning in a section each week. For example, Assignment #1 has seven parts. The first week students do Part 1 and 2, the second week they do Parts 1 through 5, and the third week they do Parts 1 through 7. The instructor gives them feedback each week, allowing students to revise those sections and turn them in with the next section of the assignment that is due. By the end of the assignment they have received feedback on the entire assignment and have had an opportunity to revise both the practice and the project based on that feedback. The instructor gives direct feedback on the project after it is graded.

The students write or print the assignment on a blank form given to them by the instructor for that purpose. They may type it directly onto the blank form, or type it onto a blank sheet of paper then tape it or copy it onto the blank form, or they may turn it in on a diskette. The instructor requires the use of the blank form because it contains a criterion checklist to help students judge their performance and correct it. The instructor also uses the checklist to facilitate his giving of feedback.

The instructor's feedback is given after the student finishes writing the practice assignment and turns it in to the instructor. For positive feedback the instructor draws arrows from a criterion in the Checklist to the instance of the criterion in the assignment and writes "OK" next to the criterion in the Checklist. For negative feedback, the instructor circles the criterion in the Checklist that is missing in the assignment and writes "NEED" next to it. If the criterion is present but incorrect, he includes comments as to why it is wrong and how it might be corrected.

The Performance Task: Assignment #1

Assignment #1 is the task I observed the students performing in the study. In Assignment #1 students devise an educational plan by writing related goals and objectives for a whole skill. Assignment #1 has seven parts:

- Part # 1 - course title
- Part #2 - course structure diagram
- Part #3 - course goal
- Part #4 - course terminal objective

- Part #5 - unit goal
- Part #6 - unit terminal objective
- Part #7 - motivation/justification

This research was concerned with Parts 1 through 6 only. In class the instructor lectured on how to write objectives, answered student questions about writing objectives, demonstrated writing objectives, then described how to do the practice and project version of the assignment. Following are descriptions and examples of these parts.

Course Title - In Part 1 students name the title or subject of their course.

Part 1: Course Name or Subject Mathematics

Course Structure - In Part 2 they set up the course structure by dividing the course into units according to a scheme logical to the subject, such as chronological, topical or hierarchical.. In the example the units are short division and long division, each with two subunits: division with remainder and division without remainder.

Part 2: Course Structure (in outline and diagram form)

Solve division problems with whole numbers

A. Solve short division

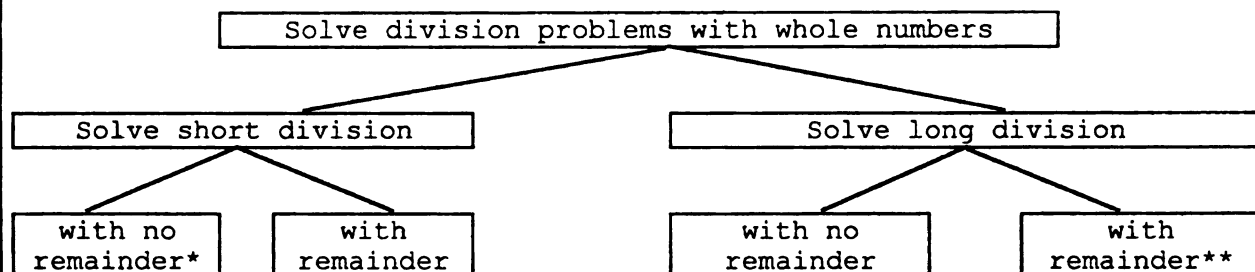
1. with no remainder* (practice)

2. with remainder

B. Solve long division

1. with no remainder

2. with remainder** (project)



Students must then select two of the units or subunits to develop, one for the practice and one for the graded project. In the example above the unit selected for practice is short division without remainder, and the unit for project is long division with remainder.

Course Goal - Now that the course structure has been set up, students write the course goal in Part 3. The course goal describes in a general way what real world performance graduates of the course will be able to do after finishing the course. The course goal contains a condition statement which describes a real world role and setting (time and/or place) in which graduates of the course would perform the skills learned in the course. It also states the purpose for learning the skills. The course goal also contains a behavior statement, which describes the real world skills graduates of the course would be able to perform.

Part 3: Course Goal

Condition

As managers of resources, for any problems
needing division of resources at home or in
business,

Behavior

graduates will solve division problems.

Course Terminal Objective - Students must then describe the course more specifically in Part 4. This is the course terminal objective, which describes the final exam for the course. The course terminal objective also contains a condition statement, but this condition statement describes the kinds of items students will be given on the course final exam and under what conditions they will take the exam. The skill in each unit must be represented in the condition statement, so the example above contains references to solving long and short division problems, with and without remainder. The course terminal objective also contains a behavior statement describing the observable test behaviors, and an optional criterion section, which describes how the behavior will be judged.

Part 4: Course Terminal Objective

Condition

Given a written description of any common management problem involving dividing resources, with whole numbers, using long or short division, with or without remainders,

Behavior

students will: 1. write out all steps, and 2. write out the solution,

Criterion

according to a checklist which shows correct choice of approach, logic, mathematical sense and precision.

Unit Goal - Part 5 is the unit goal. The unit goal is similar in purpose and format to the course goal, but describes the skill graduates of the unit will be able to do after they finish it. The unit goal contains condition and behavior statements similar to those in the course goal, but limited to the skill learned in the unit. In the example below, the unit goal describes the real world performance of short division with no remainder.

Part 5: Unit Goal

Condition

As managers, at home or in business, for problems with whole numbers involving division of small resources into equal parts, using short division with no remainder (e.g., small portions of food or small numbers of shares of stock),

Behavior

graduates will solve short division with no remainder problems.

Unit Terminal Objective - Part 6 is the unit terminal objective, which describes the unit final exam. The exam tests only the skill taught in the unit. The unit terminal objective describes what learners will be given in order to do the unit final exam, including an example of a test item (Condition), what behaviors they must exhibit (Behavior), how they must do the behaviors (Criteria), and what a passing grade is on the exam (Lower Limits).

Part 6: Unit Terminal Objective

Condition

Given 10 problem cases in written form that involve equal division of resources (e.g., goods, time, food), such as:

For a holiday you bought nine toys for your three cousins. To be fair, you wanted to give each cousin the same number of toys. How many should you give to each cousin?

Behavior

the learner will:

1. write out the problem mathematically and
2. write out the answer to the problem.

Criteria

The work shown will:

1. follow the sense of the information given,
2. follow the pattern shown in the task description:
 - a. Find the amount to be divided.
 - b. Find the divisor.
 - c. Divide the total by the divisor.
 - d. State the labeled number of equal parts.
3. Or a logical substitute to the task description following division principles,
4. so the result is:
 - a. mathematically correct, and
 - b. labeled with the units distributed.

Lower Limits

Eight out of ten of the case problems with no errors in each case will be passing.

Finally, in Part 7, students provide a justification for learning the skill to be taught in the unit, including where and when the skill is used, the consequences of doing the skill well and the consequences of doing the skill poorly, and the realism of the objective.

The Performance Support Tools

After the instructor describes and demonstrates doing the assignment, he gives the students performance support tools to help them complete the assignment outside of class:

1. blank assignment Form
2. criterion Checklist
3. prime Example of the assignment
4. Annotations to the Example and Checklist

Below is a description of each tool and how it might support the cognitive functions of performance.

1. Form

The Form provides structure for the finished assignment and a logical sequence for the students to follow while doing the assignment (Part 1 through 7). At the top of the Form is the title of the assignment and instructions for using the Form. The Form is divided into the seven parts of the assignment. Parts 3 through 7 contain subheadings naming the divisions of the parts, i.e., “condition” and “behavior.” This division into smaller chunks enables experts to “view a complicated situation in their domain of

expertise in terms of a small number of chunks, and they encode especially complex situations as a hierarchy of chunks" (Zeitz & Spoehr, 1989, p. 313). Part of the first page of the Form is shown in Figure 5 below.

NAME _____ Name of classmate checking assign. _____

☐ PROJECT ☐ have read the assignment ☐ have read the model

☐ PRACTICE ☐ have read the annotations on the model

☐ have a physical or mental skill whose steps and decisions I know well enough to describe step by step in assignment 2

School subject **1. COURSE/SUBJECT NAME**

Course = whole **2. DIAGRAM or OUTLINE SHOWING**

Unit = parts **COURSE GOAL & UNIT GOALS**

(Use back of page if needed)

Each unit is a skill

Star unit developed

Goal has real role, setting (time & place & purpose after course)

3. COURSE GOAL - REAL WORLD PERFORMANCE

Condition

Real Grad. behavior Behavior

Generally stated

Related to subject

4. COURSE TERMINAL OBJECTIVE (Course Final Exam)

Close representation of real conditions & real behavior for all skills Condition

Behavior

Specifically stated version of course goal

"Test" of students at end of course

Figure 5: Part of First Page of Blank Assignment Form Showing Checklist at Left

2. Checklist

The Checklist contains the criteria or qualifications against which the assignment will be checked. It is printed on the left side of the Form in Figure 5 shown above, and therefore appears with the prime Example as well, because the Example is printed on the Form to show what a correctly placed assignment looks like. The Checklist lists the components to be included in each part of the assignment and how they should be written. For example, a course terminal objective contains "a close representation of real world conditions and real world behavior for all skills taught in the course."

3. Prime Example of the Assignment

The Example shows one instance of a properly written assignment that follows the criteria listed in the Checklist. The Example also shows how the assignment is placed correctly on the Form. In addition, it provides a vehicle through which the instructor can show how he provides feedback. The first page of the Example is shown in Figure 6 below.

4. Annotations

The Annotations are notes written by the instructor on the Example and on the Checklist. They include definitions of terms found on the Checklist and in the Example, emphases, identification or purpose of a component, how it is to be written, and further explanations of the Example and Checklist. Arrows drawn from items in the Checklist to components of the parts of the assignment identify instances of that item. In the part of the first page of the Example shown below in Figure 6, one of the Annotations is the phrase

“what students will be able to do after the course, generally stated” with an arrow drawn from it to the example course goal. The annotation defines what a course goal is and the arrow identifies the course goal as such.

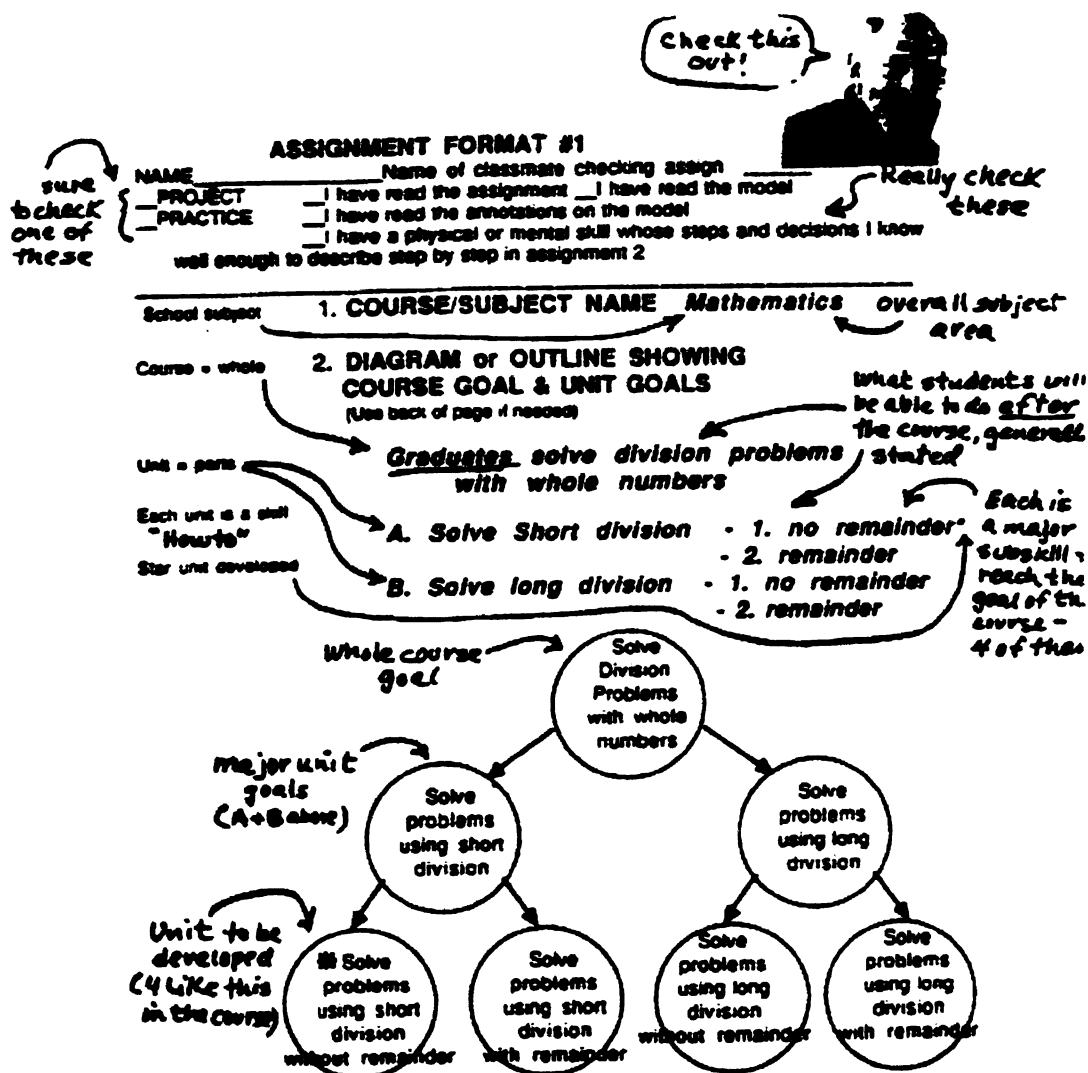


Figure 6: Part of First Page of Prime Example Showing Handwritten Annotations

THE RESEARCH QUESTIONS

The broad research questions were: “How do learners use performance support tools?” and “How do the tools support performance and learning from performance?” I hypothesized that the learners were using the cognitive functions of error preventing, detecting and correcting while performing, and that the performance support tools helped them do these functions. In order to learn which cognitive functions participants were using during unsupervised practice, I asked these specific questions:

1. Which tools did the participants use?
2. How often did they use those tools?
3. In what order did they use the tools? (What patterns of tool use did each participant show?)
4. When during the assignment did they use the tools?
5. What cues did they attend to that caused them to consciously perceive a need to use the tools?
6. For what purposes did they use the tools?
7. How did they use the tools to accomplish the purposes?
8. What were the immediate results of using the tools?
9. What characterized each participant’s use of the tools and practice of the assignment?

PILOT STUDIES

I conducted a pilot study during spring semester 1998 in order to determine if an observational case study using verbal protocol would provide useful and valid data, and if I needed to audiotape or videotape the session. I observed a student in CEP 809 (a continuation of CEP 808). This student worked on an assignment for the course, which involved writing the motivation section of a lesson. The instructor had provided a blank assignment form containing the sections of the lesson and a checklist with judging criteria for each section. In addition, the instructor had provided an example of a correct assignment.

I observed the participant as she worked on the motivation section of the assignment and had her speak her thoughts aloud. I also audiotaped the session. I prompted her during the observation with questions such as “What are you doing now?” and “Why are you doing that?” After the observation period I interviewed her about her experience doing the assignment.

The participant was interested in the research, and was able to clearly verbalize her thoughts during the practice. She studied the example first to see a specific example of what was expected of her, then studied the criteria checklist to see a more general description of what the model was an example of. She used the blank assignment form to give her assignment a structure. When she felt she understood what was expected of her, she started writing.

After she had written the first part of the motivation, she compared it with the example and the checklist. At this point she discovered she had made an error. Rather than

writing a reason why people might to study assertive speaking, she had written why people might want to be assertive speakers. She discovered the error by comparing the example with what she had written. She thought some more about the motivation, then wrote a corrected version.

In addition to data gathered from the observation, I also gathered data by taking notes during a CEP 818 (also a continuation of CEP 808) class discussion led by the instructor on how the participants used the tools and how they might be improved. This discussion helped me decide which questions to ask about tool use in my dissertation research. The tools used in CEP 818 are checklists for what to include in a lecture and how to present that lecture.

One topic that emerged during the discussion among the participants in CEP 818 and during the observation of the student was the difference in how they used the tools. Some students used the checklist in the order in which it was presented on the paper, from top to bottom. Most returned to the tools again and again as they first thought about the assignment, then consulted the example, and finally wrote their own assignment. Other students followed a different pattern, going to different parts of the assignment in an order other than top to bottom. Some students put the parts of the assignment together so they could see the big picture rather than using the blank assignment form to structure the assignment for them.

These pilot studies helped me determine that an observational case study with a verbal protocol would give me rich data about how students used the tools and why they used them. I decided to videotape the observation sessions so I could see which tools the

students were using. Because of the pilot studies I was also able to determine the questions to ask that would guide my data analysis.

THE RESEARCH DESIGN

Ohlsson's theory of learning from performance errors guided the design of this research in the following ways:

- When analyzing the data I looked for evidence of conflict between what the participants perceived to be true and what they believed ought to be true;
- I looked to see if the participants were using the tools to gain initial competence and if the tools provided an informative task environment;
- I looked for evidence of the participants detecting, correcting and preventing errors; and
- I analyzed the participants' errors to see if the errors they detected and corrected with the tools were displacement errors or other types of errors.

Because this was exploratory research I used an observational case study design with a verbal protocol. In a verbal protocol, study participants are asked to verbalize their thoughts as they solve problems. While I used that protocol I videotaped the participants doing the assignment to unearth and capture details of tool use and error handling, of which participants may not be conscious. I used a modified version of a qualitative research design called the Constant Comparative Method, in which the researcher starts analyzing the data as it is collected, looking for key activities while continuing to collect

further data to flesh out the theory the researcher is developing. The theory in this case was how performance support tools aid learning from performance (Bogdan, R. & Biklen, S., 1992).

A frequent criticism of qualitative research is that it is hard to generalize qualitative findings to other settings. There are three arguments researchers use to make their case for the generalizability of their findings: a) extrapolation from sample to population, b) analytic generalization or extrapolation using a theory, and c) case-to-case translation.

Analytic generalization is an argument made by researchers using the constant comparative method.

In analytic generalization, the researcher tries to generalize certain findings to a theory. This means the findings would support but not definitively prove the theory. When you generalize to a theory, you use the theory to make predictions, then you see if the findings confirm those predictions.

The predictions I made from Ohlsson's theory were:

- Students will learn a complex cognitive skill by detecting and correcting errors in performance.
- Students will use the performance support tools to help them detect and correct errors.
- Students will use the performance support tools to provide initial competence and an informative task environment.

If the predictions hold only under certain conditions, then those conditions are the limitations of the theory. Ohlsson states the limitations of his theory as being limited to:

- practice, not the learning of knowledge elements,
- learning during unsupervised practice,
- learning by detecting and correcting displacement errors, and
- the learning of complex cognitive or complex cognitive/motor skills,

A researcher increases confidence in her theory by using analytic generalization to show the scope of the theory. This is done by anticipating or recognizing conditions that may affect the application of the theory or that may be threats to the external validity of the theory. If analytic generalization is used, then to apply the findings from the study, application "requires going from a theory supported by the research to a specific set of conditions that might be different from those studied in ways that are important, but not specified" (Firestone, p. 19).

A researcher can increase the capacity to generalize from the study by doing multi-site research, where each case is analogous to an experiment, except that "the qualitative researcher develops a theory inductively through a series of successive approximations, each of which is compared with the available data. Important parts of this process include imagining plausible rival explanations and seeking out evidence to assess them and more generally seeking out negative evidence for the preferred theory of the moment." (Firestone, p. 19)

There are several ways to generalize analytically. One way is to organize predictable threats under the broad headings of selection, setting, history, and construct effects (the four main types of threats). Another way is to select critical cases that will be particularly fruitful for comparing different theories. Another way is to select a deviant

case that will extend and refine theories, and will "help to generalize by specifying the conditions under which a theory holds." (Firestone, p. 19)

DATA COLLECTION PROCEDURES

I began collecting data at the beginning of Fall semester, 1998, and continued for three weeks. The timeline and tasks are shown below. First the instructor assessed all the students' general knowledge about writing instructional objectives by giving them a pretest and asking them how to write one (assessing their declarative knowledge), then having them write one (assessing their practical knowledge), and finally asking them how they know the objective is a good one (assessing their declarative knowledge in terms of error detection). He judged their work according to a criterion Checklist he had created and that is used as one of the performance support tools in this study. This pretest assessed the students' initial competence in writing instructional goals and objectives to see if they would need to use the performance support tools to do the task. The data from the pretest is shown in Chapter 4: Findings.

As the participants worked on practice assignment #1, I asked them to use a verbal protocol as they did the assignment. A concurrent verbal protocol involves having the participants verbally describe what they are doing and why as they are doing it, and state any thoughts or questions they think about during the practice. Concurrent verbal protocol is a way of obtaining data about the cognitive processes involved in human problem solving, and is the "best available measure of conscious, easily verbalizable thoughts" (Wilson, 1994, p. 249). I address limitations of this method later in this chapter.

As I observed the participants' actions, I prompted them as necessary to verbalize their thinking. The verbal protocol enabled me to hear what they were thinking and their reasons for doing something. Without this protocol I would have observed only the actions they took, but not their reasons for doing those actions. If I had waited until after they were done to ask them about their thinking and reasons, they might not have remembered or might have remembered incorrectly.

I observed the four participants during the next three weeks as they wrote their assignment. The observation timeline is shown below.

Session 1 (3rd week): I observed the participants as they began work on Assignment #1, parts 1 and 2, writing the course title and a visual diagram of their course goal.

Session 2 (4th week): I observed the participants as they revised part 2 of Assignment #1 and wrote parts 3, 4 and 5, the course goal, course terminal objective and unit goal.

Session 3 (5th week): I observed the participants as they revised parts 1 through 5 of Assignment #1 and wrote part 6, the unit terminal objective.

During the remaining weeks the instructor gave the class test 1, and at the end of the semester gave them the final exam and the survey on how they had used the performance support tools.

INSTRUMENTS

The instruments I used were given to the class by the instructor as part of the course, and are reproduced in the Appendices. I used the instruments to compare the participants with each other. The instruments are:

- 1) a pretest to judge what the students already knew about writing instructional goals and objectives, that is, their initial competence in this area. The pretest included questions about the qualities and parts of instructional goals and objectives. It also included two production sections in which the students were asked to write a goal and an objective. The instructor analyzed the pretest by scoring the goal and objective according to the criterion Checklist.
- 2) the production portions of test 1, in which the students were given a course goal and asked to write a related unit goal and a unit terminal objective. This was also scored according to the Checklist.
- 3) the production portions of the course final exam, in which the students were given a course goal and asked to write a unit goal and a unit terminal objective. Like the pretest and test 1, this was also scored according to the Checklist.
- 4) a survey after assignment #1 was finished asking how the students used the support tools to help them do the assignment. There were six or seven statements about each tool (Form, Checklist and Example), with multiple answers. The students could

check all the answers that applied. There were also two statements about tool use in general.

LIMITATIONS AND ASSUMPTIONS

There were several limitations to this study. Being a qualitative study, the sample was small, with four participants. I was not, however, trying to generalize to all graduate students performing a complex cognitive task, but was only describing what the four participants did. This study could provide data to inform future research involving larger samples.

The methodology used to collect the data was verbal protocol, where the participants voiced their thoughts as they worked on their assignment. They did not try to interpret, analyze or explain their thoughts, but merely spoke them aloud. I used an additional source of data, videotape. With the videotape I was able to correlate the participants' actions with their spoken thoughts, increasing confidence that what the participants said was accurate. I gave them instructions at the beginning of observation session #1 to tell me what they were thinking and doing, to carry on a monologue, as it were, but two of the participants frequently had to be prompted to talk. I also had occasional difficulty obtaining a clear audio recording of the participants.

During data collection the participants sometimes asked for my help. I had to decide if the kind of help they were asking for would affect the study. Thus, I inadvertently participated in the detection and correction of three types of errors, errors in following the rules of the assignment, errors in using the tools, and errors concerning the

content. These errors I did not include in the count of errors the participants detected and corrected on their own.

The transcripts of the videotapes were analyzed by myself only. Crutcher (1994) describes how to decrease subjectivity, improve reliability and validate verbal reports.

Analyzing a task domain as well as subjects' knowledge beforehand to determine logically possible sequences necessary to perform the task facilitates development of a clear set of categories and rules for encoding protocol segments and ensures a clearer mapping between the possible verbalizations and encoding categories. This approach decreases subjectivity in encoding, improves reliability, and helps validate the verbal reports. (p. 243)

The task domain of the assignment in my study had already been thoroughly analyzed by the instructor and codified into the tools. In addition, the participants' task knowledge before they started the assignment was tested in the pretest, which verified that their knowledge was quite limited. It was fairly clear what some of the categories for encoding would be. After coding the data once, I clarified the code definitions, then rechecked the data to see if the categorizations were still accurate. I followed this procedure two more times, ending up with stable codes.

I made two assumptions at the beginning of this study. I assumed the participants would actually use the tools to help them do the assignment. I also assumed that using a verbal protocol would give an accurate picture of what the participants were thinking while they were using the tools to do the assignment. The participants' statements did corroborate their actions on the videotape and what they had written in their assignment.

DEFINITIONS OF TERMS

The terms in the study are defined below.

Attempt to detect errors

Looking for possible errors in the assignment. When an actual error was detected, this was then counted as detecting errors.

Correcting errors

Changing an error to conform to the criteria for a task. Ohlsson defines error correction as specializing a production rule to fit a situation.

Detecting errors

Perceiving a conflict between what one expects to be true and what one perceives to be true. Finding an actual error in the assignment. Looking for possible errors and not finding them was called attempting to detect errors.

Domain knowledge

The knowledge of a subject matter, such as math, science and geography. Contrast with task knowledge, the knowledge of a skill.

Initial competence

Enough knowledge of the task and domain knowledge to be able to detect and correct errors during a task.

Method

A group of production rules for doing a task. A method may be specialized to a particular task or general.

Preventing errors

Before doing a task, learning how to do the task and resolving problems that could impede the accomplishment of the task.

Problem

The problem or question the participants encountered while practicing writing the goals and objectives, which they had to resolve to successfully complete the assignment.

Production rule

A production rule describes the goal of an action and the features of the situation in which the action is appropriate. The action is the behavior the person should take to accomplish the goal in the situation.

Purpose of tool use

The reason the participants used the tools; the goal or result they hoped to gain from using the tools.

Task environment

The structure of a task within an environment of multiple options for each step. An informative task environment helps learners judge whether situations they create or encounter are ones in which certain options are applicable or correct.

Task knowledge

The knowledge of how to do a skill, such as swimming or writing instructional goals and objectives.

Tool use

Actions participants take when using a performance support tool.

Tool use task

The particular task the participants did with the tools in order to accomplish the purpose of the tool use.

DATA ANALYSIS

My raw data were the transcripts of the videotapes. First I transcribed the videotapes I had made of the participants doing the assignment. I then categorized parts of the individual transcripts as to the subject of their speech: problems, strategies, and tool use. I defined problems as the concerns or questions the participants had about doing the assignment and anything related to the assignment. For example, Dana had a question about what the difference was among course goal, major goal and unit goal.

And what I wasn't real clear on was what a course goal, major goal and unit goal was, to get it shortened. So I was going to look and see if I could figure that out. Because to me a course is like math for the whole year. So this has got to be pared down. (P1, 1:55)

I defined strategies as the plans the participants made to complete the assignment. For example, one of Dana's strategies was to review the assignment before she began writing. (In the section of the transcript below, R: refers to the researcher.)

D: I have done a little thinking on this before. So, what I'm going to do first is just review what it is I'm supposed to do, because I'm not real clear on this. [Opens course pack.]

R: What will you use to review?

D: I'm going to use his course outline and I'll have a calendar because he suggested getting a personal calendar and putting dates on it, so I did that so I don't have to rely on his. And what I'm going to look for are anything with the little bubbles on it, so I can just get a general idea again what it is I'm looking for. (P1, 00:31)

I defined tool use as the actions the participants took using one of the four tools provided by the instructor--the Annotations, Checklist, prime Example and Form--or using the other tools in the course pack, such as additional examples, instructions, explanations,

practice tests and calendar. In the example below, Dana used the prime Example to learn the extent of the assignment.

Okay, now I'm on the Criteria. [READS EXAMPLE] Holy Moly! Jeez oh Petes! (P3, 1:39:56)

After sections of the transcript were coded as tool use, they were further analyzed as to the purpose of their tool use and the task the tools were used for to accomplish the purpose.

Purposes of Tool Use

The purpose of the tool use I defined as the goal of the tool use. The tool use itself was merely the action of using the tool; the purpose was the reason for using the tool. After the initial observations I created four categories and then categorized the purposes of each tool use into: 1) prevent errors, 2) attempt to detect errors, 3) detect errors, and 4) detect/correct errors.

1. Prevent Errors

When preventing errors, the participants used the tools before writing to learn what components they were supposed to write and how they were supposed to write them. For example, when writing the course diagram they looked at the Checklist and saw that they had to write a course goal and unit goals, and that each goal had to have a verb

and an object. They also used the tools to answer questions or resolve problems they encountered while studying the tools to learn what and how to write. As shown below, Carol used the Example and the Checklist to prevent errors when she read them first before writing the behavior of her course terminal objective.

Okay. [READS EXAMPLE]: "Student will." Okay, I'm looking back again to see how they did it. [READS EXAMPLE]: "Students will." Okay now. [READS CHECKLIST]: "Specifically stated." [WRITES]: "The student will, 1. Write the terms of the offers in the form $Y=MX+B$." (L1, 501-503)

2. Attempt to Detect Errors

The participants used the tools after writing to check the correctness of their writing but did not find any errors. This I called "attempting to detect," to distinguish it from times when the participants actually found errors ("detect errors"). In the example below Beth read the Checklist and noted that she had already starred the unit in the diagram she was developing.

[TYPES] So, number 1 and 2 is done. [READS CHECKLIST] And I already starred the unit to develop. (I2, 42)

Beth checked her writing to see if she had done parts 1 and 2 and if she had starred the unit to develop. She discovered she had already done this, so she did not find any errors. This tool use I categorized as "attempt to detect errors" because, although she attempted to find errors, she did not actually find any.

3. Detect Errors

The participants used the tools after writing to check the correctness of their writing. This purpose is similar to “attempt to detect errors” above except that the participants did actually detect an error. I distinguish the two because if they were not separated, it looked as if the participants had detected many errors, rather than just looking but finding few.

4. Detect/Correct Errors

It was often difficult to separate participants’ tool use for the purpose of detecting errors from their tool use for the purpose of correcting errors, so I called it detect/correct errors. For example, after reading an example and the Checklist, Dana realized her goal did not sound right because it needed a purpose for the behavior.

First, what's bothering me is, this [INDICATES HER WRITING] is the behavior, what they'll be able to do after the course, general, but when I go to the goal that he has written, every single one of them state purpose. [READS OTHER EXAMPLE ON PAGE 88] And that's what's missing, that's why it didn't seem right. "Graduates will be able to find the percent of a number. [READS CHECKLIST]: "So that." [NODS] (P2, 475-479)

Tool Use Tasks

Tool use tasks I defined as how the participants used the tools to accomplish the purpose. For example, when the participants looked at the Checklist before writing to see what they were supposed to write, the purpose was to prevent errors because the tool use was done before writing. The task I called “guide writing” because they used the Checklist

to guide their writing by determining what they were supposed to write and how they were supposed to write it. I categorized 13 tasks for which the tools were used:

- | | |
|--------------------|------------------------|
| 1. Announce Part | 2. Copy Wording |
| 3. Derive Rules | 4. Explain Checklist |
| 5. Explain Example | 6. Explain Feedback |
| 7. Find Place | 8. Gauge Writing |
| 9. Guide Writing | 10. Identify Component |
| 11. Learn Extent | 12. Paraphrase Wording |
| 13. Use Tool | |

How the Tasks Were Categorized

Some tasks were easily categorized because the participants stated the task they were doing. This was direct observation of the task. For example, Peggy liked the way the Example stated one of the criteria: "Follow the sense of the information given." She felt it was similar to what she was doing and decided to borrow the instructor's words.

So maybe I'll just borrow his—I hate to do that but—borrow his words, and I'm going to put that in here. (P3, 1158-1159)

Other tasks were not so easily categorized. Sometimes the participants did not state the task they were doing, but I could infer the task from their comments. For example, Carol read the Example, then wrote in her assignment what she had just read. From this I inferred that she had copied those words from the Example, so I coded this task as "copy wording."

[READS EXAMPLE]: "Student will." Okay, I'm looking back again to see how they did it.
[READS EXAMPLE]: "Student will." Okay now. [READS CHECKLIST]: "specifically state." [WRITES]: "The student will." (L1, 501-503)

After I had coded the transcripts, I recoded them to clarify the definitions I had initially used. If the participants used the Example to derive rules, I asked myself why I thought the task category was “derive rule,” and what rule was being derived. In this way I was able to clarify the category definitions. To validate the categorizations, I then recoded the tool uses a third time using the clarified definitions. To make sure the categorizations were reliable, after a few weeks I recoded them a fourth and final time to see if there was a change. Most of the initial categorizations did not change.

The task that was relatively difficult to categorize was “guide writing.” I usually had to infer the category because the words the participants said while they were using the tools were sometimes general. In this example I inferred that Alan was using the Checklist to guide his writing. I inferred from the context of his speech that he had not written yet, that he was preparing to write, and thus that he was using the Checklist to guide his writing.

Number 3. [READS CHECKLIST]: “Goal has real role, setting, time, place, purpose after course.” Okay. So. Hm. (F2, 183-184)

If I could not categorize a tool use, I labeled it as “could not categorize” and did not count it with the other tasks. Other categories were relatively easier to code because there were no similar categories or because it was clear from the context what the task was. For example, I inferred from Alan's action in the example below that he was deriving a rule that said the wording of the course goal should have a verb as well as an object.

[LOOKS AT EXAMPLE] I was looking at this, the whole course goal, and it starts out with "solve." So it's, I mean, you're saying, you're saying you're doing something, you're solving problems. (F1, -15:30)

Sometimes I categorized a participant's single tool use as more than one task. For example, Alan used the Annotations: 1) to identify components in the example course diagram, and 2) as a source from which to derive rules. (I have inserted bracketed numerals in the transcript section below to indicate the different tasks just listed.)

See, I don't know what these are called. [READS ANNOTATIONS]: [1] "Major unit goals A and B. Subskills to reach the goal." These are obviously subskills to reach the goal. I mean, they are subskills to reach the goal. [2] In order to accomplish this [COURSE GOAL], you have to know how to do this, this, this and this [UNITS]. (F1, -6:17)

After I had coded the transcripts as to problem, strategy, and tool use, and further coded tool use as to purpose and task, I counted the number of items in each category and used these as the findings.

Types of Tool Use Tasks

These are the categories of tasks the participants did when using the tools.

1. Announce Part

The participants looked at the Form, reading the heading for the part of the assignment they were working on. It may be that the participants announced the part for orientation, to learn which part they were about to write or to remind themselves which

part they were currently writing. For example, Dana read the subheadings--"conditions, behavior"--for the parts of the goal she was writing, then she went on to something else.

So. [READS HEADINGS ON BLANK FORM]: "Conditions, behavior, real world performance." (P2, 9:00)

I often had to infer this category because usually all the participants did was read the heading then go on to something else. It was not difficult to infer the category, though, because all I had to do was determine if they were reading a heading or not. This category was sometimes similar to "find place" but if there was any indication in the speech or the context that the participant was lost and looking for the right place in the assignment, I categorized it as "find place," otherwise I categorized it as "announce part."

2. Copy Wording

Participants copied words or phrases, usually from the prime Example or other examples, to use in their own assignment. For example, Dana copied the phrase "given a written" from the Example. In this case copying the phrase gave her some difficulties because, although she wanted her students to role-play a situation, she thought she had to give them something written instead.

D: [READS EXAMPLE THEN TYPES]: "Given a written." I just don't want them all to be the same.

R: You don't want what to be the same?

D: I don't want every question I do to be a written description. I want, maybe, here's an ad from a newspaper, maybe, here's a receipt from the restaurant. But are those written descriptions? Given a, given. [READS EXAMPLE] Given a consumer scenario, given a written consumer scenario. Well, I'm going to have to [UNINTELLIGIBLE] [TYPES]

R: So, what's it say?

D: Well, I'm using his [EXAMPLE] right now, but I don't, I don't really. It says: "Given a written description of any consumer problem." (P2, 53:41)

This task was not difficult to infer because I could observe them reading aloud the wording from the tool, then writing it in their assignment. "Copy wording" is related to the task "paraphrase wording," where participants paraphrase the wording in the tools.

3. Derive Rules

The participants analyzed a tool, usually the prime Example or other examples, in order to derive rules which they could then apply to their own assignment. A rule prescribes what to do, such as "Include a setting in the condition of the course goal." For example, Alan studied the Example to learn how he should phrase the goals in the course diagram. He discovered he needed to begin each goal in the course diagram with a verb.

[LOOKS AT EXAMPLE] I was looking at this, the whole course goal, and it starts out with "solve." So it's, I mean, you're saying, you're saying you're doing something, you're solving problems. (F1, -15:30)

I usually had to infer the category for this task because the participants did not directly state they were deriving a rule. What they did was explain the tool, usually the Example, to themselves, and so discover how they should write their assignment. This is different from the task "explain Example" because the participants were not trying to determine the meaning of the Example but were looking at how the Example was written.

4. Explain Checklist

This task refers to the participants using the tools, usually the Annotations, to learn more about what the Checklist items meant. For example, Dana wonders what a Checklist item means, and is able to understand it after reading the accompanying Annotation.

D: [READS CHECKLIST]: "Close representation of the real conditions: time and place in unit goal." What does that mean? Okay. [READS ANNOTATIONS]: "Like conditions in unit goal, as real as possible, similar to times, places, purposes, roles intended." He explained it in his written words. But I didn't know what close representation of real conditions means, and that's just similar to time, place, purpose and role that you're intending to be, and I think mine does.
R: Okay, So that was his note, further explaining [PAUSES]
D: Um hm, on page 76, that further explained the left column [CHECKLIST], and I think that's helped me. [P3, 877-889]

It was not difficult to infer the category for this task because all the Annotations to the Checklist provided further explanation of it. This category is different from the "explain Example" and "explain feedback" because the participants are learning more about the meaning of the Checklist items rather than learning about the Example or the feedback. This category is different from "derive rules" because, although the Checklist contains rules for writing the assignment, the participants were looking for help in understanding the meaning of the Checklist items, not looking for rules for writing the assignment.

5. Explain Example

The participants used the tools, usually the Annotations, to learn more about the meaning of portions of the Example. For example, Alan learned what the second level of unit goals, the major unit goals, were by reading the Annotations to the Example.

See, I don't know what these are called. [READS ANNOTATIONS]: "Major unit goals A and B. Subskills to reach the goal." These are obviously subskills to reach the goal. I mean, they are subskills to reach the goal. (F1, -6:17)

It was not difficult for me to infer the category of this task because the Annotations to the Example clearly did one of two things: identified components of the Example or provided further explanation of it. This category is different from "derive rules" because in this task the participants were learning the meaning of the Example rather than determining how to write their assignment." This category can be similar to "identify component" because identifying can be seen as a way of learning the meaning of something. I separated "identify component" from "explain Example" because it seemed that the participants already knew the meaning; they just needed to know that this component was the one to which the meaning should be attached. In other words, they already knew what a setting was; they just needed to have the instantiation of setting pointed out to them.

6. Explain Feedback

This task refers to the participants using the tools, usually the Checklist, to learn more about what the instructor's feedback meant. The tool the participants usually used to explain the feedback was the Checklist because the instructor integrated the Checklist into his feedback by drawing arrows from Checklist items to their instantiation in the assignment and writing short notes next to the item, such as "OK" or "NEED." Examples of the instructor's feedback are shown in the reproduction of the Example in the Appendix. For example, Carol wondered what the instructor's feedback—"yes"—meant.

When she read the Checklist item next to the "yes" she was able to understand that the feedback meant the instructor agreed her unit goal was one whole piece of the course goal.

[READS CHECKLIST]: "Unit goal is one whole piece." [READS FEEDBACK]: "Yes." He's got "yes." So I assume that means it's okay. (L3, 28-29)

This task was not difficult to categorize because any time the participants used a tool to help them understand the feedback, I categorized it as "explain feedback."

7. Find Place

Participants used the example to help them find their current place in the assignment. They also used it to help them find the next or previous section. For example, Dana was ready to write the criteria in the unit terminal objective, but after looking at the Form she discovered she was not doing that part of the assignment yet.

Oh, I haven't gotten there yet. [READS FORM] I haven't gotten to the Criteria yet. (P3, 990-991)

This category sometimes seems to overlap with "announce part," however, when the participants indicated that they were lost or were looking for a particular place in the assignment, I categorized it as "find place." When they read a heading in the Form then started to work on that part, I categorized it as "announce part." I categorized the

example above as “find place” because the context showed she was apparently lost and had thought she was working on the Criteria section.

8. Gauge Writing

Participants gauged their writing by comparing it with the tools. They used the tools to see if they had included all the required components, to confirm corrections, and to detect errors and omissions. For example, Carol compared her unit goal to the Example and decided they are similar.

[READS EXAMPLE]. I think it [HER UNIT GOAL] goes along with the Example pretty well. (L2, 30:30)

It was relatively easy to categorize this category, even though I often had to infer it. When the participants checked their writing against a tool to see if what they had written was correct, I categorized it as “gauge writing.”

9. Guide Writing

Before writing, the participants used the tools to guide their writing by learning what the required components were and how they were supposed to be written. For example, Beth read a heading in the Form to see what required component she was supposed to write next.

[READS FORM] And now I need to write out behaviors. (I2, 26:05)

This task that was relatively difficult to categorize sometimes the participants merely read the tools aloud and did not say anything else. I could often infer from the context of their speech that they had not written yet, that they were preparing to write, and that they were using the tools to guide their writing. This category may be too general and perhaps could be broken down into subtasks, but it would be even more difficult to categorize those for the same reasons it is difficult to categorize the larger task. It may be that some of the other categories are subtasks of “guide writing.”

10. Identify Component

The participants used the tools, usually the Annotations, to identify an instantiation of a component in the prime Example or in the other examples. For example, Carol read an Annotation and identified the top level goal in the diagram as the whole course goal. She then decided to start writing her own diagram.

[READS ANNOTATION]: “Whole course goal.” Let’s see if I can get this thing roughed out. My whole course goal. (L1, 151-152)

This category is can be similar to “explain Example” because the tool used is usually the Annotations. Also, the Annotations are usually referring to the Example because instantiations of the components to be identified are found in the examples. The difference between the tasks is one of meaning versus identity. When using the tools to do the task “explain Example,” the participants were looking for further explanation of the meaning of the Example. When identifying components, the participants may have already

understood what the components meant and simply needed to know if this was an example of one.

11. Learn Extent

Participants used the tools, usually the prime Example or other examples to learn what the entire assignment was like, somewhat like an advance organizer. They may have wanted to see how large the assignment was, or how much work was required, or if their choice of topic was going to be suitable for each part of the assignment. For example, Carol looked at the Example to see if her units would fit in with the other parts of the assignment she would have to do later.

Okay, what I'm doing now is, first of all, I'm looking ahead to the rest of this [EXAMPLE] to see what else I have to do for Assignment #1 to make sure this all fits in. (L1, 193-195)

This task was not difficult to categorize because often the participants directly stated that that was why they were using the tools. Sometimes I had to infer this category because they did not directly state the task, but it was relatively easy to see that that was what they were using the tools for.

12. Paraphrase Wording

The participants used the prime Example and the other examples as models on which to base their own wording. For example, Beth looked at the prime Example to help her choose words when writing the conditions of her course terminal objective.

B: [READS EXAMPLE] I'm just trying to think of a way to, I'm just trying to think if I need to say, "Given a written description of the assignment, of the web design, designs." Because I know that it's hard for me to pick the right words. [UNINTELLIGIBLE]
[WRITES THEN ERASES]
R: What are you trying to think?
B: I'm trying to think [PAUSES]
R: What comes after "written"?
B: Yeah.
R: "Given a written."
B: I know what I want to do. "Given a written, the, involving web page design, involving constructing and publishing a web page on the Internet." No, actually it's, "Given a written description of a computer project involving creating HTML documents and publishing a web page." (I2, 19:27)

This category is similar to "copy wording" except that here the participants did not copy exactly, but paraphrased the wording or phrase structure found in the tools.

13. Use Tool

The participants read the instructions on the tools to help them do the assignment correctly or use the tools correctly. For example, Alan realized he had to do two versions of the assignment, for practice and project, when he read the instructions at the top of the Form.

Here. [POINTS TO INSTRUCTIONS ON FORM] I just realized I have to do two of these. I have to do this twice. (F2, 126-128)

This task was not difficult to categorize because any time the participants read instructions from the tools, I categorized it as "use tool."

SUMMARY

I observed four graduate students in an instructional design class as they practiced writing instructional goals and objectives. They used the four paper-based performance support tools supplied by the instructor: the blank assignment Form, the criterion Checklist, the prime Example and the Annotations. I videotaped the three observation sessions and used a verbal protocol with the constant comparative qualitative method to collect the data. To check the similarity of the participants to the rest of the class, I also collected data from the class through a pretest, test 1, the final exam, and a survey after the students completed assignment #1.

When analyzing the data, I transcribed the videotapes of the observation sessions, then categorized the occurrences of tool use as to which tool was used and the purpose for the tool use. I identified four purposes for the tool use: 1) prevent errors, 2) attempt to detect errors, 3) detect errors, and 4) detect/correct errors.

I looked at how the tools were used, that is, what tasks the participants were doing in order to accomplish the purposes stated above. I identified 13 tasks:

- | | |
|--------------------|------------------------|
| 1. Announce Part | 2. Copy Wording |
| 3. Derive Rules | 4. Explain Checklist |
| 5. Explain Example | 6. Explain Feedback |
| 7. Find Place | 8. Gauge Writing |
| 9. Guide Writing | 10. Identify Component |
| 11. Learn Extent | 12. Paraphrase Wording |
| 13. Use Tool | |

I counted the number of times the participants used the four tools, did the tasks, and used the tools for the different purposes. I also analyzed the pretest, test 1 and final exam production items by comparing them to the Checklist, which is how the instructor evaluated the students' class assignment. I then tallied the number of times the answers were selected in the survey.

CHAPTER 4

FINDINGS

This chapter is divided into two sections. Section I contains profiles of each participant, including tool use, the problems and errors encountered while doing the assignment, and how the participant compared with the other participants. Section II compares all the participants with each other. For each participant in Section I and for all the participants in Section II these specific questions are answered:

1. Which tools did the participants use?
2. How often did they use those tools?
3. What patterns of tool use did each participant show?
4. When during the assignment did they use the tools?
5. What cues did they attend to that caused them to consciously perceive a need to use the tools?
6. For what purposes did they use the tools?
7. How did they use the tools to accomplish the purposes?
8. What were the immediate results of using the tools?
9. What characterized each participant's use of the tools and practice of the assignment?

As mentioned earlier, I videotaped four graduate students—Alan, Beth, Carol and Dana—as they practiced writing instructional goals and objectives using paper-based performance support tools supplied by the instructor. I asked the participants to speak their thoughts aloud as they practiced writing. I also collected data from through a pretest,

test 1, final exam, and survey after they completed assignment #1. I transcribed the videotapes, then categorized the occurrences of tool use as to which tool was used, the purpose for the tool use and the tasks the participants did with the tools in order to accomplish those purposes.

SECTION I: PARTICIPANTS' PROFILES

Section I contains profiles of the participants and their tool use.

ALAN

Alan is in charge of the technology classrooms at Michigan State University. He took CEP 808 because he wanted to teach his student workers how to digitize video and audio files for use on the World Wide Web and on CD-ROM.

The observation site was the course instructor's office. Alan opened the course pack and looked at the Example, familiarizing himself with it, and identifying what part of it he was supposed to do during the first observation session. He then identified the Form on which to write his course diagram.

Alan was unorganized in terms of knowing where necessary information was in the course pack, initially spending some time leafing through it looking for examples and explanations. After the first search he decided to start marking important pages. He digressed 14 times during the three observation sessions.

Alan decided to do the assignment as it was organized on the Form. He decided to write as completely as possible the first time, then edit later, making sure his wording and grammar were correct and editing for sense and brevity because he tended to over-explain.

Question 1: Which tools did Alan use?

Alan made use of all four tools during the three observation sessions.

Question 2: How often did he use the tools?

The number of times he used each tool during each session is shown in Table 1 below.

	SESSION #1	SESSION #2	SESSION #3
Annotations	3	10	0
Checklist	0	4	4
Example	19	7	0
Form	5	9	0
Other Tools	3	8	3
Ambiguous	1	5	0
TOTAL = 81	31	43	7

Table 1: Alan's Frequency of Tool Use

He did not use the Checklist at all during session #1, used it sparingly during session #2, and used it almost exclusively during session #3.

The frequency with which he used each tool is compared for each of the three sessions in Figure 7 below.

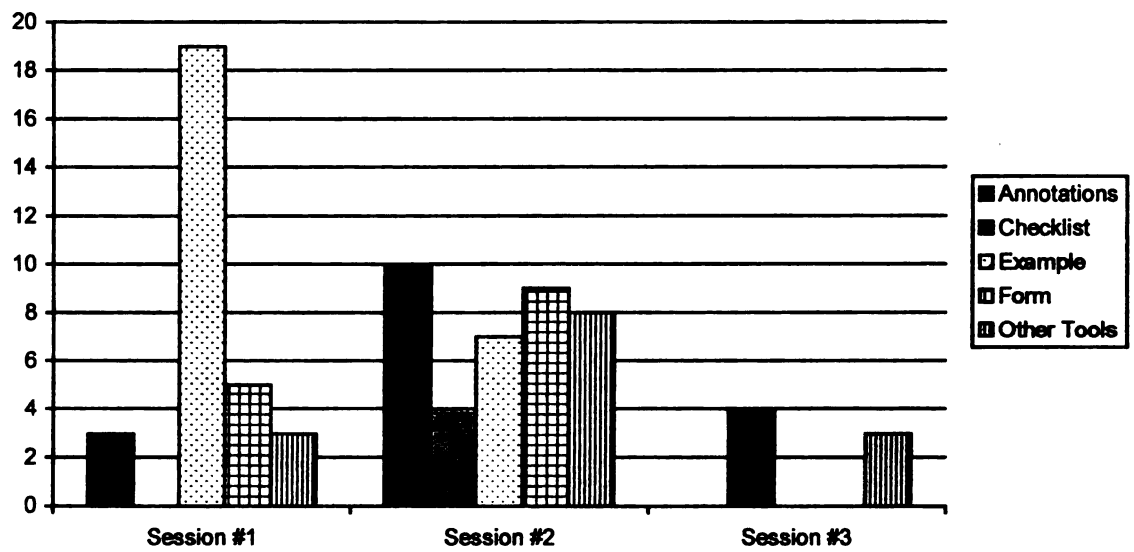


Figure 7: Alan's Frequency of Tool Use

The change of frequency of Alan's tool use over the three sessions is shown in Figure 8 below.

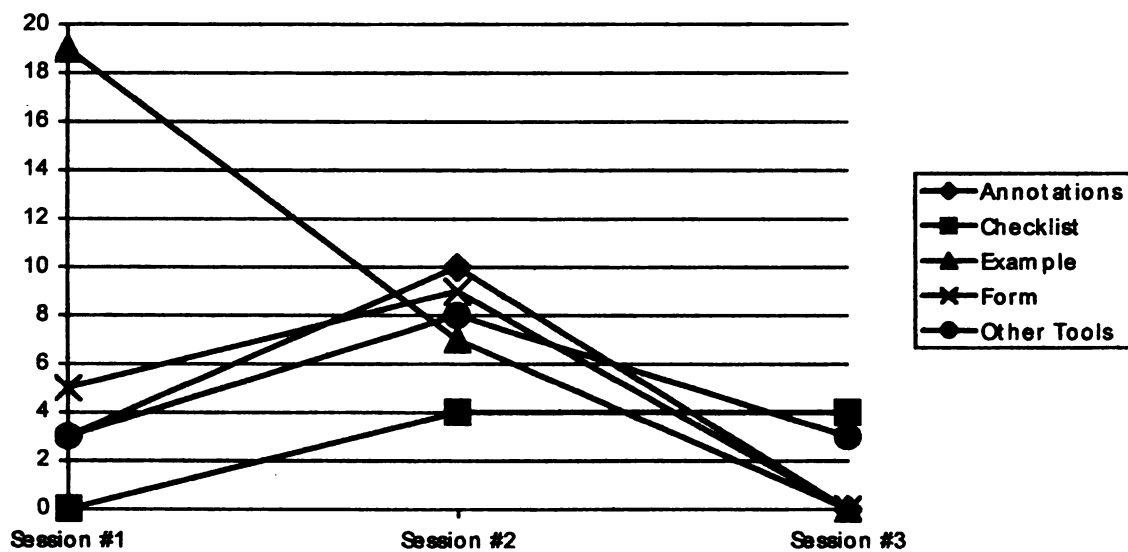


Figure 8: Change in Frequency of Alan's Tool Use

Alan used the Example much more frequently during session #1 than the other sessions, used all the tools about the same number of times during session #2, and used only the Checklist, and that only four times, during session #3.

Question 3: What patterns of tool use did Alan show?

Alan spent more time at the beginning of session #1 orienting himself to the tools than in the other sessions, although he did read instructions on the tools several times throughout session #2. His total tool use was much less frequent during session #3 than the other two sessions. He used the tools more often to prevent errors in session #1 than in the other sessions, and more often to detect errors in session #3 than in the other sessions. In all sessions he used multiple tools together before he wrote or revised a piece of the assignment.

Question 4: When during the assignment did Alan use the tools?

In all three sessions Alan made use of the tools at the beginning of the session, before writing and after writing, but the purpose and the tasks he did to accomplish the purpose varied. He used the tools for orientation only at the beginning of the first session and to explain feedback only at the beginning of the third session. In all three sessions he used the tools for guidance before writing and as a gauge after writing. He also used them at the end of the first session to learn the extent of the assignment.

Question 5: What cues did Alan attend to that caused him to consciously perceive a need to use the tools?

There were two cues to use the tools to which Alan responded consciously in each session: 1) when he was uncertain what to write, such as when he started a new part or when he did not understand the tools or instructions and 2) when he wanted to check what he had written to see if it was correct. These were cues for him to use the tools for guidance and as a gauge, respectively. There was a third cue that Alan responded to only in sessions #1 and #2, namely, when he had questions about the tools or instructions.

Question 6: For what purposes did Alan use the tools?

Alan's purpose for using the tools changed over the sessions. During session #1 he used them almost equally to prevent and attempt to detect errors. During session #2 he used them mostly to attempt to detect errors. During session #3 he used them only to attempt to detect errors. Table 2 below shows the number of errors he prevented and attempted to detect over the three sessions.

	Session #1	Session #2	Session #3
Prevent Errors by Resolving Problems	15	13	0
Attempt to Detect Errors	14	21	7

Table 2: Number of Times Alan Prevented and Attempted to Detect Errors

Question 7: How did Alan use the tools to prevent, detect and correct errors?

Figure 9 below shows a comparison of how often he used the tools in each session to prevent, attempt to detect, and to detect/correct errors.

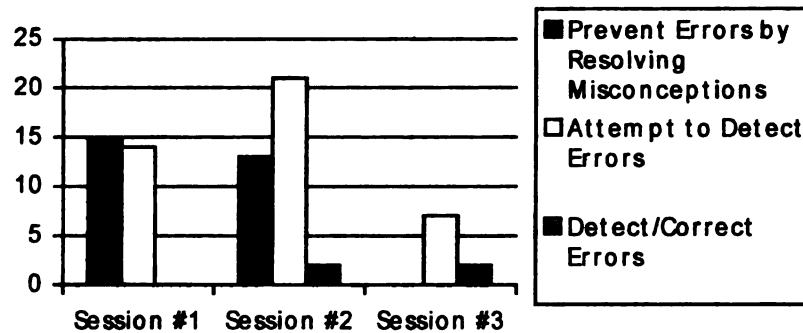


Figure 9: Alan's Frequency of Tool Use for Preventing, Attempting to Detect, and Detecting/Correcting Errors

Preventing errors included learning, resolving misconceptions, and resolving problems that would otherwise have resulted in errors.

The tasks Alan did with the tools to prevent and detect errors changed over the three sessions, as shown in Figure 10 below. In sessions #1 and #2 only he used the tools to guide his writing, identify components, learn the extent of the assignment and learn how to use the tools. In session #2 only he used the tools to announce the part he was working on and to explain the Example. In session #3 only he used the tools to explain the feedback. The only tasks he did in all three sessions were to derive rules and gauge writing.

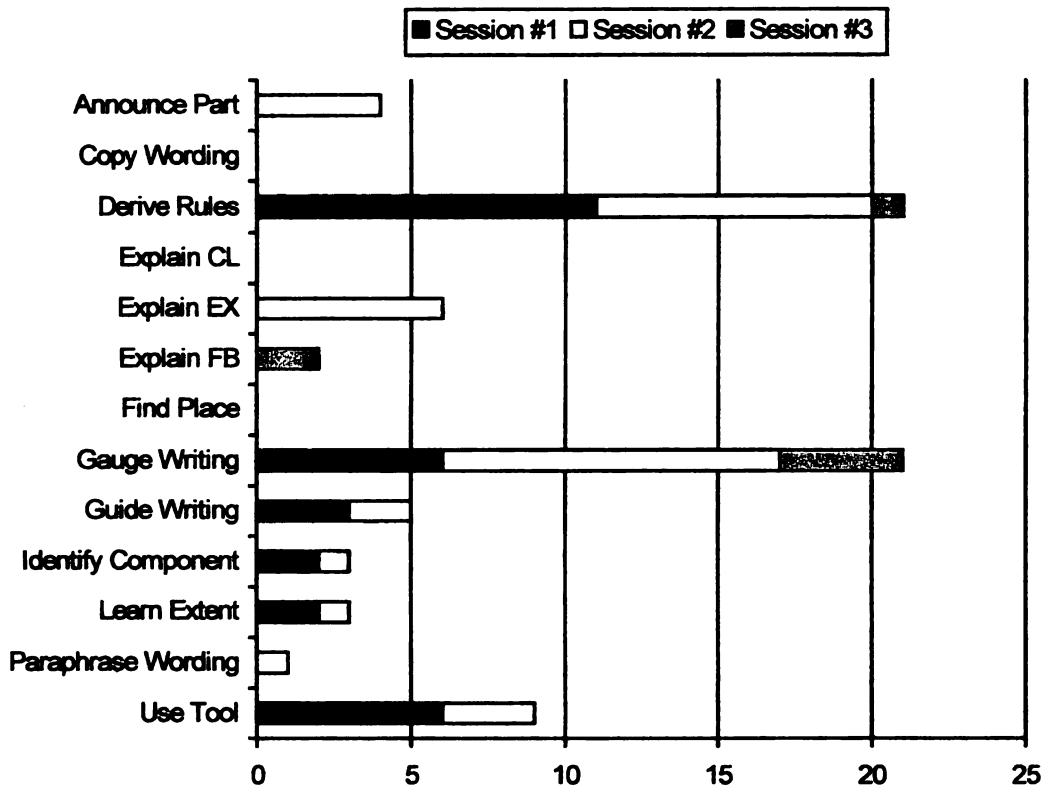


Figure 10: Change in Alan's Frequency of Tasks

Alan sometimes did a particular task always using the same, such as using the Annotations alone to explain more about the Example, or using the Example to guide his writing and as a source of rule derivation. He used the Example more often than the other tools to derive rules from, although he did do that task with all the tools. He also used the Annotations, Checklist, Example and other tools to gauge his writing; the only tool he did not use to gauge his writing was the Form. He used the Checklist to explain the feedback to him, and paraphrased wording from the other examples in the course pack. He learned how to use both the Example and Form by reading the instructions each contained (use tool). Figure 11 below shows which tasks Alan did with which tools.

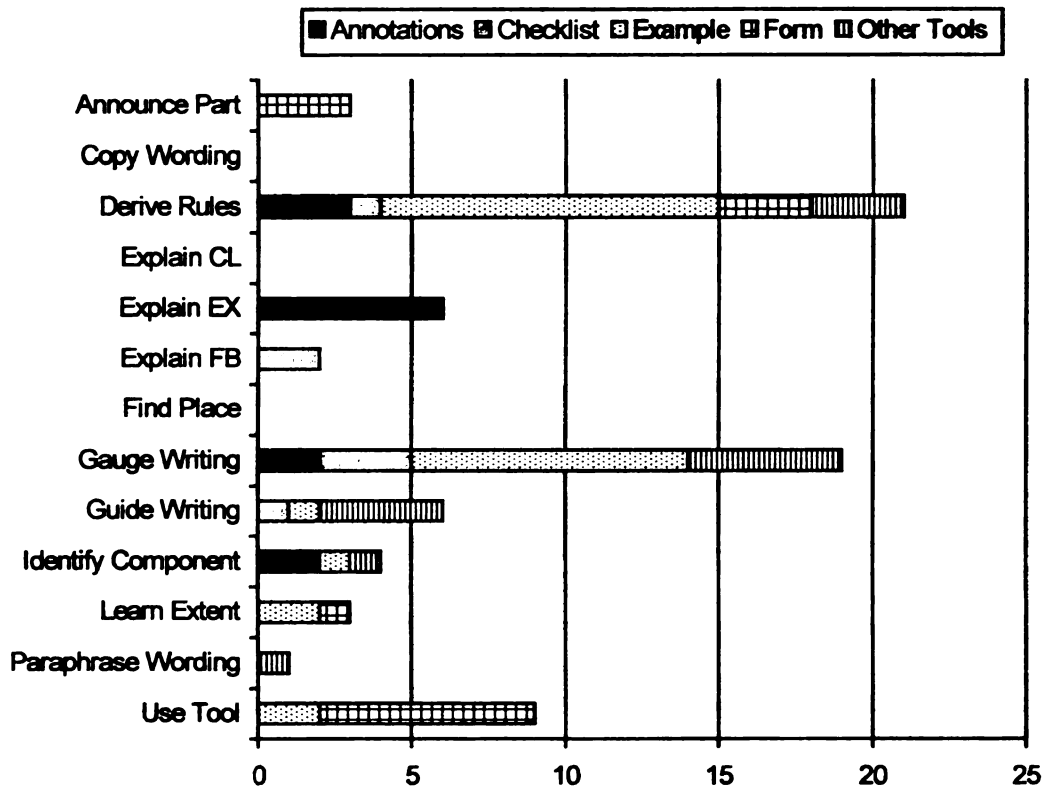


Figure 11: Alan's Tasks by Tools

Question 8: What were the immediate results of Alan using the tools?

The immediate result of Alan's use of the tools was that he was able to prevent five errors by resolving problems and was able to detect and correct four errors, as shown in Table 3 below. He prevented more errors in sessions #1 and #2 than in the last session, and detected and corrected more errors in sessions #2 and #3 than in the first session.

	Number Of Errors Prevented	Number Of Errors Detected/Corrected
Session #1	2	0
Session #2	2	2
Session #3	1	2

Table 3: Number of Errors Alan Prevented and Detected/Corrected through Tool Use

Question 9: What characterized Alan's use of the tools and practice of the assignment?

Alan's use of the tools changed over the course of the three sessions. He went from relying mostly on the Example in session #1 to using all the tools in session #2 to using only the Checklist in session #3. He used the tools extensively as a source from which to derive rules in sessions #1 and #2, avoiding relying on the Checklist, but in session #3 he used only the Checklist. At first he had difficulty finding the tools in the course pack, but by session #3 he had improved at finding and using them.

Alan's practice of the assignment also changed over the course of the three sessions. He grew more confident in his ability to do the assignment and in his understanding and use of the tools. His use of the tools peaked in session #2 but was minimal in session #3. He digressed during all three sessions and so was unable to finish the parts of the assignment he was supposed to be working on during sessions #2 and #3.

BETH

Beth was an international student in her early twenties, studying for a master's degree in educational systems development. Although English was her second language, she spoke and wrote it fluently. She stuck to the assignment, digressing only once during the three sessions. She liked precise examples that were laid out concisely with bullets, indents and numbers. She liked the course pack because it had many examples, although some of them were not clear but were written in prose paragraphs rather than bullets and numbers.

Beth felt the tools would tell her what the instructor was trying to teach them and what he was looking for in the assignment. She thought that by following the Checklist she would “satisfy a requirement” and “get a good grade.” (I1, 14-22) She used it by first reading it then looking for examples that instantiated it. Although Beth liked the Checklist, she felt it would probably be unclear to someone who had not had the explanation the instructor had given in class before they started using it.

Question 1: Which tools did Beth use?

Beth used all the tools during the course of the assignment, but she used the Annotations only during session #2.

Question 2: How often did Beth use the tools?

Beth used the Example 11 times, plus one time when it was not clear which task she was doing with the Example. She used the Checklist the most frequently, 18 times, and used the Form and the other tools equally. Table 4 below shows the frequency of Beth’s tool use.

	SESSION #1	SESSION #2	SESSION #3	TOTALS
Annotations	0	4	0	4
Checklist	6	10	2	18
Example	1	9	1	11
Form	1	5	3	9
Other Tools	1	2	6	9
Ambiguous	0	1	0	1
TOTALS	9	31	12	52

Table 4: Beth’s Frequency of Tool Use

Beth's favorite tool seemed to change over the three sessions. During session #1 she used the Checklist most often. During session #2 she used the Example almost as much as the Checklist. During session #3 she used the other tools (an explanation and additional examples) as much as she used the other tools combined. Her tool use is compared in Figure 12 below.

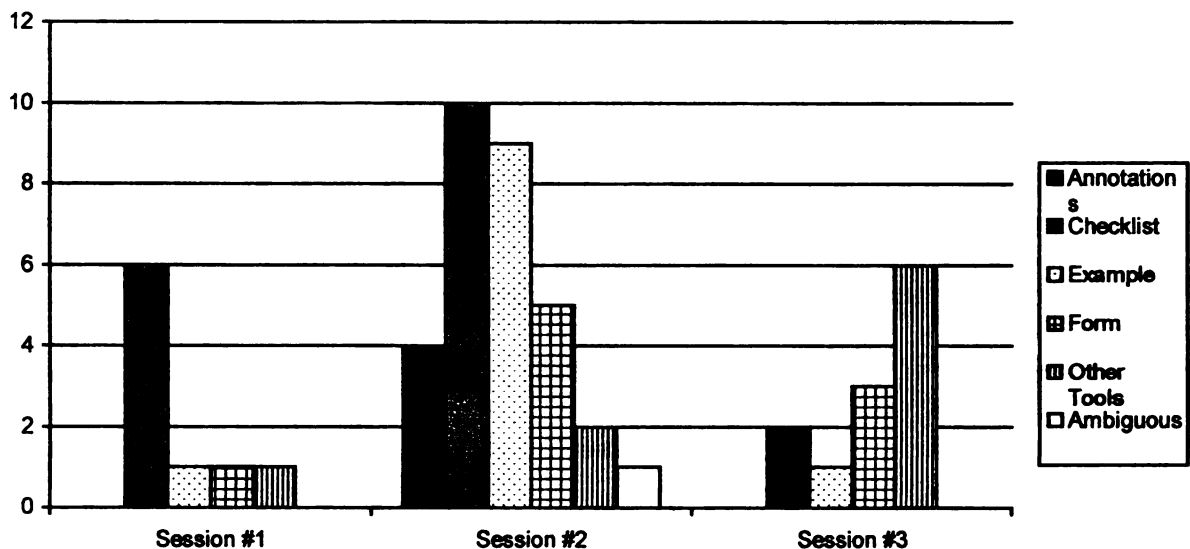


Figure 12: Beth's Frequency of Tool Use

Question 3: What patterns of tool use did Beth show?

The patterns of Beth's tool use changed over the three sessions. She used the tools mostly to prevent errors in sessions #1 and #3, but used them an almost equal number of times to prevent and detect errors in session #2. She did the most work in session #2: the course title, goal, terminal objective and course goal. The model of session #3 is the shortest, although the unit terminal objective, on which she worked in session #3, is the longest of the parts of the assignment. She did some of the work on the unit terminal objective at home (the "such as" in the condition and the criteria).

Question 4: When during the assignment did Beth use the tools?

The points within the assignment at which Beth used the tools changed little over the three sessions. During session #1 she used three of the tools (the Example, Checklist and Form) at the beginning of the assignment to familiarize herself with them. During the rest of session #1 and the other two sessions she used the tools for guidance before beginning to write a specific component, and after writing it to gauge its correctness.

Question 5: What cues did Beth attend to that caused her to consciously perceive a need to use the tools?

During the three sessions she consciously responded to three cues to use the tools:

- 1) when she was uncertain what to write, such as when she started a new part or when she did not understand the tools or instructions,
- 2) when she had questions about or disagreements with the tools or instructions, and
- 3) when she wanted to check what she had written to see if it was correct.

Question 6: For what purposes did Beth use the tools?

Beth used the tools at the beginning of session #1 to orient herself to the assignment and to the tools. After that she used the tools before writing to guide her writing and after writing to gauge the correctness of her writing.

Question 7: How did Beth use the tools to prevent, detect and correct errors?

During sessions #1 and #3 Beth used the tools mostly to prevent errors, although during session #2 she used the tools almost as often to detect errors. Figure 13 below

compares Beth's frequency of tool use for preventing, detecting and correcting errors over the three sessions.

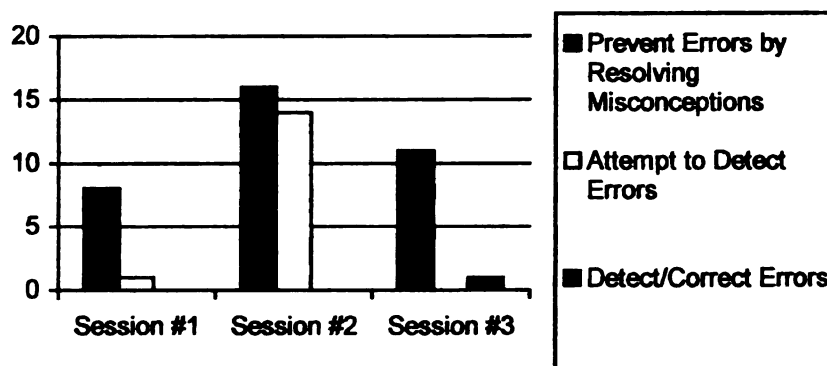


Figure 13: Beth's Frequency of Tool Use for Preventing, Attempting to Detect, and Detecting/Correcting Errors

The main task Beth did to prevent errors was to use the tools to guide her writing. Her main task for detecting errors was to use the tools to gauge the correctness of her writing. Table 5 below shows the tasks she did to prevent, detect and correct errors.

	Prevent Errors By Resolving Problems	Attempt To Detect Errors	Detect/Correct Errors
Session #1	Derive Rules – 1 Guide Writing – 4 Use Tool – 3	Gauge Writing – 1	
Session #2	Announce Part – 4 Derive Rules – 2 Guide Writing – 9 Paraphrase Wording – 1	Derive Rules – 1 Gauge Writing – 13	
Session #3	Announce Part – 2 Derive Rules – 1 Guide Writing – 7 Learn Extent – 1		Gauge Writing – 1

Table 5: Beth's Tasks to Prevent, Attempt to Detect, and Detect/Correct Errors

The tasks Beth undertook are compared across sessions in Figure 14 below. She studied the tools to familiarize herself with them only in session #1 (Use Tool). She used the tools to learn the extent of the assignment only in session #3. She paraphrased the wording of the Example or examples only in session #2. She used the tools to guide and gauge her writing in all three sessions.

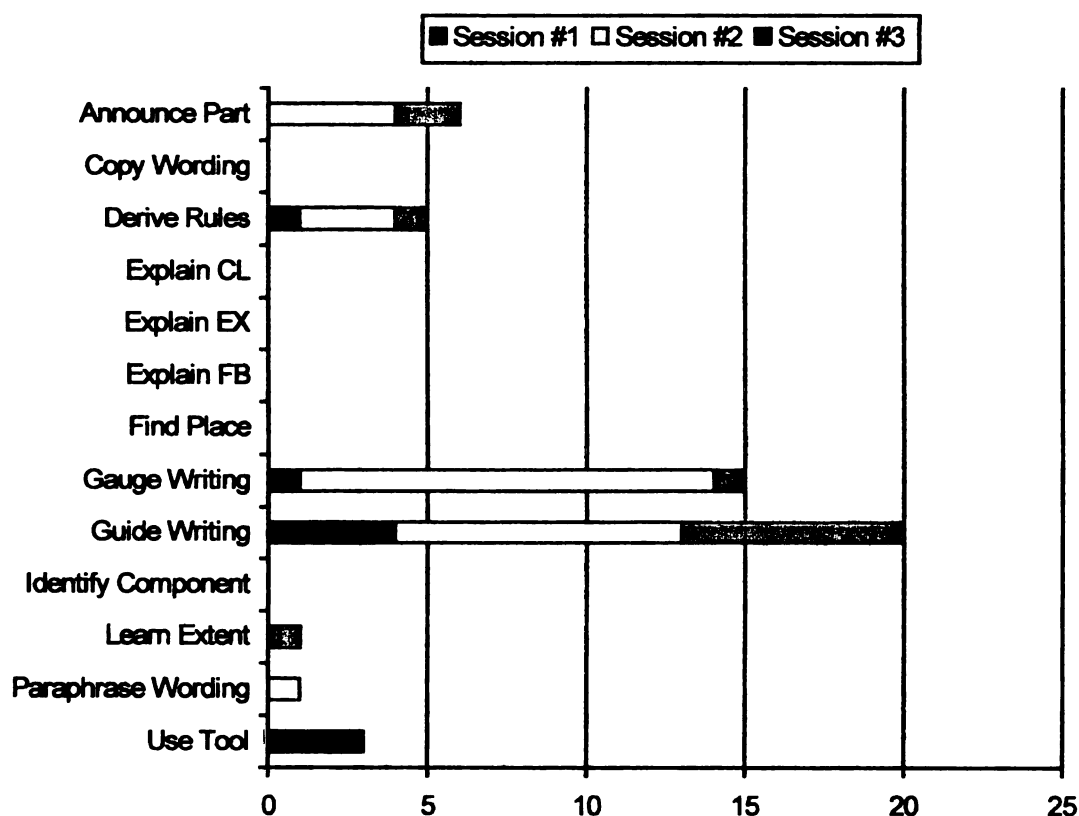


Figure 14: Change in Beth's Frequency of Tasks

Beth used the Checklist, Example and the other tools in the course pack to guide her writing. She used the Example the most often. Beth gauge the correctness of her writing through the use of three tools: the Annotations, the Checklist and the Example, but she used the Checklist most often. She derived rules only from the other tools rather

than from the major tools. She also spent a little time learning how to use the Checklist, Example and Form. The tasks and the tools she used are shown in Figure 15 below.

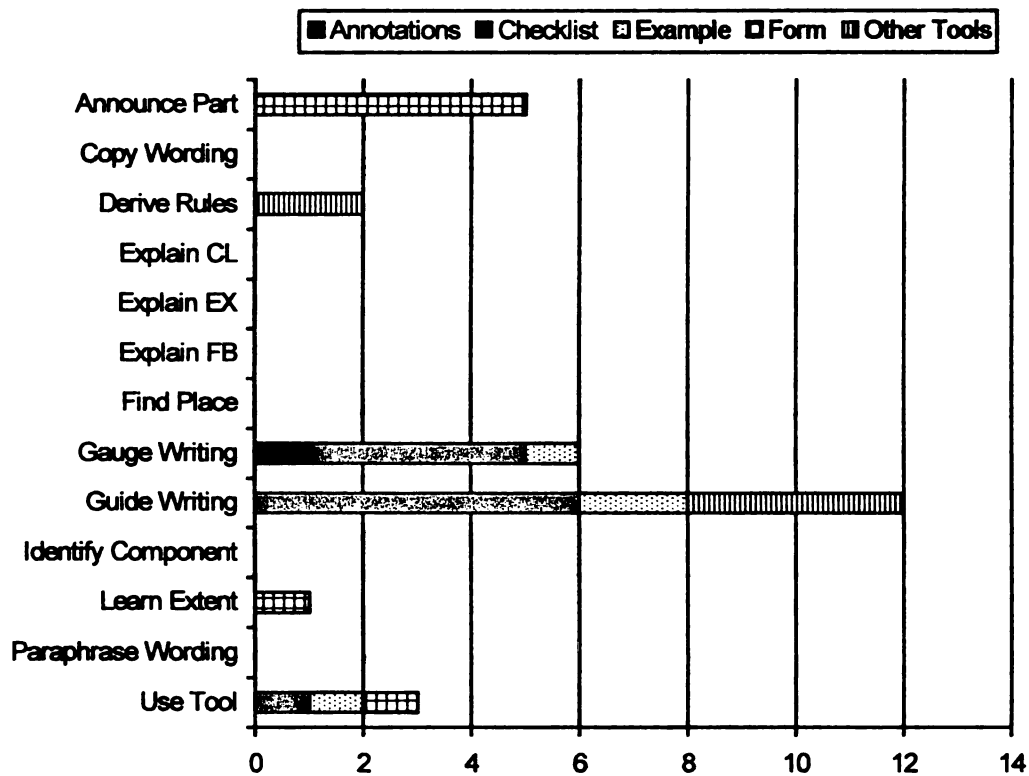


Figure 15: Beth's Tasks by Tools

Question 8: What were the immediate results of Beth using the tools?

The immediate results of Beth's tool use, shown in Table 6, was that she was able to prevent three errors by resolving problems and detect and correct one error.

	Number of Errors Prevented	Number of Errors Detected & Corrected
Session #1	1	0
Session #2	1	0
Session #3	1	1

Table 6: Number of Errors Beth Prevented and Detected/Corrected through Tool Use

Question 9: What characterized Beth's use of the tools and practice of the assignment?

Beth's use of tools over the three sessions was characterized by her increasing facility with the tools and her movement away from the major tools to extensive use of the other tools in the course pack. Her use of the major tools peaked in session #2 while her use of the other tools increased each session, until by session #3 the number of times she used the other tools equaled the number of times she used the major tools combined. Her increasing use of the other tools is shown in Figure 16 below.

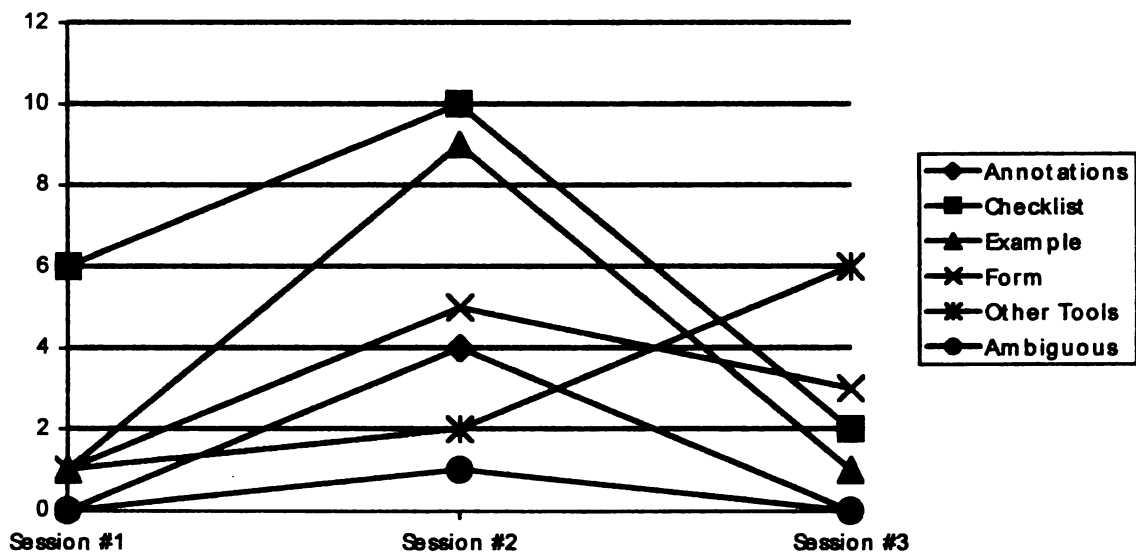


Figure 16: Change in Beth's Frequency of Tool Use

Beth's practice of the assignment over the three sessions was characterized by her initial and continued understanding of how to do the assignment and how to use the tools. She made no errors in the assignment, so she had no errors to correct. She did have two major misunderstandings of the tools (what the "such as" in the unit terminal objective was an example of, and how "number of situations" in the condition and "number of

cases” in the lower limits of the unit terminal objective were related), but she was able to use the tools to resolve them before she turned her assignment in.

CAROL

Carol taught first year high school algebra. She was taking CEP 808 as part of the requirements for earning an MA. Upon beginning the class she already had a good idea what educational goals and objectives were, what their parts were, and what made a good goal and objective. She was organized, marking important pages in the course pack before she needed them. She digressed only two times during the three observation sessions. She said she didn’t like too much or irrelevant information. She liked to follow short, numbered, step-by-step instructions that told her clearly what and how something was to be done. She asked herself questions and used concrete examples when thinking about how to write her assignment.

Carol knew she had a tendency to wordiness and over-explaining, and said she could “spend hours trying to get it perfect.” She also knew she tended to spin her wheels, so she took the advice of a former instructor of hers and asked the instructor rather than trying to perfect the assignment on her own. She tried to be efficient about getting the assignment done well with little wasted effort. Her main strategy was to quickly write a draft version then edit it later. She roughed out the whole assignment first then wrote something, even if she was unsure about it. She knew she could always take it out later. She made sure her writing was grammatically correct. She also checked what she had written in earlier parts of the assignment to make sure later parts were consistent with it.

Carol also used the tools to help her implement self-regulation strategies. For example, before she started to write she looked at the Forms for each assignment in Project #1 so she would know what to expect, and could see if her topic would “fit” the other assignments before she committed herself to it.

When Carol finished the assigned parts early, she started working on the parts of the assignment that were not yet due. She would then take these to class and take notes on what she should change. If she wondered about something she had written, she waited for the instructor’s feedback on it before making any changes. She then revised as the feedback suggested.

Question 1: Which tools did Carol use?

Carol used all four tools during each observation session.

Question 2: How often did Carol use those tools?

She used the tools a total of 131 times: the Example 50 times, the Checklist 36 times, the Form 27 times, the Annotations 12 times and the other tools in the course pack two times. Four times it was impossible to determine which tool was used, or for which task or purpose. These numbers are compared in Table 7 and Figure 17 below.

	Session #1	Session #2	Session #3
Annotations	5	3	4
Checklist	15	2	19
Example	20	16	14
Form	13	7	7
Other Tools	2	0	0
Ambiguous Use	4	0	0
TOTAL = 131	59	28	44

Table 7: Carol's Frequency of Tool Use

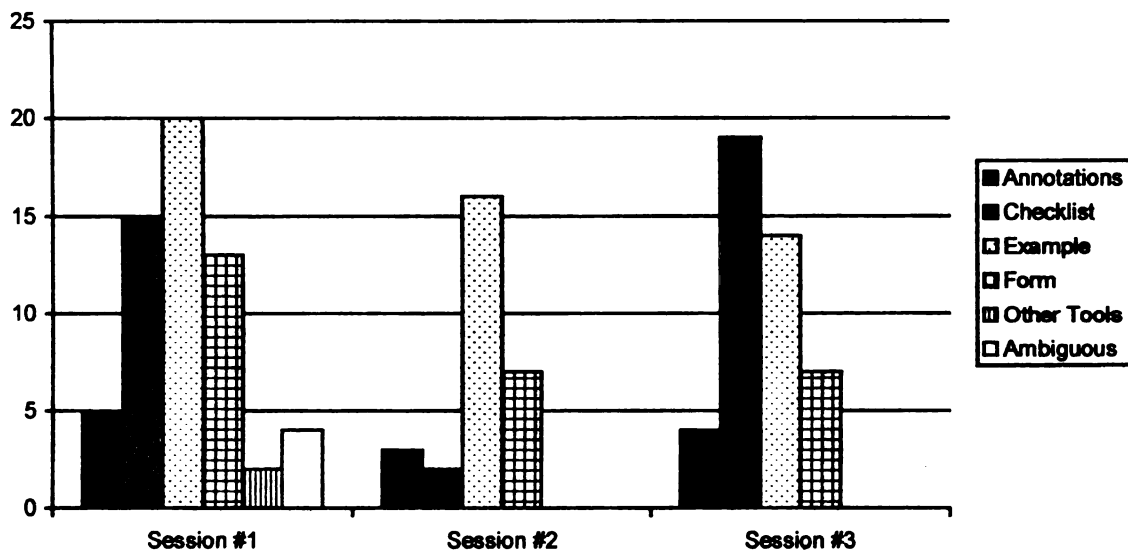


Figure 17: Carol's Frequency of Tool Use

The tool Carol used most often was the Example. She relied on it heavily to tell her how the parts of the assignment were to be written and what they were to contain. If the Example did not contain an element such as a setting, she did not put that element in her writing. She did so only if the Example told her to do so. She looked to the Example to answer most of her questions. If the Example was not sufficient, she looked for

additional examples in the course pack. Before she started writing, she would read the Example again.

Carol used the Form and the Checklist about the same number of times, the Form mostly to identify the purpose of the part she was about to write, and the Checklist to learn what components were required and how they were to be written before she started to write. She used the Annotations for further explanation of the Checklist and Example and to identify the components in the Example.

Carol used the tools most frequently during session #1 (59), less frequently during session #3 (44) and least frequently during session #2 (28). The change in frequency of tool use over the three sessions is graphed in Figure 18 below.

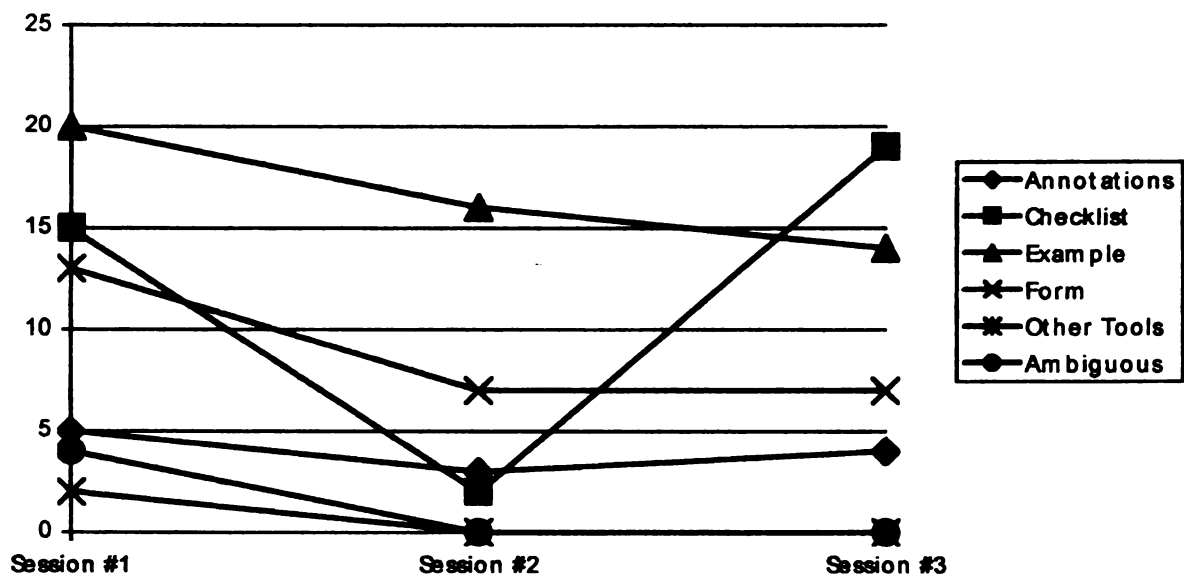


Figure 18: Change in Carol's Frequency of Tool Use

Carol used the Annotations about the same number of times in each session. Her use of the Example and Form decreased with each session, but her use of the Checklist

dipped sharply in session #2, then shot up in session #3. She ended up using the Checklist most frequently during session #3. She used it only a few times during session #2, perhaps because she had already written her assignment for that session during the session before. She already knew what she wanted to say, what was required and how to say it, so perhaps she did not have to consult the Checklist often.

Question 3: What patterns of tool use did Carol show?

Carol used the tools in the following patterns. She read the headings in the Form whenever she began a new component or part. She used the tools most often to prevent errors by resolving problems before or while she wrote.

Carol's use of the tools changed over the three sessions. She no longer oriented herself to the assignment in session #3 as she had in the previous two sessions. She used the tools more often to detect in session #2 and more often to prevent in the other two sessions. Also in session #2 she revised an entire part at a time (such as both the condition and behavior of the course goal) rather than a component or part of a component at a time (such as lower limits).

Question 4: When during the assignment did Carol use the tools?

Over the three sessions Carol used the tools:

- 1) at the beginning of the assignment to learn what was expected of her and how extensive the assignment was,
- 2) while she was writing to determine what components to include and how to write them, and to answer questions and problems as they arose, and

- 3) after she finished writing to help her gauge the correctness of what she had written.
- 4) at the beginning of sessions #2 and #3 to help her understand what the instructor's feedback meant.

Question 5: What cues did Carol attend to that caused her to consciously perceive a need to use the tools?

Carol felt a conscious perception of need to use the tools when:

- 1) she was uncertain what to write, such as when she started a new part or when she did not understand the tools or instructions;
- 2) when she had questions about or disagreements with the tools or instructions;
- 3) when she wanted to check what she had written to see if it was correct; and
- 4) when she had found an error and wanted to know how to correct it.

Starting with session #2 she also felt a need to use the tools when she tried to read and understand the instructor's feedback.

Question 6: For what purposes did Carol use the tools?

Carol used the tools to prevent errors by resolving misconceptions and problems before or while writing, to attempt to detect errors, and to detect/correct errors. Over the three sessions she used the tools 79 times to prevent errors, 46 times to attempt to detect errors, and four times to detect and correct errors. Figure 20 below compares these numbers.

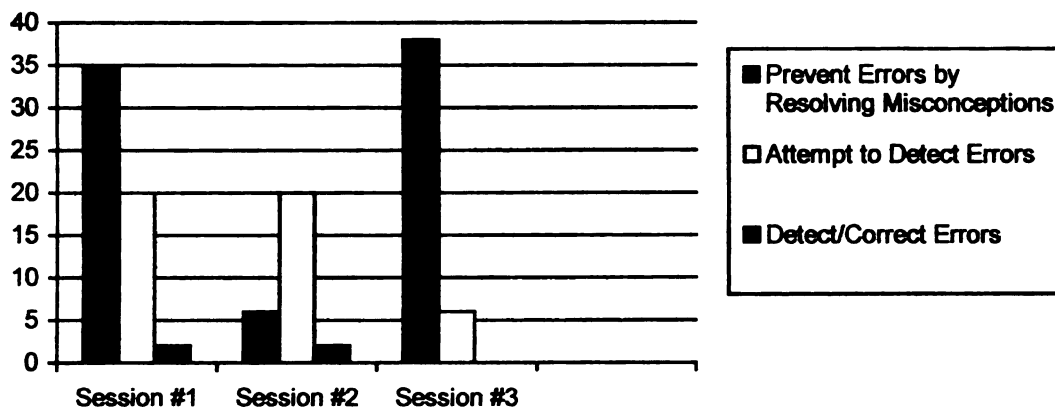


Figure 19: Carol's Frequency of Tool Use for Preventing, Attempting to Detect, and Detecting/Correcting Errors

She used the tools to prevent errors more often than to detect errors during sessions #1 and #3, but not at all during session #2. Then she used the tools only to detect and correct errors. This may be because she wrote the assignment for session #2 during session #1, then took notes during class about what changes to make during session #2. So essentially she spent less time during session #2 preventing errors because she had already done so during session #1.

Question 7: How did Carol use the tools to prevent, detect and correct errors?

Throughout the assignment Carol used the tools to do 13 tasks to help her prevent, attempt to detect, and detect/correct errors. Table 8 below lists the tasks she did to accomplish each of these three purposes over the three observation sessions.

Prevent Errors By Resolving Misconceptions and Problems	Attempt To Detect Errors	Detect/Correct Errors
Announce Part – 9 Copy Wording – 2 Derive Rules – 5 Explain Checklist – 4 Explain Example – 2 Guide Writing – 41 Identify Components – 3 Learn Extent – 3 Paraphrase Wording – 4 Use Tool - 4	Announce Part – 6 Derive Rules – 5 Explain Feedback - 3 Gauge Writing – 25 Identify Components – 1 Paraphrase Wording – 1 Use Tool - 2	Derive Rules – 1 Use Tool – 2 Gauge Writing - 2

Table 8: Carol's Tasks to Prevent, Attempt to Detect, and Detect/Correct Errors

Carol's main task for preventing errors was to use the tools to guide her writing. Her main task for attempting to detect errors was to use the tools to gauge the correctness of her writing. Figure 21 below shows the change in her frequency of doing the various tasks over the three observation sessions.

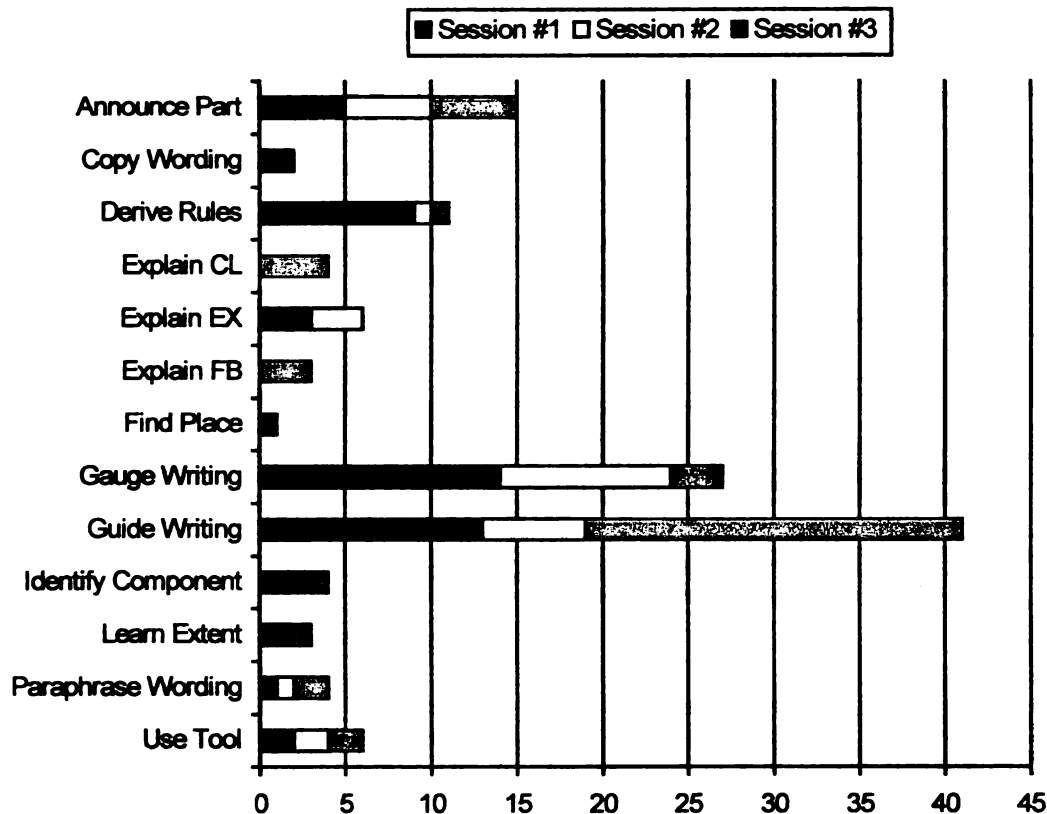


Figure 20: Change in Carol's Frequency of Tasks

Carol's main tasks for preventing and attempting to detect errors did not change over the three sessions. To prevent errors, in all three sessions she used the tools as a guide to writing. To detect/correct errors she used the tools to gauge the correctness of her writing.

After session #1 Carol no longer copied wording from the Example or needed to use one of the tools to help her find her place. In session #2 she did not need to learn the extent of the assignment or identify components shown in the Example. In session #3 alone she used the tools to explain the feedback and the Checklist. Carol paraphrased the wording of the Example more often in session #3 than she did in the other two sessions.

Carol used the tools to do certain tasks more than others. For example, she mostly used the Example as a source for deriving rules. She used only the Checklist, Example and Form to gauge her writing, and used those tools plus the other tools to guide her writing. She used only the Example rather than any of the other tools to copy and paraphrase wording and learn the extent of the assignment. She used only the Annotations to explain the Checklist and Example further. She used only the Form to announce parts as she started working on them. Her tool use by task is shown in Figure 21 below.

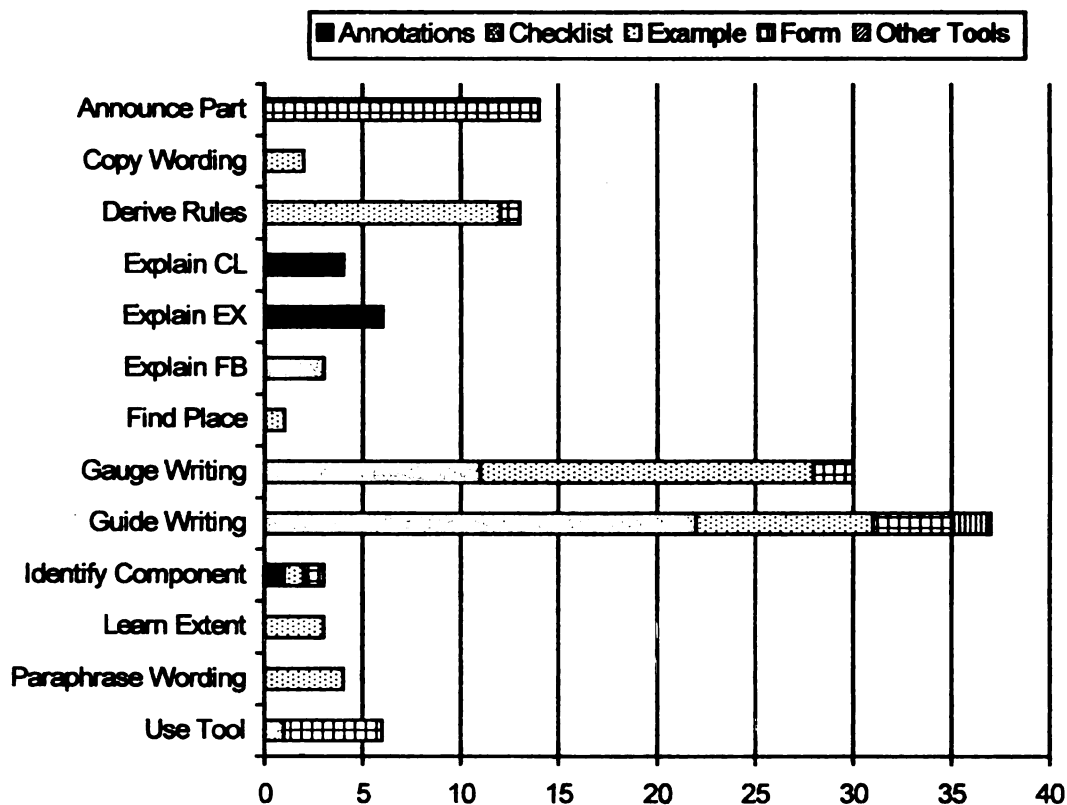


Figure 21: Carol's Tasks by Tools

Question 8: What were the immediate results of Carol using the tools?

One immediate result of Carol's use of the tools was that she was able to prevent 16 errors by using the tools to resolve problems she encountered before or while writing.

Another result was that she was able to detect and correct four errors by using the tools. Thus, use of the tools made it unnecessary for the instructor to detect and write feedback for 20 errors that Carol might have left uncorrected in her assignment.

Table 9 below shows that Carol prevented and detected/corrected the most errors during session #1, when she would be expected to make more errors because she was still learning how to write the assignment and how to use the tools. She made two errors that she did not detect or correct on her own. These were corrected by feedback from her classmates and from the instructor.

	Number of Errors Prevented By Resolving Problems Through Tool Use	Number of Errors Detected/Corrected Through Tool Use	Number of Errors Detected/Corrected Through Feedback
Session #1	9	2	1
Session #2	4	2	1
Session #3	3	0	0

Table 9: Number of Errors Carol Prevented and Detected/Corrected through Tool Use and Feedback

Question 9: What characterized Carol's use of the tools and practice of the assignment?

Carol's use of the tools was characterized by her extensive use of the tools even though she had concluded that the tools were less helpful than she wished. Even as she was using the tools frequently to help her write the assignment correctly, she felt the tools were not as helpful as she would have liked, partly because the Example and other examples in the course pack were too simplified to help her when writing her course.

Her course subject was mathematics, the same as for the Example. She tried using the Example diagram without adapting it first, structuring her course like it. Later she

changed the structure, saying she had followed the Example diagram too closely and as a result had divided the course goal into units artificially. Carol liked to be told exactly what to do, step 1, step 2, and did not like having to derive and adapt. She felt the tools were not as specific as she liked, and that they could have been improved upon.

Carol's practice over the three sessions was characterized by her growing facility in using the tools and in the efficiency with which she wrote the assignment. She followed several strategies to help her finish her assignment quickly. She decided right from the start to write a quick draft version, then edit it later. She also decided not to try to perfect her assignment when she had questions, but to ask the instructor instead.

She roughed out the whole assignment first then wrote something, even if she was unsure about it. She knew she could always take it out later. When she finished the assigned parts early, she started working on the parts of the assignment that were not yet due. She then took notes in class on what she had to change. If she wondered about something she had written, she waited for the instructor's feedback on it before making any changes. She also made sure to revise as the feedback suggested.

DANA

Dana, a middle-aged woman, had taught middle school algebra for many years. She prepared for session #1 by finding and bringing to the session guidelines from the State Board of Education on mathematics goals and objectives, to help her divide her course into units. She had already looked through the course pack and marked important

pages before the session started. She also followed the instructor's suggestion and created a personal course calendar for herself, marking assignment due dates and test dates in it.

She said she found it difficult to get started writing the assignment. When she finally did start, she read many examples and frequently looked through the course pack for more information. She seemed never to have enough information and was constantly uncertain of her knowledge and her writing. She was used to working at the lesson level, and had a difficult time keeping track of the big picture.

Dana did not like options. She liked the instructions for the Preliminary Assignment better than the one for the whole assignment because its steps were numbered and formatted like a checklist. She did not like the Example because it seemed scary and hard to understand, with arrows leading here and there and handwritten notes (the Annotations) all over the page.

Dana decided to write the assignment on paper initially, then type it onto the Form later because she said she was not a great typist. She also decided to write a draft quickly then edit later. She said she was willing to take a risk on her practice unit because it would not be graded.

Question 1: Which tools did Dana use?

Dana ended up using all four tools to do her assignment, but she used mostly the Example during session #1.

Question 2: How often did Dana use those tools?

Dana used all four tools during sessions #2 and 3. Over the three observation sessions she used the tools a total of 212 times: the Example 76 times, the Checklist 31 times, the Form 19 times, the Annotations 24 times, and the other tools in the course pack 50 times. Twelve times the tool use was ambiguous in terms of which tool was used or for which task or purpose it was used. These figures are shown in Table 10 below.

	Session #1	Session #2	Session #3
Annotations	0	10	9
Checklist	1*	9	21
Example	9	39	28
Form	0	17	7
Other Tools	11	33	6
Ambiguous Use	0	8	4
TOTAL = 212	21	116	75

* Dana used the Checklist after the session ended to detect and correct an error.

Table 10: Dana's Frequency of Tool Use

Dana made little use of the tools during the first session, but started using all the tools in session #2, as shown in Figure 22 below. She continued to use the Example extensively during sessions #2 and #3, and it remained her favorite tool. She used the Checklist the most often during the final session. Her use of the Form decreased from session #2 to session #3. She used the other tools in the course pack more often during session #2 than she did any of the other tools except the Example.

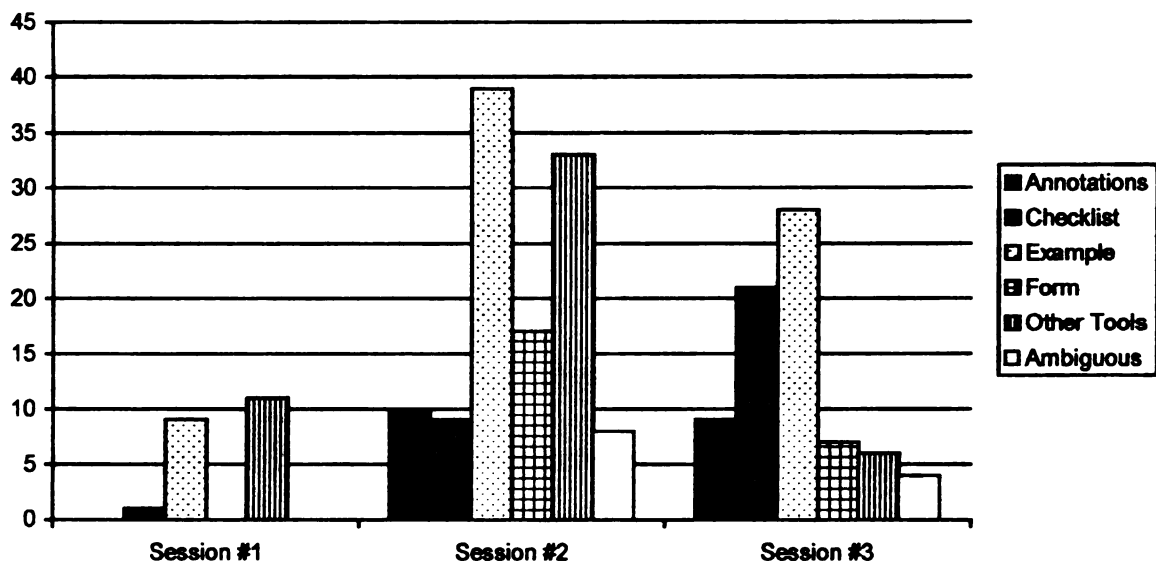


Figure 22: Dana's Frequency of Tool Use

Figure 23 below shows how her use of the tools changed over the three sessions. She used all the tools except the Checklist the most often during session #2. She used the Checklist the most often during session #3.

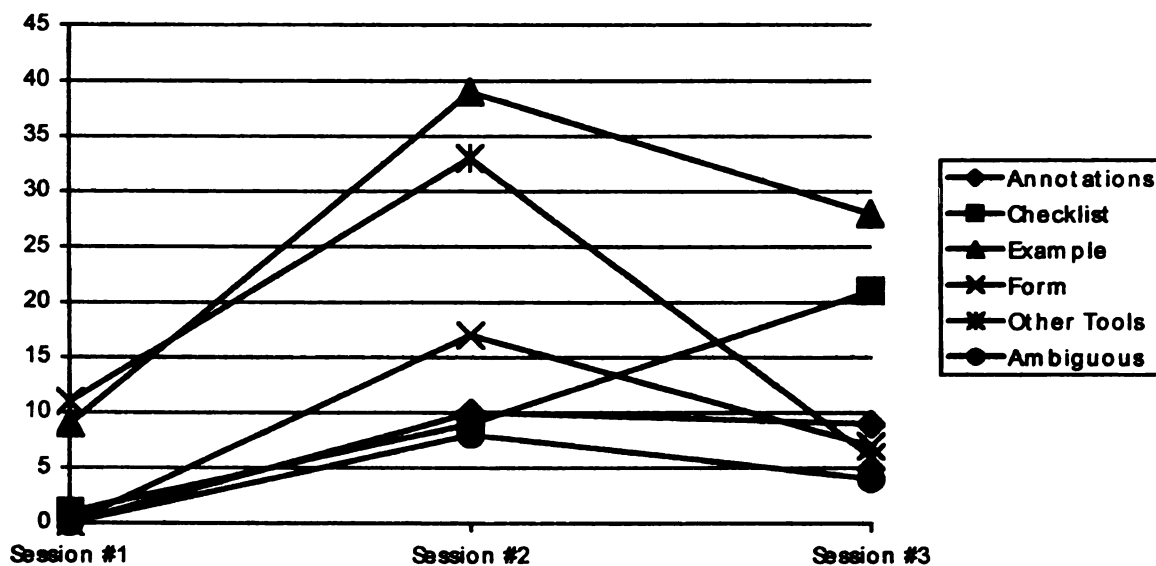


Figure 23: Change in Dana's Frequency of Tool Use

Question 3: What patterns of tool use did Dana show?

In session #1 Dana used the tools initially to orient herself to the entire assignment and to learn how to use the tools. Then in all three sessions she used the Form to orient herself to the individual component she was going to write. She prepared to write this individual component by studying multiple tools for guidance and further explanation. As problems or questions occurred, she searched the tools for resolution. If she was unable to resolve the problem using the tools, she searched the course pack for the information she needed. When she was satisfied, she then wrote the component, using one or two tools afterward to gauge the correctness of her writing. She then moved on to next component and repeated the procedure. When revising previous parts of her assignment Dana read the instructor's feedback, then looked at the Example as a guide to how to revise according to the instructor's suggestions.

Over the course of the assignment Dana continued to use the tools most often to prevent errors by resolving problems. During session #3 she increased her use of the tools to attempt to detect errors. In each session she always began a new section of the assignment by reading the title and purpose of the section from the Form.

Question 4: When during the assignment did Dana use the tools?

During session #1 Dana used the tools at three different times throughout the assignment:

- 1) at the beginning of the assignment to learn what was expected of her and how extensive the assignment was,

- 2) while she was writing to determine what components to include and how to write them, and as questions and problems arose, to answer them, and
- 3) after she finished writing to help her gauge the correctness of what she had written.

During session #2 she also started using the tools at the beginning of her session to help her understand what the instructor's feedback meant. During session #3 she continued to use the tools at these times.

Question 5: What cues did Dana attend to that caused her to consciously perceive a need to use the tools?

During the three sessions Dana felt a conscious perception of need to use the tools when:

- 1) she was uncertain what to write, such as when she started a new part or when she did not understand the tools or instructions,
- 2) she had questions about or disagreements with the tools or instructions,
- 3) she wanted to check what she had written to see if it was correct,
- 4) she had found an error and wanted to know how to correct it, and
- 5) she received feedback from the instructor on her previous writing.

Dana did not start perceiving cue #5 until sessions #2 and #3, when she started receiving feedback from the instructor on her previous writing.

Question 6: For what purposes did Dana use the tools?

Most of Dana's tool use was for the purpose of preventing, attempting to detect, and detecting and correcting errors, as shown in Figure 24 below. She used the tools 124 times to prevent errors by resolving problems, 77 times to attempt to detect errors, and six times to detect/correct errors.

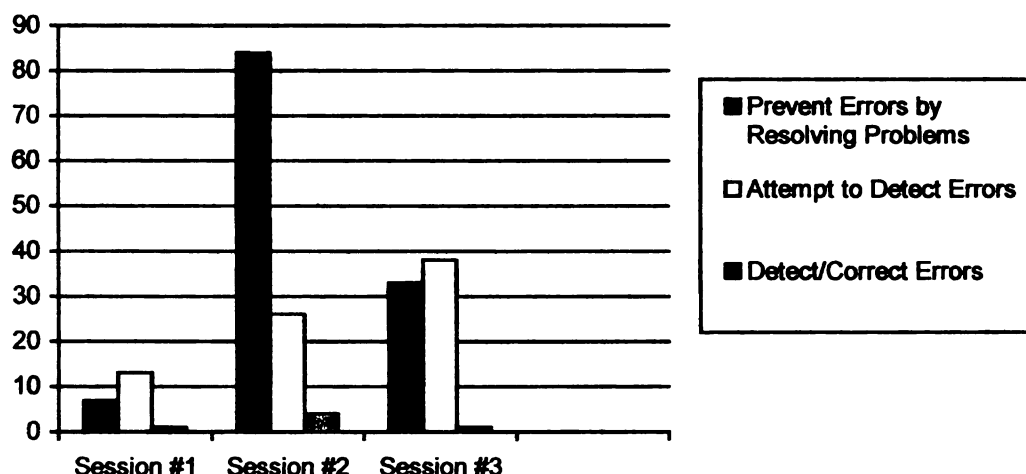


Figure 24: Dana's Frequency of Tool Use for Preventing, Attempting to Detect, and Detecting/Correcting Errors

Dana's use of the tools to prevent errors was more frequent during session #2 than during the other two sessions. She greatly increased her use of the tools to detect errors during the last session, at the same time decreasing her use of them to prevent errors.

Question 7: How did Dana use the tools to prevent, detect and correct errors?

Throughout the assignment Dana used the tools in 11 ways to help her prevent, detect and correct errors. Her three favorite tasks were using the tools to derive rules, and to guide her writing and gauge the correctness of her writing. Her use of the tools greatly

increased in session #2. Figure 25 below shows the change in the frequency of the various tasks over the three observation sessions.

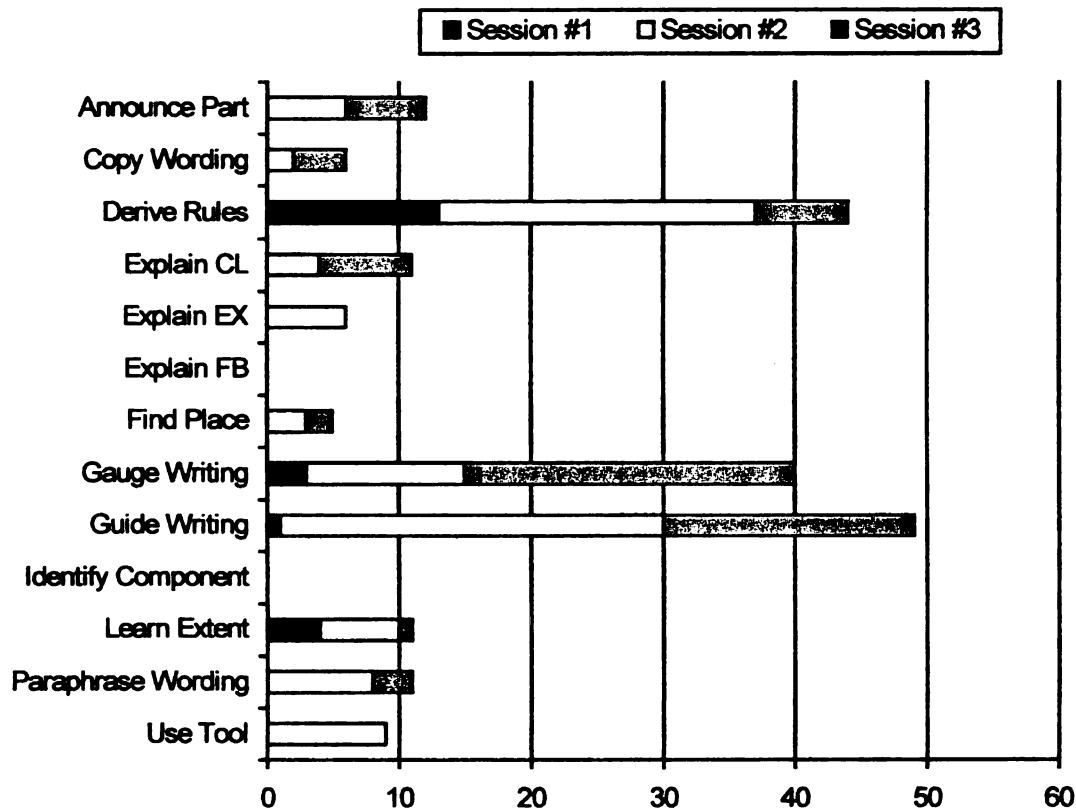


Figure 25: Change in Dana's Frequency of Tasks

Dana started using the tools in session #3 much more often to help her gauge the correctness of her writing than she did in the previous two sessions. Her use of the tools to help her derive rules and other knowledge dropped off in the last session, as did her use of the tools to learn the extent of the assignment. She did not need to use the tools to explain the Checklist until session #3, but she did use them to explain the Example a few times in session #2 but only once in session #3. The tasks Dana did using the tools are shown in Figure 26 below.

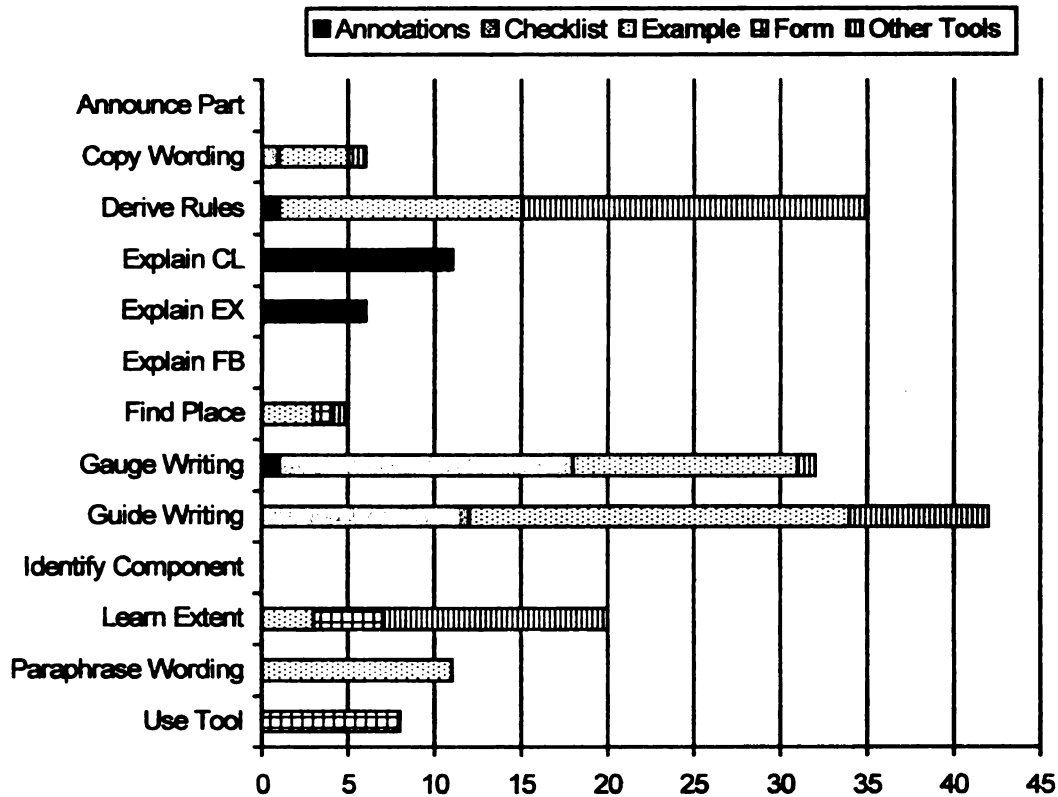


Figure 26: Dana's Tasks by Tools

She used the Example and the other tools from the course pack almost equally as a source from which to derive rules. She also used the Annotations a little. She used the Checklist, Example and other tools to both guide and gauge her writing, and used the Example, Form and other tools to learn the extent of the assignment.

Question 8: What were the immediate results of Dana using the tools?

The immediate results of Dana using the tools was that over the three sessions she was able to prevent 13 errors by resolving problems. She was also able to detect and correct five errors. Thus, the instructor was freed from having to provide feedback on a

possible 18 errors in her assignment. Table 11 below summarizes the immediate results of Dana's tool use.

	Number of Problems Encountered	Number of Errors Prevented by Resolving Problems	Totals
Session #1	7	4	11
Session #2	11	5	16
Session #3	11	4	15
Totals	29	13	42

Table 11: Number of Problems Dana Encountered and Errors She Prevented through Tool Use

Question 9: What characterized Dana's use of the tools and practice of the assignment?

Dana's use of tools over the three sessions was characterized by her use of them over and over before writing. Her general method of operation was first to orient herself to the assignment and the particular part she was working on by reading the Form. Then she went back and forth among the tools and other parts of the course pack, studying them over and over, deriving rules, looking for instantiations of the Checklist items, reminding herself of the purpose of the part of the assignment, and rereading the assignment instructions.

She got as ready as she could before actually writing anything. After she wrote, if she was satisfied with what she had written, she would move on. If she was not satisfied she would analyze the tools again to determine why she was not satisfied. For example, after she wrote her course goal she was not satisfied with how it sounded. She studied the tools and realized she had not included a purpose in the goal. Her preparation to write the course goal in part 3 involved reading the Checklist, Example and Form five times each, the additional examples in the course pack three times, and the Annotations and

instructions once each. After writing she would check what she had written, but not extensively.

Dana was thorough. By checking many examples she made sure her assignment was written as generally or as specifically as required. Punctuation and grammar were as important to her as content and writing. She disliked that the instructor required students to separate the condition and behavior statements and to put the purpose in the condition statement, before the behavior, because it sounded awkward.

When she had a question she would search the tools and the course pack for a satisfactory answer. She even brought in her own tool, the State Board of Education guidelines on mathematics education. She used these guidelines to help her select a topic for her course and to divide that topic into units. When she didn't like the Example, she would look for another one.

Dana did not use the Checklist at all during session #1. She noticed it when she was typing her diagram into the computer after the observation session. Upon reading it she found she had not included a verb or object in her course and unit goals. She corrected them, then decided she had better start reading the tools more closely. In sessions #2 and #3 she used the Checklist before writing to tell her what components were required in each part of the assignment and how they should be written. She used the Checklist after she wrote to check if she had written correctly. She also used it to learn what the instructor's expectations were for her assignment.

The thoroughness with which Dana did her assignment and her lack of confidence in her ability to do the assignment well characterized her practice of the assignment. She was nervous about the researcher observing her while she was doing the assignment. She

had a difficult time getting started and thought the Example looked “scary” with its arrows and handwritten annotations. She liked straightforward instructions rather than the options of a complex cognitive task such as writing an educational plan. She was not certain what a real world performance in mathematics might be, although often she thought it was preparing for the next math course. She was uneasy about certain parts of the assignment, especially assessing her students’ learning and teaching them when and how to round percents.

Dana was meticulous about writing the assignment correctly. She referred to previous parts of her assignment to ensure the consistency of later parts with them. She used many strategies to help her regulate her learning and performance, including paying attention to the instructor’s suggestions for choice of an assignment subject, noting what the instructor pays attention to then doing it and putting assignment due dates on a personal calendar and using it. She familiarized herself with the course pack before beginning the assignment (she had tabs on many pages when the first observation session began) and with the assignment before writing. She not only marked important pages in the course pack but also marked important points on the individual tools.

Her preparations sometimes raised questions about the subject of her assignment (mathematics), how to do the assignment, or the meaning of items in the tools. She did not start to write until all her questions had been answered.

SECTION II: COMPARING PARTICIPANTS' TOOL USE

In this section I compare the participants' tool use by answering the specific research questions.

Q1: Which tools did the participants use?

All four participants used all the major tools (Annotations, Checklist, Example and Form) and the other tools in the course pack.

Q2: How often did they use these tools?

The frequency with which they used the tools is shown in Table 12 below.

	ALAN	BETH	CAROL	DANA
Annotations	13	4	12	19
Checklist	8	18	36	31
Example	26	11	50	76
Form	14	9	27	24
Other Tools	14	9	2	50
Ambiguous Use	6	1	4	12
TOTAL = 476	81	52	131	212

Table 12: Participants' Frequency of Tool Use by Number

Beth used the tools the least number of times (52) while Dana used them the most (212). Dana used the Annotations, Example and other tools more often than the other participants. Carol used the Checklist and Form more often than the others. Beth used the Annotations, Example and Form less often than any of the other participants. Alan used the Checklist the least often.

When the frequency of use is shown graphically, as in Figure 27 below, it becomes apparent that the two mathematics teachers (Carol and Dana) used the tools more often than the two people who designed courses about computers (Alan and Beth). The Example was the most often used tool for three of the participants, while Beth used the Checklist more often.

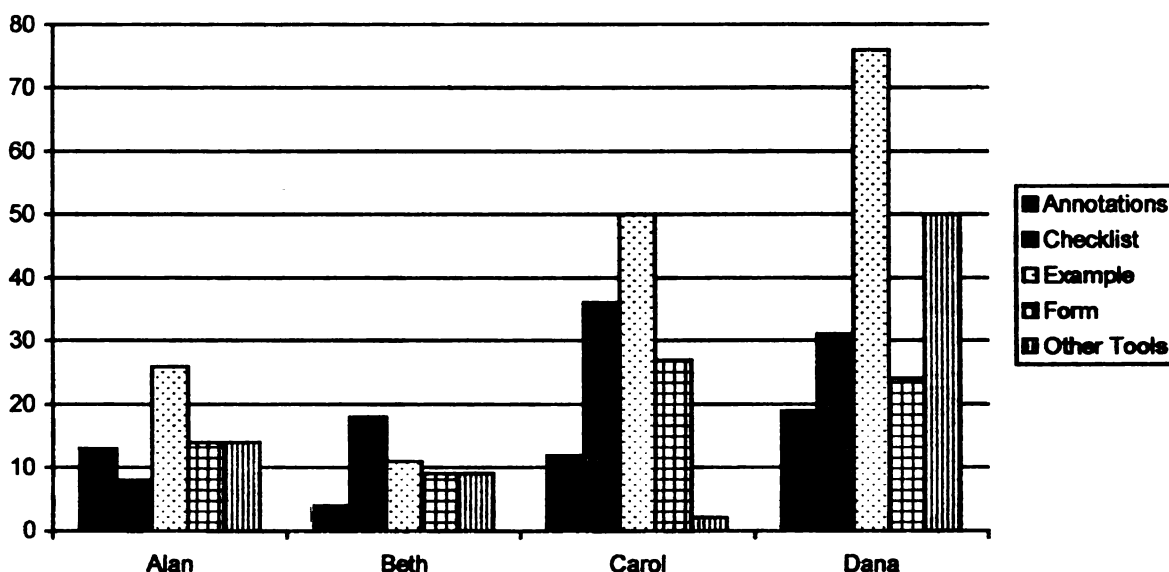


Figure 27: Participants' Frequency of Tool Use by Number

When these numbers are calculated as percents of total tool use, as shown in Table 13 below, the numbers show a different story. Although Dana used the tools more often than the other participants, in terms of percent, Alan used the Annotations more than any other participant, Beth the Checklist, Carol the Example and Form, and Dana the other tools in the course pack.

	ALAN	BETH	CAROL	DANA
Annotations	16%	8%	9%	9%
Checklist	10%	35%	24%	15%
Example	32%	21%	38%	36%
Form	17%	17%	21%	11%
Other Tools	17%	17%	6%	24%

Table 13: Participants' Frequency of Tool Use by Percentage

These percentages are shown graphically in Figure 28 below.

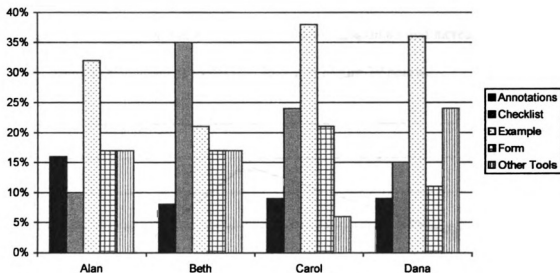


Figure 28: Participants' Frequency of Tool Use by Percentage

Q3: In what order did they used the tools?

Most of the participants showed a similar pattern in frequency of tool use over the three sessions, although there were exceptions. They used the tools at the beginning of session #1 to orient themselves to the assignment and to the tools. They read the headings in the Form whenever they began a new component or part. They used the tools to

prepare to write small individual components, such as the role in the course goal condition, before using the tools to prepare to write the next component, although Carol and Dana wrote several components together, such as the entire course goal, before they consulted the tools. Most of the participants used the tools mostly to prevent errors in session #1, although Dana used the tools mostly for attempting to detect errors. All the participants consulted several tools when they encountered problems, searching for resolution.

For three of the participants, their use of the tools increased in session #2 and decreased in session #3, although Carol's decreased in session #3 and increased in session #3. The change in frequency of tool use is shown in Figure 29 below.

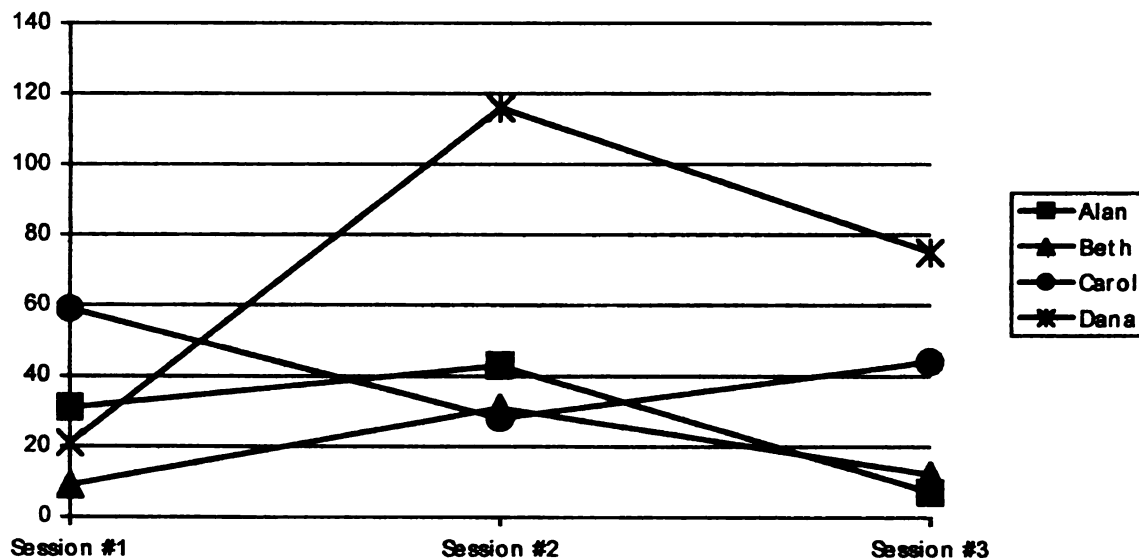


Figure 29: Change in Participants' Frequency of Tool Use

The participants' use of the tools changed over the three sessions. They no longer oriented themselves to the assignment in session #3 as they had in the previous two sessions.

Q4: When during the assignment did they use the tools?

Over the three sessions the participants generally used the tools:

- 1) at the beginning of the assignment to learn what was expected of them and how extensive the assignment was,
- 2) as a guide while writing and to answer questions and problems as they arose,
- 3) after they finished writing to help them gauge the correctness of their writing, and
- 4) at the beginning of sessions #2 and #3 to help them understand the instructor's feedback.

Q5: What cued them to use the tools (conscious perception of need)?

The participants consciously perceived a need to use the tools in five different situations, when:

- 1) they were uncertain what to write, such as when they started a new part or when they did not understand the tools or instructions;
- 2) they had questions about or disagreements with the tools or instructions;
- 3) they wanted to check what they had written to see if it was correct,
- 4) they had found an error and wanted to know how to correct it, and
- 5) they tried to understand the instructor's feedback, starting with session #2.

Q6: For what purposes did they use the tools?

The participants used the tools for three purposes: 1) to prevent errors by resolving problems before or while writing, 2) to attempt to detect errors, and 3) to detect and correct actual errors. Three of the participants used the tools more often to prevent errors than for other purposes. Alan, however, used the tools more often to attempt to detect errors. Alan also used the tools more often to detect and correct errors than the other three. Table 14 and Figure 30 below compare these numbers.

	Alan	Beth	Carol	Dana
Prevent Errors by Resolving Problems and Misconceptions before Writing	28	35	79	124
Attempt to Detect Errors	42	15	46	77
Detect/Correct Errors	7	1	4	6
TOTALS	77	51	129	210

Table 14: Participants' Frequency of Tool Use by Number for Preventing, Attempting to Detect, and Detecting/Correcting Errors

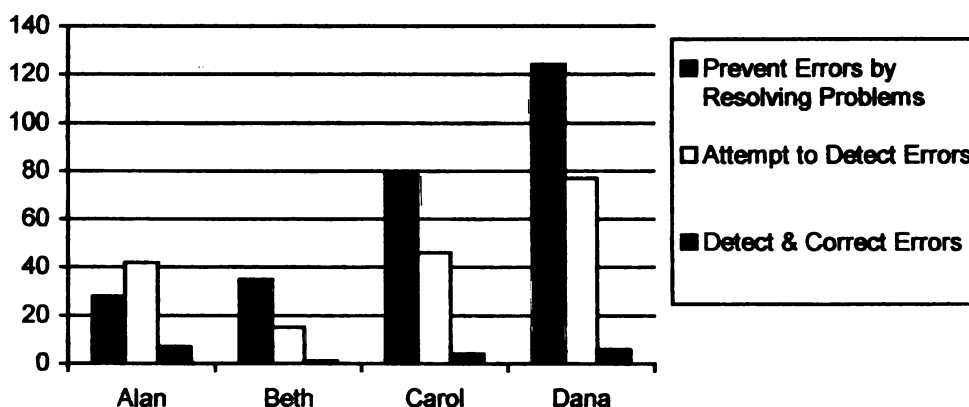


Figure 30: Participants' Frequency of Tool Use by Number for Preventing, Attempting to Detect, and Detecting/Correcting Errors

Table 15 and Figure 31 below compare the participants' percentages of preventing, attempting to detect, and detecting/correcting errors.

	Alan	Beth	Carol	Dana
Prevent Errors by Resolving Problems before Writing	36%	69%	61%	59%
Attempt to Detect Errors	55%	29%	36%	37%
Detect/Correct Errors	9%	2%	3%	3%
TOTALS	77	51	129	210

Table 15: Participants' Frequency of Tool Use by Percentage for Preventing, Attempting to Detect, and Detecting/Correcting Errors

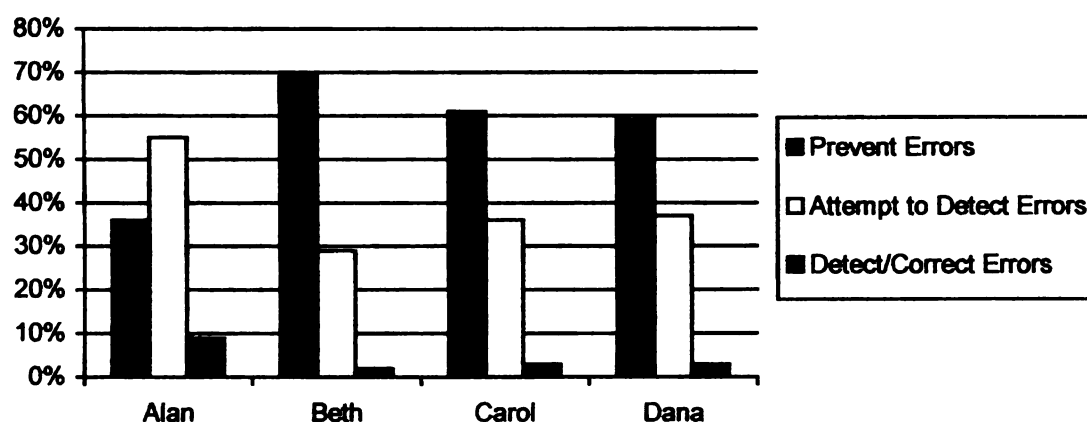


Figure 31: Participants' Frequency of Tool Use by Percentage for Preventing, Attempting to Detect, and Detecting/Correcting Errors

Q7: What tasks did they do with the tools?

Throughout the assignment the participants used the tools in various ways to help them prevent, attempt to detect and detect/correct actual errors. The tasks the participants did most frequently were to use the tools to guide writing, to gauge writing, from which to derive rules, and to announce the part they were going to working on.

Figure 32 below compares the frequency of the tasks they did. Carol did more tasks than the others (13), while Beth did the least (7). Alan did 10 of the tasks and Dana did 11.

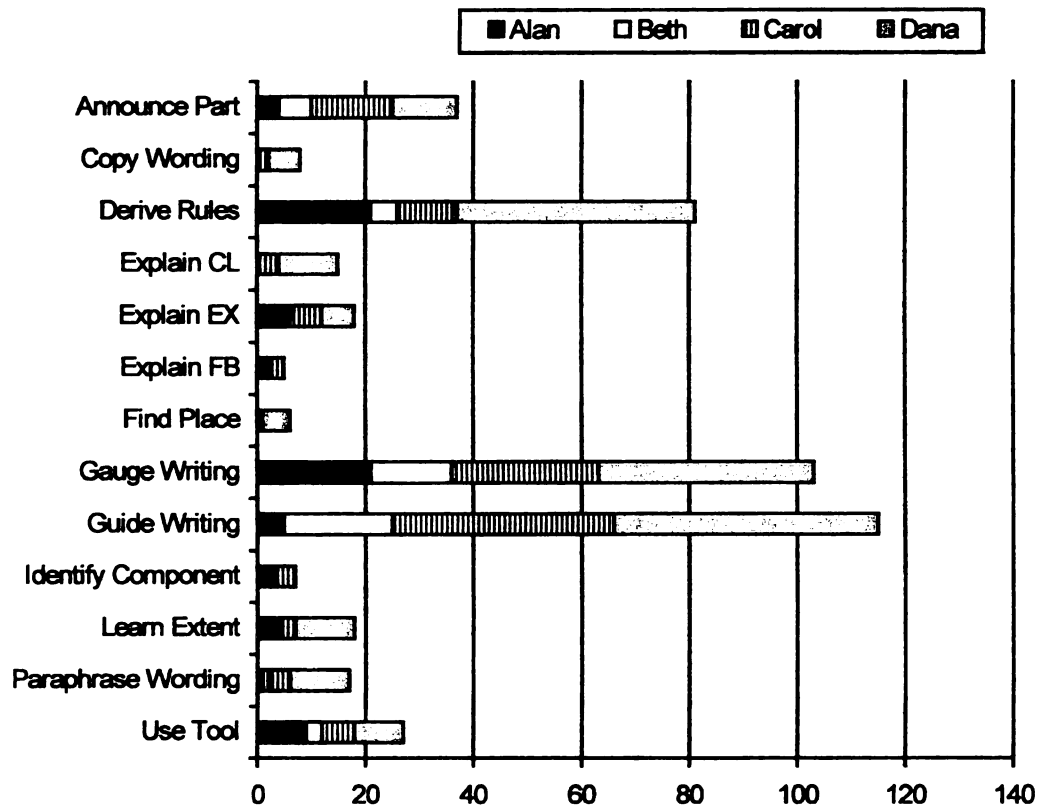


Figure 32: Participants' Frequency of Tasks

As shown in Figure 33 below, the participants used the Annotations most often to explain the Checklist and the Example. Although Dana used them to do four tasks, Alan used the Annotations more than the other participants when percent of use is considered.

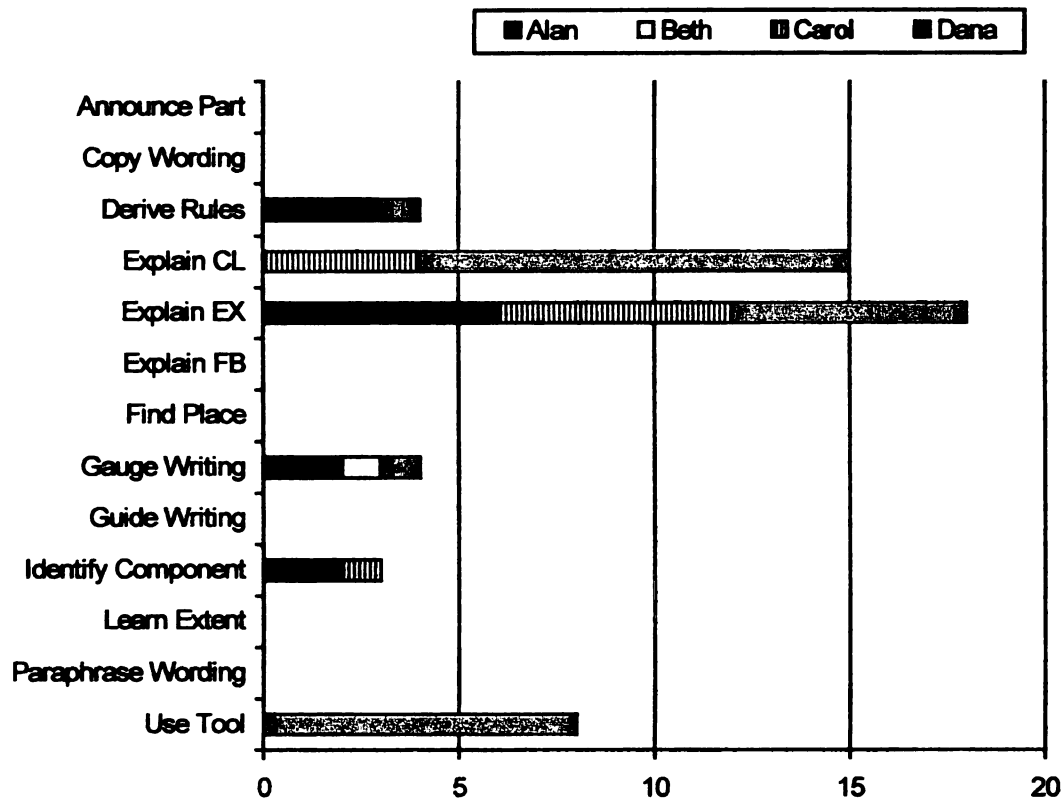


Figure 33: Use of Annotations to Accomplish Tasks

As shown in Figure 34 below, the Checklist was used by far to guide and gauge writing. All four of the participants used the Checklist to do these tasks, but Carol and Dana used the Checklist the most often.

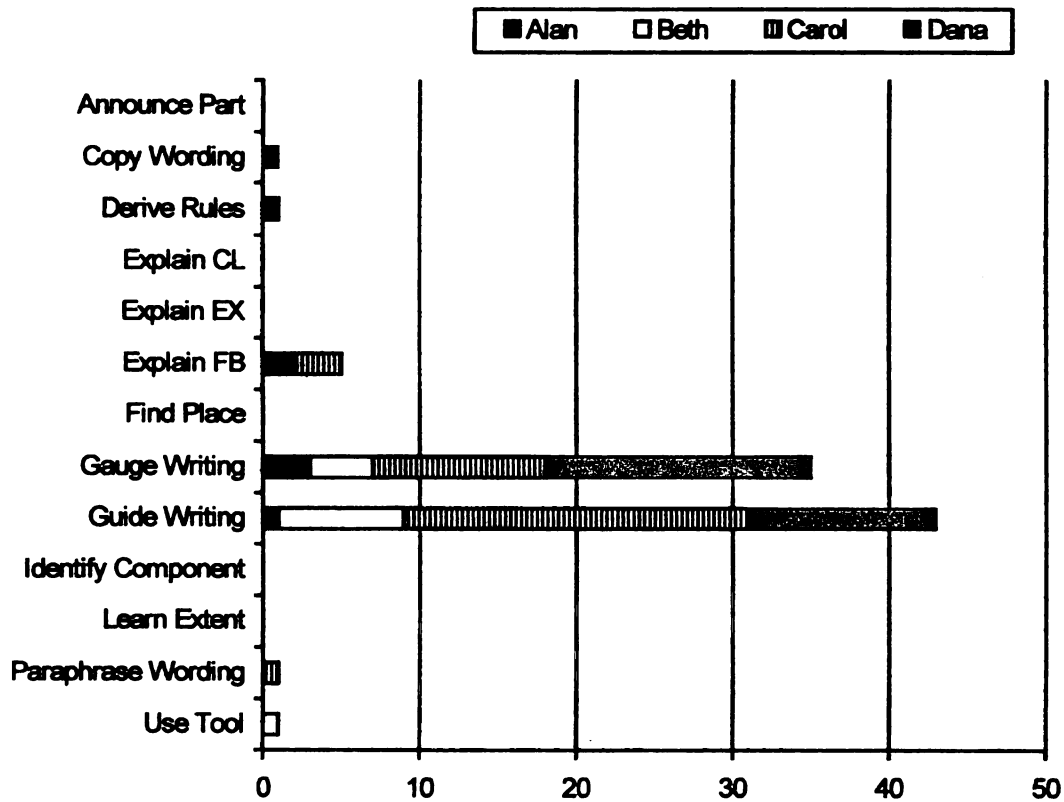


Figure 34: Use of Checklist to Accomplish Tasks

As shown in Figure 35 below, the Example was used most often as a source from which to derive rules, and to guide and gauge writing. All four participants used it to guide and gauge writing, but only three of them used it as a source for deriving rules.

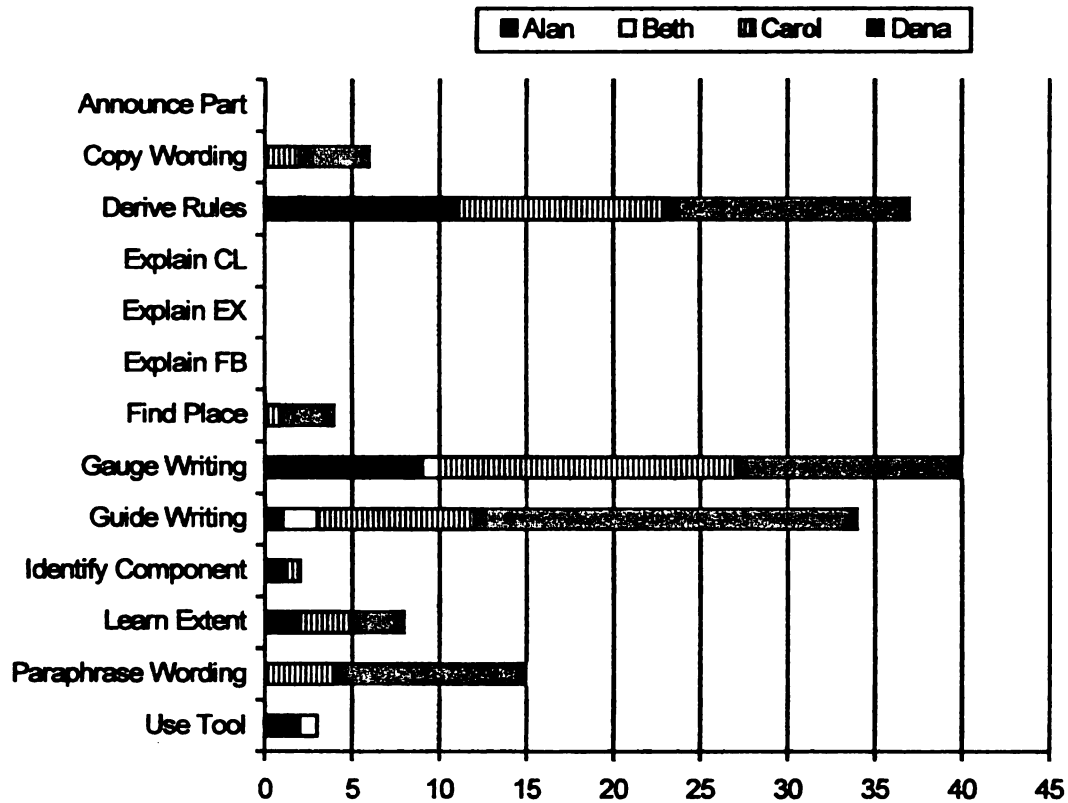


Figure 35: Use of Example to Accomplish Tasks

As shown in Figure 36 below, the Form was mainly used to do two tasks: to announce the part the participant was working on or was about to work on, and to provide instructions for using the tools.

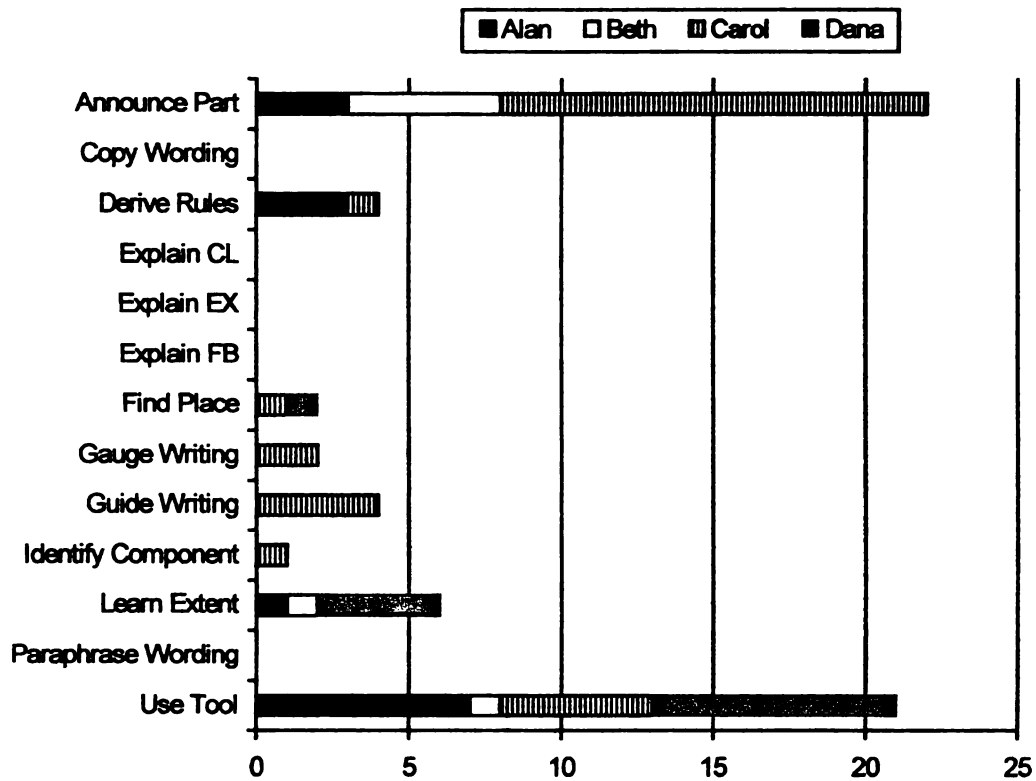


Figure 36: Use of Form to Accomplish Tasks

As shown in Figure 37 below, the other tools in the course pack, mostly additional examples, were used as the prime Example was used: as source for rule derivation and to guide and gauge writing. They were also used by Dana several times to help her learn the extent of the assignment. Dana was the major user of the other tools. Carol and Beth used them the least.



Figure 37: Use of Other Tools to Accomplish Tasks

Q8: What were the immediate results of tool use in terms of errors prevented, detected and corrected?

One immediate result of the participants' use of the tools was that they were able to prevent 37 errors by using the tools to resolve problems they encountered before or while writing. Another result was that they were able to detect and correct 13 errors by

using the tools. Thus, the participants' use of the tools made it unnecessary for the instructor to detect and write feedback for 50 errors the participants might otherwise have left uncorrected in their assignments. Table 16 below compares the number and percent of errors prevented and detected/corrected by the participants.

	Number Of Errors Prevented Through Tool Use	Number Of Errors Detected/Corrected Through Tool Use	Number Of Errors Detected/Corrected Through Feedback
ALAN	28% (5 of 18 problems encountered)	33% & 17% (3 of 12 errors made were detected through tool use, and only 2 of those 3 errors were corrected by tool use)	42% & 60% (5 of 12 errors were detected through feedback, and 3 of those 5 errors were corrected through feedback)
BETH	27% (3 of 11 problems encountered)	50% (1 of 2 errors made)	0
CAROL	52% (16 of 31 problems encountered)	50% (4 of 8 errors made)	25% (2 of 8 errors made)
DANA	46% (13 of 28 problems encountered)	45% (5 of 11 errors made)	45% (5 of 11 errors made)

Table 16: Percent of Errors Participants Prevented and Detected/Corrected through Tool Use and Feedback

Carol and Dana were able to resolve about half of their problems through the tools, while Alan and Beth resolved around one quarter of their problems through the tools. The rest of the problems the participants resolved through rereading the assignment or thinking more about the problem.

Three of the participants were able to resolve about half the errors they made. Alan was able to detect one-third of the errors he made, and correct 17 % of them. Almost half of his errors were detected by the instructor, and over half of those were corrected by

the instructor. Dana had almost half of her errors detected and corrected by the instructor, and Carol had one-quarter of her errors detected and corrected by the instructor.

Q9: What characterized their use of the tools and practice of the assignment?

All four participants made use of the four major tools (Annotations, Checklist, Example and Form) and a few of the other tools in the course pack, but Dana used the other tools more often than all the tools but the Example. The tools confused three of the participants at first, but Beth seemed to understand them right away and was able to find the pages she was looking for in the course pack. Over the course of the three sessions the other participants grew more expert and confident in using the tools.

All the participants found the assignment confusing and intimidating in its length and detail at first, but as they gained experience in doing it, they found it less confusing, although just as long and detailed. All of them found the separation of the purpose and the behavior awkward, although they seemed to understand the reason for it. They all enjoyed talking about the topic of their assignment and showed enthusiasm for it. Three of the four participants did not finish their unit goals during session #2, Alan because he tended to digress, Dana because she spent a lot of time on the other parts of the assignment, and Beth because she ended the session early so she could go home and catch up on missed sleep.

Beth, Carol and Dana were methodical and organized in how they approached doing the assignment: they had marked important pages in the course pack and kept on working. Alan was prepared in terms of knowing what he wanted to develop a unit on, but he was unorganized in knowing where important pages were in the course pack.

Test Scores

The class was tested twice on their writing of goals and objective, once on a test and once on the final exam. They were assessed on their project as well. The scores on test 1 and the final exam shown below are part scores on the production items of the tests that were similar to the tasks the students did on the assignment, i.e., they wrote a goal and an objective.

Table 17 below shows the participants' scores and the mean class score on the production items on the pretest, test 1 and the final exam. Table 18 below shows the participants' scores and the mean class score on all items on the final exam. Percentage scores are shown in parentheses. Out of 21 students in the class, the scores of 20 of those students were calculated for the mean because one student's part score on the final exam was missing.

	Part of Pretest: Writing a Goal & Objective 17 points possible	Part of Test 1: Writing a Goal & Objective 12 points possible	Part of Final Exam: Writing a Goal and Objective: 20 points possible
ALAN	6 (35%)	8.5 (71%)	19.5 (98%)
BETH	7 (41%)	12 (100%)	19.5 (98%)
CAROL	5 (29%)	11 (92%)	20 (100%)
DANA	7 (41%)	11.5 (96%)	20 (100%)

Table 17: Participants' Pretest Scores and Test 1 and Final Exam Part Scores

The pretest was a take home test in which the students were free to look at the course pack before taking the test, although they were asked not to. The part scores of Beth, Carol and Dana all were within 1 point of each other, while Alan's part score was 2.5 points below the lowest of the three. Carol and Dana scored the highest possible part score, while Alan and Beth scored only one-half point lower. Table 18 below shows that

on the total final exam Dana scored the highest, then Carol, Beth and Alan. Alan scored below the class mean on the total final exam score.

	Final Exam: All Items 100% possible
Alan	90.0%
Beth	95.0%
Carol	97.5%
Dana	99.5%

Table 18: Participants' Total Final Exam Scores

How Students in the Class used the Performance Support Tools

The anonymous survey of how students used the tools was given to the entire class of 21 students; 17 were returned. Almost all the respondents used all the tools: Example = 16, Form = 14, Checklist = 15. (The Annotations did not have separate questions but were included as part of the Example.) A little more than half said they used the three tools as needed, and a little more than half said they used the Example, then the Form, then the Checklist. Most of them reported that they used the tools for all parts of the assignment, not just for the hard, long or unclear parts.

Most of the students said they used the tools to help them do the assignment correctly and to gauge its correctness after writing. They also said they used the tools to guide their writing and to check that they had completed all the parts. They reported that they did not use the tools to help them do the assignment more quickly.

Students stated that they used the Checklist more during the assignment to check for correctness than afterward. They also stated that they used the Form more to check work after writing than while writing. They reported that they used the Example to help

them determine how detailed their objectives should be and to give them suggestions for wording.

Students said they used the Example "very carefully" but the Form only "carefully." They reported that they tended to use the Checklist more than the other tools when they thought they had made a mistake, but that they used the Form and the Example to determine what to do next. Students said they used the Example and the Form more before and while writing than after.

SUMMARY

The summary of the findings for each question is listed below.

Question 1: Which tools did the participants use?

All the participants used all the major tools that were provided: the Annotations, Checklist, Example and Form. They also used the other tools in the course pack, such as other examples, instructions, explanations, the calendar, and the syllabus.

Question 2: How often did they use those tools?

The participants used the tools a total of 476 times: the Annotations 48 times, the Checklist 93 times, the Example 163 times, the Form 74 times and the other tools 75 times. Alan used the tools a total of 81 times, Beth 52 times, Carol 131 and Dana 212. Alan's, Beth's and Dana's tool used increased in session #2 and decreased in session #3. Alan used the Annotations more than the other participants, Beth used the Checklist

more, Carol used the Example and the Form more, and Dana used the other tools in the course pack more.

Question 3: What patterns of tool use did each participant show?

The participants showed these patterns of tool use during the assignment: 1) they read the tools before beginning the assignment to orient themselves to the tools and to the assignment, 2) they read the headings in the Form as they began a new part, and 3) they consulted multiple tools when trying to resolve a problem.

Question 4: When during the assignment did they use the tools?

The participants used the tools during certain conditions or situations of their writing. They used the tools before, during and after writing: before starting the assignment to orient themselves to the tools and to the assignment, during as a guide to what to write and to resolve problems as they arose, and after to gauge the correctness of what they had written. In addition, those students who had received constructive feedback (as opposed to all “OKs”) used the tools at the beginning of sessions #2 and #3 to help them understand the feedback.

Question 5: What cues did the participants attend to that caused them to consciously perceive a need to use the tools?

The participants felt a need to use the tools when presented with some common cues: (1) when they were uncertain what to write, such as when starting a new part or when they did not understand the tools or instructions; (2) when they disagreed with the

tools or instructions; (3) when they encountered a question or problem, (4) when they wanted to check what they had written to see if it was correct; (5) when they had detected an error and wanted to know how to correct it; and (6) when they did not understand the instructor's feedback.

Question 6: For what purposes did the participants use the tools?

The participants' tool use could be generally organized into three categories: to prevent errors, to detect errors, and to correct errors. In addition, they used the tools to reassure themselves that the resolutions they found to the problems they encountered were correct.

Question 7: How did the participants use the tools to prevent, attempt to detect, detect and correct errors?

The participants performed 13 tasks to help them prevent, attempt to detect, detect and correct errors: announce the part they were working on, copy wording, derive rules, explain Checklist, explain Example, explain feedback, find their place in the assignment, gauge their writing, guide their writing, identify a component, learn the extent of the assignment, paraphrase wording, and read instructions on the tool. The participants did more tasks (nine) using the Example and the least number of tasks (six) using the Annotations.

Question 8: What were the immediate results of using the tools?

The immediate results of using the tools were that the participants were able to prevent, detect and correct a total of 50 errors in a portion of one of the four class assignments.

Question 9: What characterized each participant's use of the tools and practice of the assignment?

Alan, Beth and Carol were confident from the beginning that they could do the assignment, while Dana had a difficult time getting started and checked the tools often for reassurance. Beth, Carol and Dana mostly prevented errors by using the tools to guide their writing before they wrote, but Alan used the tools mostly as a source from which to derive rules and to gauge the correctness of his writing after he wrote. Beth was the only participant who initially understood how to write the assignment and use the tools; the others learned as they did the assignment. The two professional teachers, Carol and Dana, encountered more problems while writing their assignments than did the two non-teachers, Alan and Beth. All the participants found some things about the tools they did not like, but all eventually learned how to use them and found them useful.

CHAPTER 5

DISCUSSION

The broad questions asked in this study were: “How do learners use performance support tools?” and “How do the tools support performance, and learning from performance?” In order to answer these questions, I asked several specific questions while analyzing the data:

1. Which tools did the participants use?
2. How often did they use those tools?
3. In what order did they use the tools? (What patterns of tool use did each participant show?)
4. When during the assignment did they use the tools?
5. What cues did they attend to that caused them to consciously perceive a need to use the tools?
6. For what purposes did they use the tools?
7. How did they use the tools to accomplish the purposes?
8. What were the immediate results of using the tools?
9. What characterized each participant’s use of the tools and practice of the assignment?

In this chapter I will discuss the answers these questions. After summarizing the findings for each question, I have made some interpretations, which are listed in bulleted

form under each question. I will also talk about the implications of the findings for teachers and for future research in this area.

The interpretations and discussion in this chapter pertain only to this specific case. Studies with other tasks and students may show other findings.

ANSWERS TO MINOR RESEARCH QUESTIONS

Question 1: Which tools did the participants use?

All four participants used all the major tools that were provided: the Annotations, Checklist, Example and Form. They also used other tools in the course pack, namely other examples, instructions, explanations, the calendar, and the syllabus.

- Interpretation 1-1: The participants used varied tools to help them do complex cognitive tasks.

Complex cognitive tasks have various related subtasks which may require the use of different tools. This is how the tools were used. The Annotations identified the components in the assignment and provided further explanation of the Checklist, Example and instructor's feedback. The Checklist reminded students of what components should be included in the assignment and how those components should be written. The Example showed instantiations of those components, and provided an opportunity for students to compare their assignments with a prime example and to copy or paraphrase wording. It also provided an opportunity for students to derive rules for how to write the

assignment, allowing them to understand how to write the assignment by explaining to themselves how the assignment worked. This is known as the Explanation Effect (Chi et al., 1998; VanLehn & Jones, 1993) The Form provided instructions and a structure for the assignment. This structure helped students learn the extent of the assignment, learn how and where the different parts of the assignment fit in, and keep track of which parts they had already done, or remained to be done, and what they were currently working on.

The participants not only used different tools to do different tasks, but also used different tools to do the same tasks. In addition to using different tools to do different tasks, the participants may have used different tools because they had different learning styles and different tool preferences. While the participants did some tasks with only one tool, such as using the Form to announce which part they were working on, the majority of tasks could and were done by more than one tool. Likely both explanations have some validity.

- Interpretation 1-2: Examples from the same domain as the participants' course goal domain did not seem to be more helpful than examples from other domains.

The prime Example is from the domain of math, the same domain as Carol's course goal. She copied the course diagram from the prime Example into her own assignment but later found that copying it was not useful. She may have assumed, because the Example was a math example, that the structure would be appropriate for her math course.

I think when I separated this out I was sort of doing it artificially, just to follow what he's got, kind of, because I don't think I'd teach it that way. (L574-576)

She also said that the other examples from math were too simple to help her with her more complex math course goal. Although she apparently found the math-based examples not useful, the largest percentage of her tool use was using the examples, so it seems she found the examples from other domains more helpful than the math examples.

An alternate explanation for copying examples might be that the participants were lazy and wanted to do as little work as possible. Their other tool use did not seem to bear this out, however. They used many tools, and for the most part they did apply the other tools correctly. It may be easy to misapply the examples because copying is a valid use, and the copy looks correct on a superficial level. It was not until Carol had gained a deeper understanding of what the course diagram was and how it was used that she realized she had misapplied the Example.

Question 2: How often did they use those tools?

The participants used the tools a total of 476 times: the Example 163 times, the Checklist 93 times, the other tools 75 times, the Form 74 times and the Annotations 48 times. Alan used the tools a total of 81 times, Beth 52, Carol 131 and Dana 212.

- Interpretation 2-1: The participants may have used the tools less when they knew how to do the assignment and how to use the tools.

It appeared that Beth used the tools less often than the other participants because she had fewer questions and encountered fewer problems, so she needed to use the tools less often to resolve those problems. An alternative explanation might be that the participants may have used the tools less often when they did not understand how to use them or how to do the assignment. Alan used the tools fewer times than Carol and Dana, and he did not understand the assignment until the end of the task. I think the first explanation fits the evidence better; in general, the more problems the participants encountered, the more often they used the tools to resolve those problems.

- Interpretation 2-2: Frequency of tool use may have been influenced by the domain of the participants' course goal, initial competence in tool use and in how to do the assignment, perception of their own initial competence and how much time they spent on task.

The two math teachers, who designed courses in math, used the tools more often than the other two participants, who designed units in computer use. The math teachers used the tools to help them resolve the problem of what real world performance meant in a math class, where students were not being prepared for use of math outside the classroom but for the next math class. Regarding initial competence in task and tool use, Beth seemed to know at the outset of the assignment how to use the tools and how to write the assignment. She rarely used the tools to learn how to use the rest of the tools, while Carol used the Annotations several times to determine how to use the Checklist. Regarding

perception of initial competence, Dana had little confidence in her ability to do the assignment. She used the tools multiple times to learn how to do the assignment and to reassure herself that she had written it correctly. Regarding time spent on task, both Beth and Alan spent the least time on task, Alan because he digressed often, and Beth because she was tired during one session and did not finish that part of the assignment. Carol and Dana digressed very little and spent most of the time during the sessions on task. There are likely other factors that influence the frequency of tool, such as students' energy level or degree of desire for mastery of the material. There was a suggestion of these factors, but not enough evidence to support them at this time. Future research may identify additional factors in frequency of tool use.

Alan's, Beth's and Dana's tool used increased in session #2 and decreased in session #3.

- Interpretation 2-3: The participants' tool use decreased as they learned how to do the task and use the tools.

During session #1 participants laid out their course structure, which was a smaller part of the assignment than they would be doing in later sessions. In session #2 they wrote the course goal, course terminal objective and unit goal, larger parts and more complicated than what they did in session #1. Their tool use increased during session #2 from what it had been in session #1. In session #3, when their tool use decreased, they were writing only the unit terminal objective, although this was the most involved part of the assignment. But the participants

had learned how to write the assignment and how to use the tools during sessions #1 and #2, so perhaps they did not have to refer to the tools multiple times as they did in the earlier sessions. The exception to this trend was Carol, whose tool use decreased during session #2 from what it had been in session #1, and increased again in session #3. But she had done most of the work for session #2 during session #1, so she used the tools the most frequently during session #1. During session #2, when she referred to feedback and mostly revised what she had written previously, she used the tools the least frequently.

This decrease in tool use might be alternately explained by a decrease in the complexity of the task to be performed. While it was the case that the participants were to write the course goal, course terminal objective and unit goal during session #2 and only the unit terminal objective during session #3, the unit terminal objective was more complex than the other three parts and usually took longer to write. Thus, the more difficult task was done during session #3, after the participants had had two sessions in which to learn how to use the tools and do the assignment. I also found this decrease in tool use as the task is learned to be evident in an earlier study of how people use online support tools to run an unfamiliar photocopier (Sleight, 1995).

If tool use decreased as the participants learned to do the skill, could this mean that proficiency in using the tools is the same as proficiency in doing the skill? The skill in this study was writing instructional goals and objectives. The task knowledge required to do the skill included knowing:

- the parts of a goal and an objective,

- which components comprised each part, and
- how to write the components.

The tools the participants used to help them do the skill listed the parts of a goal and an objective, listed the components of each part, described how to write the components, provided examples of the parts and components, identified the components, and provided further explanation of the parts and components. Once the participants understood how to use the tools, they had access to this task knowledge. In addition to gaining the task knowledge provided by the tools, however, the participants also had to learn how to use the tools to gain this knowledge. The instructor explained in class how to use the tools and demonstrated their use, but this was general knowledge. All the participants had some trouble with the tools, Carol most of all. She spent some time with the Checklist for the unit terminal objective, finally realizing that she did not have to write something to correspond to each item on the Checklist, but that sometimes an item described how rather than what to write. Learning how to use the Checklist helped her gain the task knowledge of how to write the components of the assignment.

Having only the task knowledge was not enough for them to do the skill, however. The skill also required having domain knowledge, that is, knowledge of the domain in which the goals and objectives were to be written, such as mathematics. Even if the participants knew that a unit terminal objective should contain a description of the students' behavior, they would still need to know what

that behavior was in order to write the behavior section of the objective. So in this study knowing how to use the tools, which equates to having the task knowledge of how to do the skill, was not enough to enable the participants to do the skill. They also needed the domain knowledge that provides the content of the goals and objectives.

A complex cognitive task by its nature is applicable to varied domains, so domain knowledge is a requirement for doing the skill. If the skill is not applicable to varied domains, then it is not a complex skill. It has already been shown (Rossett & Gautier-Downes, 1991) that it is possible to design tools that enable people to do a simple skill without any task or domain knowledge. Simple cognitive tasks, such as entering a record into a database, may be accomplished by following a job aid containing a list of the steps to take. Proficiency in using the support tools for a complex cognitive task does not necessarily mean proficiency in how to do the skill.

Alan used the Annotations more than the other participants, Beth used the Checklist more, Carol used the Example and the Form more, and Dana used the other tools in the course pack more.

- Interpretation 2-4: When the participants were prepared in class to do the task and use the tools, they appeared to have made more efficient use of the tools.

Beth knew how to use the tools and do the assignment from listening to the instructor in class. She was able to use the tools immediately without having to

figure out on her own how to use them and without having to refer to them several times to resolve the same problem. In fact, she stated that someone who was not a class member and had not heard the instruction probably would not be able to use the Checklist:

If I give this sheet to another person, they'll probably go, "Huh?" You know. But I know, like [reads Checklist item] "Each entry has a verb and object." This actually goes with this part [of the Checklist] right here, but they're separate, so if you give it to another person, they might not know, after doing this part, they need to do another part, that needs an entry with verb and object. But actually saying that each unit, when you really have to do something, you need to include a verb and an object. So it's a little bit unclear, but since I've been to classes and he has explains [sic] it, it doesn't confuse me. (I1, 268-278)

Although Carol had been to class, she did have trouble with the Checklist and Example during session #3. She thought, as Beth just described, that there was a one-to-one correspondence between each Checklist item and a component of the assignment. During session #3 she finally realized that sometimes a Checklist item was paired with an earlier or later item, providing further description of it. So some participants had trouble even though they had heard the instructor explain how to use the tools.

- Interpretation 2-5: The participants' experiences or attitudes may have affected their tool use.

Carol and Dana felt that real world performance did not apply to math classes because the goal of the lower level classes was to be able to understand the next level math class. They had to use the tools multiple times to determine how to express real world performance in their course and unit goals. Alan had taken an

instructional design class years earlier and had confidence that he could “breeze through” the assignment. He did not consult the Checklist during session #1, and had trouble with the assignment throughout the sessions.

An alternate explanation might be that their tool use was affected more by their understanding of how to do the assignment than their attitudes or experience, but the descriptions of Carol, Dana and Alan above have little to do with their understanding of how to do the assignment, and more to do with their experiences and attitudes. Thus, it seems likely that their tool use was affected by all three: understanding, experience and attitude.

Question 3: What patterns of tool use did each participant show?

The participants showed these patterns of tool use during the assignment: 1) they read the tools before beginning the assignment to orient themselves to the tools and to the assignment, 2) they read the headings in the Form as they began a new part, and 3) they consulted multiple tools when trying to resolve a problem.

- Interpretation 3-1: The participants appeared to need to orient themselves to the tools and the assignment initially, and to orient themselves to each component of the assignment.

All the participants used the tools initially to orient themselves to the tools themselves and to the assignment. It took Alan and Dana a large part of session #1 to accomplish this and start doing the part of the assignment they were supposed to do in session #1: write a diagram of the course structure. They used the tools to

remind themselves what they were supposed to do in the assignment and how to use the tools to help them do the assignment.

- Interpretation 3-2: The participants appeared to prepare for and write each subtask individually.

Rather than write an entire part of the assignment, the participants would work on one component at a time. For example, rather than write the entire course goal, the participants would work on the setting, then the role, then the purpose, and so on.

- Interpretation 3-3: The participants appeared to need to check the possible resolution of a problem from different angles by using different tools.

After encountering a problem, the participants would search the tools for a resolution. Sometimes they searched several tools before they found the resolution, but sometimes they continued searching after finding the resolution. It may be that they needed clarification, but an alternate explanation might be that they needed reassurance that the resolution was a good one. They were able to obtain both clarification and reassurance because there were multiple tools they could use.

Question 4: When during the assignment did they use the tools?

The participants used the tools during certain conditions or situations of their writing. They used the tools before, during and after writing: before starting the assignment to orient themselves to the tools and to the assignment, during as a guide to

what to write and to resolve problems as they arose, and after to gauge the correctness of what they had written. In addition, those students who had received feedback used the tools at the beginning of sessions #2 and #3 to help them understand the feedback.

- Interpretation 4-1: There seemed to be common conditions during the assignment when the participants used the tools.

It appeared that the participants approached writing the assignment in a similar fashion, using the tools before writing for orientation and guidance, during writing to resolve problems and to help them understand the instructor's feedback, and after writing to gauge the correctness of what they had written. Perhaps this is how people approach this kind of complex cognitive task that has support tools available. An alternate explanation may be that this is how the instructor demonstrated writing the assignment and using the tools. It might be interesting to see if students approach the assignment and use the tools in the same way when they have not been so instructed.

Question 5: What cues did the participants attend to that caused them to consciously perceive a need to use the tools?

The participants all felt a need to use the tools when presented with some common cues: (1) when they were uncertain what to write, such as when starting a new part or when they did not understand the tools or instructions; (2) when they disagreed with the tools or instructions; (3) when they encountered a question or problem, (4) when they wanted to check what they had written to see if it was correct; (5) when they had detected

an error and wanted to know how to correct it; and (6) when they did not understand the instructor's feedback.

- Interpretation 5-1: There seemed to be common cues that caused the participants to consciously perceive a need to use the tools.

All four participants felt a need to use the tools when presented with the same cues. This finding is related to the one in Question 4, which dealt with conditions of the assignment. Conditions are time-based while cues seem to be signs of conceptual conflict. Conceptual conflict (Berlyne, 1965) is a conflict between what one believes to be true and what one perceives to be true. The cues in this study were uncertainty, doubt and lack of confidence: uncertainty about the meaning of tools or instructions, about what to write or how to write, or about how to resolve a problem; doubt about the correctness of what they had written; and lack of confidence about understanding. Conceptual conflict can arouse curiosity and motivate people to resolve or alleviate the conflict.

The participants may have perceived common cues to use the tools because the tools were designed to resolve just such conflicts. The instructor had seen the problems his students in previous classes had had in writing the assignment, and had designed the tools to help alleviate those problems. Such problems may be typical for people attempting a cognitive task in which one applies a set of rules to a new situation.

- Interpretation 5-2: Tools with sufficient information appeared to make it possible for the participants to practice a task correctly.

The participants were novices at writing educational goals and objectives; that is why they were doing the assignment, so they could practice writing them. But they needed expert information to know what to write and how to write it. They found this information in the tools, which enabled them to practice writing the goals and objectives correctly.

- Interpretation 5-3: The participants seem have encountered different problems while doing a task.

In this study "problem" meant a difficulty in applying the format of the assignment to the course topic they had selected. The participants encountered different problems while writing the assignment because they had different course topics and because of the particular subtask they were working on. Carol and Dana encountered problems because the domain of their course topic was math. They were supposed to write course and unit goals that reflected real world performance. They both thought that, realistically, the goal of a math class was to prepare the student to understand the following math class. Carol spent some time determining what real world performance a unit on graphing might enable.

An alternate explanation might be that they encountered different problems because of different background and experiences. Beth and Carol both encountered problems with the tools because they liked certain kinds of tools: Beth liked concise, bulleted tools while Carol liked tools that told you what to do step-

by-step, rather than open-ended tools that presented choice. It is likely that both explanations are valid, and that the problems the participants encountered depended on various factors relating to the assignment and to individual differences.

Question 6: For what purposes did the participants use the tools?

The participants' tool use could be generally organized into three categories: to prevent errors, to detect errors, and to correct errors. In addition, some of the participants used the tools to reassure themselves that the resolutions they found to the problems they encountered were correct.

- Interpretation 6-1: The tools seemed to enable the participants to prevent, detect and correct errors.

Using the tools, all four participants were able to prevent, detect and correct errors they might otherwise have missed. This interpretation seems to substantiate Ohlsson's theory on learning from performance errors. Ohlsson (1996) states that, in order to learn from the process of detecting and correcting errors, people have to have some initial competence and an informative task environment. The tools in this study seemed to provide initial competence in how to write the assignment and an informative task environment for making decisions about the assignment. Although the participants were able to detect and correct some errors without use of the tools, they were able to detect and correct more errors by using the tools than they otherwise might have detected.

Nine of the 13 errors the participants detected and corrected through tool use were errors of displacement, where the participants had a too-general understanding of a definition or production rule. The remaining four errors were errors in tool use, where the participants used a tool incorrectly. Three of the errors the participants made that they did not use the tools to detect or correct were detected by the researcher. One of these errors was one of displacement and two were errors in following the rules of the assignment.

- Interpretation 6-2: The more the participants prevented errors, the less they detected and corrected errors.

The more errors prevented, the fewer there are to detect and correct. Beth, Carol and Dana used the tools more to prevent errors and less to correct and detect errors, while Alan used the tools less to prevent errors and more to detect and correct errors. The tools enabled all the participants to prevent some errors by resolving problems before they were written down.

- Interpretation 6-3: The participants seemed to use the tools for purposes other than preventing, detecting and correcting errors, such as for reassurance.

Dana searched for resolutions to her problems, but even after she found the answer, she continued to look at additional tools in an apparent attempt to make sure the answer was correct. She seemed to be methodical and wanting to be sure she looked at every tool before she committed herself to writing. Her use of additional tools for reassurance seemed to be an attempt to resolve that feeling of

conceptual conflict her lack of confidence engendered, as discussed earlier under Interpretation 5-1.

Question 7: How did the participants use the tools to prevent, attempt to detect, detect and correct errors?

The participants performed 13 tasks to help them prevent, attempt to detect, detect and correct errors: announce the part they were working on, copy wording, derive rules, explain Checklist, explain Example, explain feedback, find their place in the assignment, gauge their writing, guide their writing, identify a component, learn the extent of the assignment, paraphrase wording, and read instructions on the tool. The participants did more tasks (nine) using the Example and the least number of tasks (six) using the Annotations.

- Interpretation 7-1: Certain kinds of tasks seemed to require certain kinds of tools.

The Annotations were used mainly to explain the Checklist, Example and feedback. The Checklist was used mainly to guide and gauge writing. The Example was used mainly as a source from which to derive rules, and to guide and gauge writing. The Form was used mainly to announce the part of the assignment being worked on, and to provide instruction on how to use the tools. The other tools in the course pack, which were often examples, were used mainly to guide writing and as a source from which to derive rules, as the prime Example was.

The tools were designed to accomplish certain kinds of tasks, so it would be no surprise, then, that those kinds of tasks would require those certain tools.

For example, the Annotations were designed to identify components and to provide further explanation of the Example and the Checklist. The participants used only the Annotations to provide further explanation of the Example and Checklist. On the other hand, they used all the tools to do some tasks, such as guide and gauge their writing. So some tools were flexible enough to be able to accomplish several tasks, and some tasks were flexible enough to be able to be done by different tools.

- Interpretation 7-2: Explaining examples to themselves by deriving rules from them seemed to help the participants understand the assignment.

All the participants explained the examples to themselves by deriving rules from them about how to write the assignment. They then applied these rules to their writing. Although the rules were listed in the Checklist, all the participants derived rules. In fact, deriving rules was the third most popular task the participants did with the tools after guiding writing and gauging writing. Instead of using the Checklist during session #1, Alan basically recreated the Checklist by deriving it from the prime Example. Even though the other participants used the Checklist, all of them derived the same rules, which were the basic rules listed in the Checklist.

Deriving rules was how the participants explained to themselves how the Example instantiated the Checklist. According to VanLehn et al. (1992), students who explain examples to themselves “learn better, make more accurate self-assessments of their understanding, and use analogies more economically while

solving problems” than those students who do not explain examples to themselves. I speculate that the participants may have explained complex cognitive tasks to themselves because they felt more conceptual conflict than they would have with simple cognitive tasks, where there are fewer decisions to make.

Self-explanation may not always be enough to affect achievement scores. Although Alan’s percentage of tool use for deriving rules from the examples was higher than the other participants, he scored lower than the other participants did on the production portions of test 1 and the final exam, and made more errors on the assignment than they did. It could be that the rules he derived and the explanations he made were not correct, or that he spent less time on task because of the number of times he digressed. Or it could be that his explanations did help him finish the course with a score of 90% on the final exam, even though this was below the class average of 93.64%. Perhaps without the self-explanation he would have finished lower.

An alternate explanation for the participants deriving rules is that rule derivation is an artifact of the verbal protocol used in this study. The participants verbalized their thoughts and actions as they did the assignment. Perhaps the act of verbalizing them encouraged the participants to explain the examples to themselves, something they might not have done if they had not been asked to verbalize.

I think they were deriving rules even when they forgot to verbalize. Alan was looking at the Example course diagram when he forgot to verbalize. When

asked what he had been thinking, he explained that he had identified components in the diagram as course goal and unit goals.

A: As I do look at this I'm starting to thinking, am thinking more about actually the unit goals and [LOOKS CLOSELY AT EXAMPLE].

R: Tell me! You suddenly got carried away by this.

A: [Laughs] Well, I guess I was. This is, okay, course goal. Okay. So this is just course goal and these are unit goals. (F1, 167-172)

Question 8: What were the immediate results of using the tools?

The immediate results of using the tools were that the participants were able to prevent, detect and correct a total of 50 errors in a portion of one of the four class assignments.

- Interpretation 8-1: Preventing, detecting and correcting errors in their performance seemed to help the participants practice correctly.

Being able to prevent, detect and correct their own errors helps students learn, according to Ohlsson's theory of learning from performance errors (1996). And appropriate tools made it possible for the participants in this study to prevent, detect and correct some of their errors. Appropriate tools are tools that can support the kinds of tasks the students will do and resolve the kinds of problems the students will encounter. Therefore, providing appropriate tools to students doing a complex cognitive task should help them learn how to do the task. They will practice the task more correctly if they prevent, detect and correct errors they make while doing the task. Otherwise they may practice incorrectly until their

errors are detected and corrected by someone else, at which point they will have to unlearn what they have practiced.

An alternate explanation might be that the participants copied the prime Example and changed its topic to their own, and so were able to practice correctly without preventing, detecting and correcting errors. This explanation might serve for simple cognitive tasks, but it was impossible for the participants to simply copy the prime Example and insert their own course topic into it, even if their course topic were in the same domain as the prime Example, which is mathematics. There were too many tasks and decisions necessary for copying to be effective. These multiple tasks and decisions are what made the assignment a complex cognitive task. Carol tried to copy the course diagram from the Example and insert her own course and unit goals into it, but found it did not work for her.

- Interpretation 8-2: Providing appropriate tools to the participants when they were doing a complex cognitive task appeared to save the instructor time.

Assuming the 50 errors can be generalized and there are 20 students in the class and four assignments, there is the potential that students can prevent and correct hundreds of errors before the instructor ever sees them. This would save a huge amount of time for the instructor, allowing him or her to spend more time individually with students making more serious errors they cannot detect on their own.

Question 9: What characterized each participant's use of the tools and practice of the assignment?

Alan, Beth and Carol were confident from the beginning that they could do the assignment, while Dana had a difficult time getting started and checked the tools often for reassurance. Beth, Carol and Dana mostly prevented errors by using the tools to guide their writing before they wrote, but Alan used the tools mostly as a source from which to derive rules and to gauge the correctness of his writing after he wrote. Beth was the only participant who initially understood how to write the assignment and use the tools; the others learned as they did the assignment. The two professional teachers, Carol and Dana, encountered more problems while writing their assignments than did the two non-teachers, Alan and Beth. All the participants found some things about the tools they did not like, but all eventually learned how to use them and found them useful.

- Interpretation 9-1: Participants' inaccurate perception of their initial task competence may have caused inefficient tool use.

According to Ohlsson (1996), in order to practice successfully, i.e., to learn from performance errors, people need some initial competence in doing the task that makes it possible for them to prevent, detect and correct errors. Initial competence seems to be filtered by students' accurate and inaccurate perceptions of it. This perception is the degree of confidence in and accuracy of what the students know and what they think they know.

I speculate that this perception of initial competence, whether it is accurate or not, influences tool use. The more distorted their perception, the more

inefficient the tool use, whether that distortion is inflated or deflated. Inefficient tool use means using the tools more or less than is needed to perform successfully. While Alan, Beth and Carol felt confident of their ability to do the assignment correctly, Dana lacked confidence. Dana used the tools more often than the others did, using the tools often for reassurance. Her tool use was not efficient because she used the tools more than she needed to. Alan, on the other hand, perceived that his competence was greater than it actually was. He made inefficient use of the tools because he did not use them when he needed to, thus making errors he or the instructor had to detect and correct later.

An alternate explanation might be that inefficient tool use was caused by a low actual (rather than perceived) initial task competence. I argue that a low actual task competence would create a need to use the tools, but that in itself would not make the tool use inefficient (too much or too little for the need). In general, the participants used the tools just enough to resolve the problem. It seemed it was when they felt the need for reassurance or felt overconfident that they used the tools too much or too little.

- Interpretation 9-2: Tool design seemed to make immediate sense to some participants, with little instruction needed, whereas others appeared to need more instruction and experience in order to understand them.

Beth and Dana seemed to understand immediately how to use the tools, whereas Alan and Carol needed experience using them before they became comfortable with them. The mental model the designer had of the tools was

originally based on his experience or the experience of others before him. Beth and Dana may have had experience with tools similar in design, so they immediately made sense to them, whereas Alan and Carol may have not had that experience. Dana stated she had made and used checklists, which she called grading rubrics (P2, 51-54), so she understood how to use them. Beth said she probably would not have understood how to use the Checklist if the instructor had not explained in class how to use it. (I1, 265-278) Perhaps she was able to make a mental model from the instructor's explanation, although in my experience, listening to or reading an explanation of how to use a tool is usually not sufficient to enable people to use the tool without error; experience is necessary.

- Interpretation 9-3: Participants' previous experiences may have influenced their tool use.

Carol and Dana, who had education degrees and years of teaching experience, had more questions and encountered more problems while writing their goals and objectives than Alan and Beth did, who did not have teaching degrees or experience. Carol thought the course goal in the prime Example was too small to be a course goal, but was more the size of a unit goal. Both Carol and Dana had problems deciding what a real world performance would be for their course goal, which was math. It seemed that because of the numerous problems they encountered, they both used the tools more frequently than Alan and Beth did.

- Interpretation 9-4: Tools appeared to be useful to participants despite their initial attitudes about them.

Even though all the participants saw things they did not like about the tools, they all used them and found them useful. Initially Alan had difficulty finding the tools in the large course pack. Beth thought the tools were too crowded and Carol thought the examples were too simple. Carol and Dana did not like options but preferred prescriptive tools, and Dana was initially afraid of the tools. After session #1 Dana found she needed to read the tools more carefully, because she discovered she had missed important points in the Checklist and Form. After she found the tools to be useful, she started using them more carefully. Even though Alan had initially had difficulty finding the tools in the large course pack, during the second session he stated that “everything is here for a purpose. You wouldn’t think so, seeing the huge thing, but actually everything is here...” (F2, 81-82) By the third session Dana said she no longer found the Annotations “scary” (P3, 381-386).

ANSWERS TO MAJOR RESEARCH QUESTIONS

Major Research Question #1: How do learners use performance support tools?

Complex cognitive tasks require flexible knowledge that can be applied to unfamiliar open-ended problem situations (Stark et al., 1998). A simple cognitive task, such as recalling the parts of an objective, would have one correct answer and would not

require multiple decisions. The complex cognitive task set before the students in CEP 808—to write instructional goals and objectives—was open-ended, meaning there was no one correct answer. The task required that the students apply flexible, general knowledge, such as that found in the performance support tools, to unfamiliar situations, that is, to write goals and objectives for a course goal that had not been discussed in the class. In this section of the chapter I will discuss what the findings mean with regard to the use of the tools.

To Explain Example to Self by Deriving Rules

One way the tools helped the participants accomplish the task was by providing opportunities for self-explanation. Self-explanation helps people learn better and make more accurate assessments of their own understanding (VanLehn et al., 1992). The participants explained the prime Example and other examples to themselves by deriving rules that they then applied to their own writing. All the participants derived the same rules the instructor told them in class or that were listed in the Checklist and on the rest of the tools. Alan used the tools often to derive rules. In fact, during session #1 he derived several rules during session #1 and did not use the Checklist at all. The Checklist contains a reminder of the rules for writing the assignment. In the example below, Alan explained the Example to himself by deriving the rule that the course goal in the diagram has a verb and an object.

[LOOKS AT EXAMPLE] I was looking at this, the whole course goal, and it starts out with “solve.” So it’s, I mean, you’re saying, **you’re saying you’re doing something, you’re solving problems.** (F1, -15:30) [*Bold mine - auth.*]

An alternate explanation is that deriving rules is simply an artifact of the methodology. I had asked the participants to think aloud while they were doing their assignment. This request may have prompted the participants to explain the examples to themselves, something they might not have done otherwise. Think-aloud or verbal protocol was described more than a quarter of a century ago as a method for investigating human problem solving (Newell & Simon, 1972). While self-explanation of examples by deriving rules may be an artifact of the methodology, there is evidence to show that verbal protocol is valid in representing a person’s thoughts (Newell & Simon, 1972; Ericsson & Simon, 1993; Fonteyn et al., 1993; Wilson, 1994).

To Review Essential Concepts and Satisfy Curiosity

Comprehensibility is an important cognitive determinant of motivation (McArthur, 1989). Students who do not understand concepts essential to doing the assignment correctly will likely become frustrated by their lack of understanding and inability to do the assignment. The participants used the tools to improve their comprehensibility in two ways: to identify areas they were having problems understanding, and to provide resolutions to those problems.

- The Checklist stated the required components and how they should be written.

- The Annotations provided further explanation of the Checklist, Example and instructor's feedback.
- The Example showed what a correctly written assignment looked like and acted as a source for deriving rules and self-explanation of how to write the assignment.
- The Form gave them a structure for the assignment and helped them find their place in the assignment.

After the problems were identified, the participants searched the tools and the course pack for ways to resolve the problems. They were most often successful. Problems they did not resolve successfully they left for the instructor to resolve for them via feedback. Successful resolution increased the participants' perceptions of their own competence and reduced failure and lack of motivation.

The participants also used the tools to satisfy their curiosity. The tools acted as a source of conceptual conflict by presenting rules and explanations the participants may not have understood or agreed with, and by presenting examples of the assignment that may not have agreed with their own writing. Conceptual conflict fits into one of the major categories of motivation: curiosity. Conceptual conflict occurs when there is an incongruity between the conception a person holds and the conception held out as correct and prompts information-seeking and problem-solving behavior. (Berlyne, 1965) The conceptual conflict between what they were thinking or had written and what the tools showed prompted the participants to attempt to alleviate the conflict. These prompts or cues, perceived by all the participants, were: uncertainty about the meaning of tools or instructions, about what to write or how to write, or about how to resolve a problem;

doubt about the correctness of what they had written; and lack of confidence about their understanding. The participants used the tools to alleviate uncertainty, doubt and lack of confidence by resolving problems and building understanding.

The Tools were Used Differently by the Participants

Although the participants used the tools in similar ways, as described in the previous chapter, there were also individual differences. This should be expected with general, flexible tools designed to support complex cognitive tasks. The participants used the tools differently in frequency, perception and processing.

One difference among the participants was frequency of tool use. Dana used the tools four times as often as Beth (212 times versus 52 times) while Alan used them 81 times and Carol 131 times. This difference in use is related to how the participants approached the assignment. Carol and Dana spent little time digressing, but stayed on task. Thus, they completed most or all of the assignment during the observation sessions. Alan, who digressed quite a few times and started one of the sessions 30 minutes late, was not able to finish the assignment during the observation sessions, so his recorded use of the tools is less than it is for Carol and Dana. Beth, who quit session #2 early because she was tired, also was unable to finish the assignment during the observation sessions. If Alan and Beth had been able to finish, their recorded tool use would have been higher. Having said that, there is still a large difference between the two participants with the most frequent use and the two with the least frequent use.

Frequency of tool use seems to be related to self-perception of one's initial task competence. In order to practice successfully, people need some initial competence that

makes it possible for them to prevent, detect and correct errors. I speculate that people's perception of their initial competence, whether it is accurate or not, influences tool use, and that an inaccurate perception may cause inefficient tool use. Inefficient tool use means using the tools more or less than is needed to perform successfully. While Alan, Beth and Carol felt confident of their ability to do the assignment correctly, Dana lacked confidence. Dana used the tools more often than the others did, and seemed to use the tools for reassurance more than the others did. Her tool use was not efficient because she used the tools more than she needed to. She double-checked and triple-checked various tools to make sure they agreed with the tools she had checked earlier and that what she had written was correct. On the other hand, Alan perceived that his competence was greater than it actually was. He made inefficient use of the tools because he did not use them when he needed to. For example, he used the tools infrequently when preparing to write. He then had more errors to detect and correct than the other participants did.

Another difference in perception was the participants' different responses to the tools. Dana found the Annotations "scary." Beth wanted concise tools while Carol wanted tools that gave no options. Alan initially lost his way in the large course pack. All four participants did not like something about the tools at first, but all of them used the tools and eventually came to like them and found them useful.

The participants used the tools differently in processing. One way is that they favored different tools. Alan used the Annotations more than the others in terms of percentage of use. Beth used the Checklist more, Carol the Example and Form more, and Dana the other tools more.

Probably the most striking difference in tool use was in what they used the tools for. Beth, Carol and Dana used the tools more to prevent errors than to attempt to detect them, while Alan used them more to attempt to detect errors. Preventing errors involved:

- the participants reading the appropriate heading in the Form to determine what part they were working on and what its purpose was,
- looking at the Example and Checklist to see what individual components of that part they needed to write,
- reading the Annotations for more information,
- looking for more examples,
- explaining the examples to themselves by deriving rules,
- deciding what correct writing would be,
- formulating mentally what to write,
- looking in the tools for resolutions to problems or answers to questions that arose,
- then finally writing.

Detecting and correcting involved writing, with or without preventing errors, then:

- comparing the writing to the Checklist and Example to see if the required components were included and written correctly,
- looking for more examples,
- deriving rules from examples and other tools and applying them to the writing to see if the writing was correct,
- finding resolutions to problems that arose,
- deciding if the writing was correct, and

- if the writing was not correct, determining what was incorrect and how to correct it.

Essentially this meant that Alan used the tools less to plan and learn before writing, but used the tools more after writing to see if what he had written was correct. Beth, Carol and Dana used the tools more often before writing and less often after writing.

Ohlsson (1996) refers to the cognitive tasks of performance as constraining, detecting and correcting errors rather than preventing, detecting and correcting errors. Constraining errors means to apply a specialized method or set of rules that describe and prescribe correct actions. In my study I am using the phrase “prevent errors” to mean resolving problems before writing them into the assignment. The problems are resolved, and hence errors are prevented, by using the tools to describe and prescribe correct actions, thus constraining or preventing the participant from making errors.

I speculate that there may be some similarity cognitively between preventing errors (resolving problems) and detecting and correcting errors. In this study problems were questions or misconceptions a person had that needed to be resolved or corrected. Errors were questions or misconceptions that had been written down before being resolved.

To resolve a problem or detect an error, students first must detect the error by noticing a conflict between what they think is correct and what ought to be correct. In this case, it was the tools that told the participants what ought to be correct. Thus, they identified problems and detected errors in the same way: by noticing a conflict between what the tools said was correct and, in the case of detecting errors, what they had written, or in the case of preventing errors, between what the tools said was correct and the question or conception they held.

Correcting a problem or error requires people to determine how the problem or error is wrong and how it should be changed in order to be correct. In this study the tools stated in detail what components should be included in the goals and objectives and how they should be written. To correct both misconceptions and errors, students need to change them to conform to what is correct. In this study the participants corrected the misconceptions and errors by changing them to fit what the tools stated was correct. The only difference between preventing and detecting/correcting errors, then, seems to be at what point the errors are detected and corrected: before or after they are written down.

Do students learn better or achieve higher scores by preventing errors than by detecting and correcting them? Alan, who used the tools more to detect errors, scored lower on the production sections of test 1 and the final exam than did the other three participants, who used the tools more to prevent errors. McArthur (1989) says that detecting and correcting errors are what make practice different from performance. He says it is the processes of diagnosing and correcting errors that give students a chance to improve their knowledge.

Checking for errors in correct answers may reinforce correct conceptions, but McArthur says nothing about the value of preventing errors in the first place. It would seem that if students prevented errors rather than detecting them, they would practice correctly rather than practicing errors. They would not have to unlearn misconceptions and replace them with correct conceptions. They would still go through the same processes for detecting and correcting errors, so they would still have a chance to improve their knowledge. The question of whether there is a difference in achievement between

those who do more preventing and those who do more detecting and correcting is a question that should be explored in future research.

Major Research Question #2: How do the tools support learning from performance?

Ohlsson's theory of learning through performance errors seems to explain how the tools were able to support performance and learning: 1) by providing initial competence that enabled the participants to prevent, detect and correct errors in doing the assignment, and 2) by providing an informative task environment that enabled the participants to make decisions about their writing.

In this study the complex cognitive task, which was writing instructional goals and objectives, required the participants to have three types of knowledge: 1) knowledge of the domain of the course they were writing the goals and objectives for, such as math; 2) knowledge of the task, that is, how to write instructional goals and objectives; and 3) knowledge of how to use the performance support tools.

Initial competence in this study meant the participants having enough course domain knowledge and task knowledge to be able to tell when they had made an error writing a goal or objective and how to correct it. Initial competence in the course domain knowledge was not provided by the tools but was brought to the class by the students. The instructor made it clear in class that the students were to select a course topic they already knew well. Initial competence in the task knowledge of how to write instructional goals and objectives was, however, provided by the performance support tools. The instructor also provided some initial competence in how to use the tools by explaining and demonstrating their use in class.

Ohlsson (1996) says that a task environment describes the possible situations and decisions to be made during a performance, and an informative task environment provides information to help the performer identify the current situation and make the correct decisions. "Prior knowledge about the task environment is the learner's main resource for judging whether the situations he or she creates or encounters are promising or problematic" (p. 245). It appeared that the tools provided initial competence and an informative task environment as shown in Table 19 below.

The Tools:	Provided initial competence that supported preventing, detecting and correcting errors by:	Provided an informative task environment that supported decision-making by:
Annotations	identifying components and giving further explanation about the Checklist and prime Example.	
Checklist	listing required components and how they were to be written, thus giving the novice a more specific method to use that would prevent errors and would help the novice detect and prevent errors.	describing various parts of the assignment and the decisions to be made.
Example	instantiating the Checklist, providing a source from which to derive rules for explaining the example to one's self, and providing models of phrases from which to paraphrase or copy.	illustrating the defining characteristics of a correctly written assignment.
Form	naming the parts and purpose of each part.	showing the structure of the assignment and chunking it into manageable pieces.

Table 19: How the Tools Provided Initial Task Competence and an Informative Task Environment

The Tools Provide Immediate Help

In this study the tools provided immediate answers to questions and resolutions to problems that enabled the participants to prevent, detect and correct 50 errors in assignment #1 alone. This immediacy improved the effectiveness of the tools. “Diagnostic processes work most effectively when critical information is available at the time of reasoning” (McArthur, 1989, p. 5). Being able to prevent, detect and correct errors made it possible for the participants to practice writing the assignment correctly rather than practice writing it incorrectly; they could prevent errors before writing, and detect and correct errors they had made immediately after writing. It would seem likely that correct practice is more efficient and effective than incorrect practice because the participants would not have to unlearn errors they had practiced. In addition, the participants likely learned more by preventing, detecting and correcting errors themselves than if the instructor had done it for them because, according to Ohlsson (1996), by doing so they were able to specialize their too-general production rules that caused the errors in the first place.

Expanding Ohlsson’s Theory

Ohlsson’s theory, a model of which is shown in Figure 38 below, addresses the role of error prevention (which Ohlsson calls constraint), detection and correction in learning from performance errors.

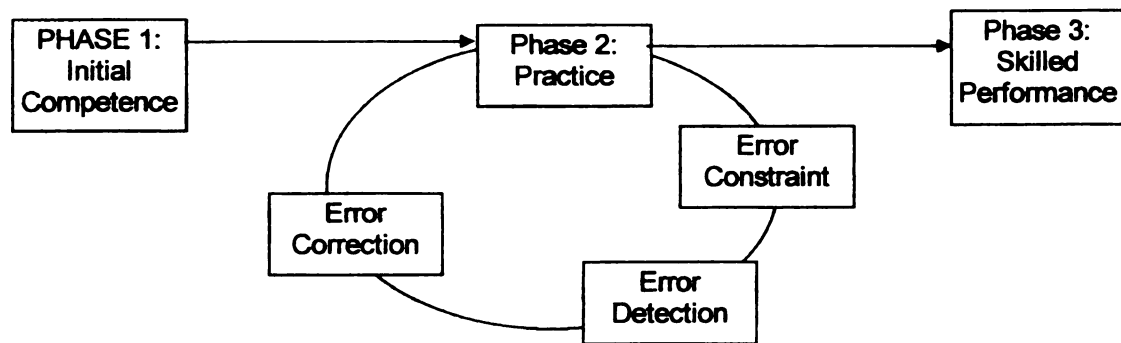


Figure 38: My Original Model of Ohlsson's Theory

Before practice begins, initial competence in the skill to be practiced and performed is acquired somehow, perhaps by reading a book or asking others. During practice learners use their initial competence to constrain or prevent errors. They gain experience and practical knowledge of how to do the skill by detecting and correcting errors in their performance. Detecting and correcting errors is frequently an iterative task because in a complex cognitive task there may be many production rules to check and correct, and these may be detected only one or a few at a time. Others might be detected after a second practice, and so on. When learners have corrected all the errors, they can then perform the skill with mastery.

Based on the findings of this study, I expanded the model to include performance support tools and individual traits and abilities, and changed how error prevention fits into the model. This expanded model is shown in Figure 39 below.

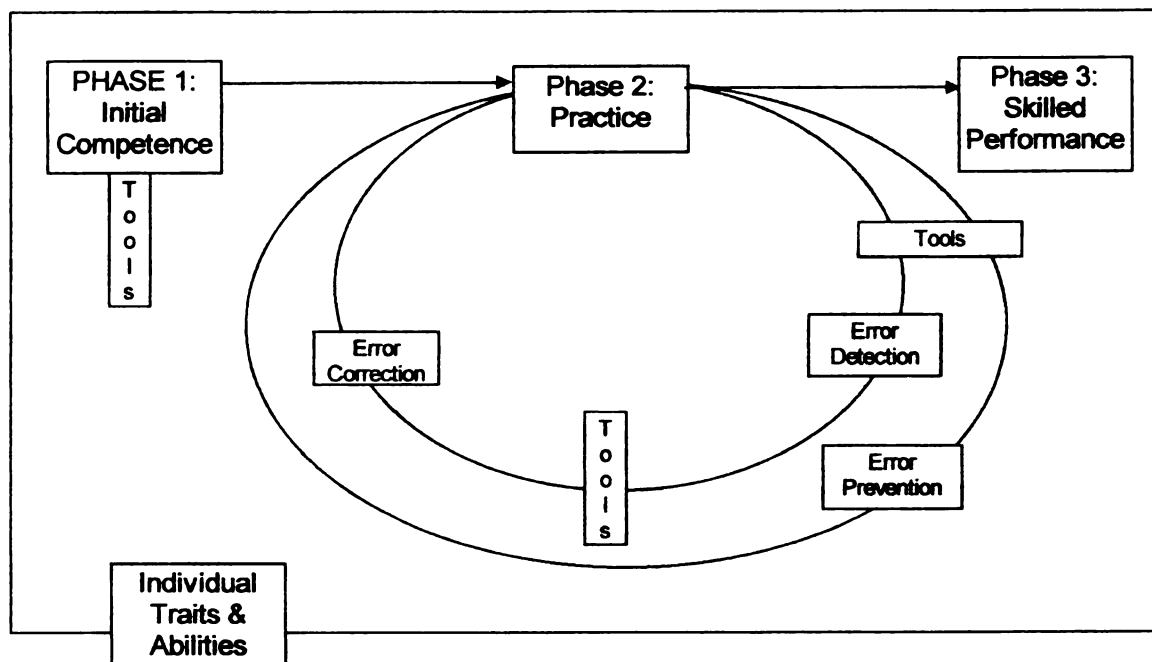


Figure 39: An Expanded Model of Ohlsson's Theory

In this study the initial competence in doing the skill—writing instructional goals and objectives—was acquired from the instructor's explanations in class and from the performance support tools. The entire model is encompassed by the individual's traits and abilities, which influence how the practice is done and how the tools are used. These individual traits and abilities may include how much time an individual spends on the task, which is affected by the individual's propensity to digress, the individual's initial competence in tool use and in how to do the assignment, and the individual's perception of his or her own initial competence, which affects how they use the tools. For example, Dana's perception of her competence was negative, so she used the tools more frequently to reassure herself that what she had written was correct. It took her longer to finish the assignment, although she ended up achieving a high score on the production parts of the

tests in class. I speculate that another individual trait might be whether the individual has a mastery or a performance orientation to learning. A student with a mastery orientation might make an effort to learn the required task knowledge and how to use the tools. A student with a performance orientation might be more satisfied with copying and simply modifying the examples. During practice of a complex cognitive skill, however, merely copying and modifying examples would not be sufficient to perform the skill effectively because of the multiple decisions to be made.

During the practice phase of the model, error prevention is shown as a circle separate from error detection and correction because preventing errors may make detection and correction unnecessary. The performance support tools are shown intersecting both the detection/correction and prevention circles and placed before prevention, detection and correction because the tools can support all three cognitive functions separately.

The practice may include practice doing the skill, such as writing instructional goals and objectives, practice detecting and correcting errors, and practice using the tools. In order for practice to be efficient and effective, knowledge of how to detect and correct errors and how to use the tools should be part of the initial competence.

The findings confirmed predictions I had made from Ohlsson's theory. The findings supported Principle #1, that learners make errors because they use production rules that are too general for the task. The types of errors the participants detected and corrected in this study were displacement errors, in which the participants' knowledge was too general for the situation and had to be specialized to correct the error.

Principle #2 says that learners must already know enough about the skill to be able to tell when they are doing something wrong and how to correct it. The participants used the tools to gain initial competence and an informative task environment so they could detect and correct errors and could make informed decisions.

Principle #3 says that learners recognize errors when there is a conflict between what they perceive is true and what they believe ought to be true. The participants frequently recognized errors by comparing the Checklist or Example with what they had written and perceiving a conflict between the two.

Principle #4 says that learners correct errors by making general knowledge structures more specialized, that is, used only in appropriate situations. After detecting errors, the participants corrected their errors by making their writing conform to the correct writing shown in the tools. This correct writing in the tools was more specialized in order to make it appropriate to the situation.

IMPLICATIONS OF THE FINDINGS

Implications for Teachers

The findings from this study may have implications for teachers of complex cognitive skills. In this study the frequency of tool use decreased, possibly because the participants learned how to do the assignment and how to use the tools. Teachers who worry that students will use support tools rather than learn how to do the task on their own are perhaps worrying needlessly. At least for complex cognitive assignments, it

seemed that the participants in this study used the tools only when they needed to and stopped using them when they became unnecessary.

Complex cognitive skills require flexible, less structured knowledge that can be applied to unfamiliar problem situations (Stark et al., 1998). Tools for such tasks must themselves be general in order to be flexible and applicable to unfamiliar situations. Because the tools are general, it is unlikely that students would be able to use them and thus avoid learning how to do the task. That is, the tools are not sufficient to enable students to do the task. They must also come to understand how to do the task, and the tools actually help students come to that understanding. Once they do understand, they may use the tools less often. This was the case in a study of how people use interactive tools to help them run an unfamiliar photocopier machine (Sleight, 1995). As they learned how to use the machine they used the tools less often.

The findings of this study also showed that the tools saved the instructor large amounts of time, and could possibly do the same for other instructors. One way the tools saved the instructor time in this study was they helped the participants prevent, detect and 50 errors in part of Assignment #1 alone. Thus, the instructor did not have to detect as many errors and provide as much feedback as he would have had to do without the tools. There were 20 or so students in the class and four assignments. Assuming these numbers generalize, simple multiplication shows that use of the tools saved the instructor from having to detect and write feedback for hundreds of errors during the course.

Another way the tools saved the instructor time in this study was by facilitating feedback. The tools provided him with a built-in criterion Checklist on which he could note which items were present and written correctly. He could write "OK" next to the

Checklist item and draw an arrow to the instantiation of that item in the student's writing. For negative feedback he could write "MISSING" next to the item and draw the arrow, or indicate what quality was lacking. This shorthand proved effective, the participants liked it, and the instructor could detect errors and write the feedback quickly.

The instructor of CEP 808 said he was surprised at how much the participants' tool use differed. When asked if he would make any changes in his class as a result of the findings of this study, he said he would continue to use the tools, but that he would have the students explain the tool use to each other before they started the assignment, to make sure they knew how to use the tools, and he would tell them the findings of this study to convince them to use the tools.

The tools accomplished what the instructor intended them to and hoped they would: to help his students practice more correctly by preventing errors and detecting and correcting errors before handing in the assignments, and to save himself time because he would have fewer errors to detect and so could write feedback more quickly. I would suggest that the instructor of CEP 808 continue to provide varied tools and additional examples from various domains, to explain and demonstrate in class how to use those tools, and to provide feedback coupled with the criterion Checklist. He might want to consider gathering the additional examples into one section of the course pack to make it easier for the students to find them, and to format them the same way as the prime Example (that is, with the condition and behavior separated and the purpose written in the condition).

The findings of this study may inform the design of performance support tools for complex cognitive tasks. For example, all the participants used the tools in response to the

same cues and during the same conditions of the assignment. These may indicate common information processing functions people use when doing a complex cognitive task:

- orientation at the beginning of the task, when starting a new part of the task and when lost,
- solving problems and preventing errors, and
- detecting and correcting errors.

Knowing these functions should help us design tools that can support complex cognitive tasks. The tools “should not just be designed to help practice as an undifferentiated whole; they should facilitate the particular information processing activities that we know contribute to learning cognitive skills” (McArthur, 1989, p. 2). These cognitive skills, McArthur says, include exercising formative and flawed conceptions, detecting and correcting errors, and strengthening correct conceptions. The tools provided in CEP 808, and the design of the course itself, did appear to facilitate these cognitive skills. The assignment elicited misconceptions and the tools helped students detect and correct errors by showing what a correct assignment looked like and by listing required components and how they were to be written. The students were also able to strengthen their correct conceptions by applying to the project what the instructor’s feedback had told them in the practice was correct.

Implications for Future Research

The methodology used in this study may be helpful for others studying the use of performance support tools. Teach the subjects how to think aloud. When observing the practice, videotape it. Make sure the angle of the video camera is such that it can catch what tools the subjects are using. It would be helpful to use two cameras, one focused on the assignment and one on the subjects. Put a microphone near the subjects to improve audio. This will be important when transcribing. During the observation session ask questions to elicit what tools are being used, why the subjects are using that tool, and what problem they are trying to resolve. Try not to speak unless it is to prompt the subject to speak or to clarify what the subject said.

Transcribe the tapes verbatim and describe the subjects' actions. Then analyze the transcripts for the strategies the subjects used when doing the assignment, the tools they used, the purpose and task for which they were used, when during the session the tools were used, and how were they used in combination with each other. Pay particular attention to problems that occur during the assignment and how those problems are resolved, and to errors that are made and how they are detected and corrected.

To increase generalizability, I would suggest replicating this study in the same class with the same tools, instructor and assignment but different students. Since this is not possible because the instructor retired, the study could be replicated in another class. The students would have to have an assignment to do a complex cognitive skill, and the instructor would have to analyze the task knowledge required to do the skill and design

tools to provide that knowledge. Additional studies could vary the skill level from complex to simple and the types of errors from displacement to other.

Future research in this area might ask these questions:

1. Are there conditions under which Ohlsson's theory of learning from performance errors does not hold?
2. Do students use performance support tools rather than learning how to a simple cognitive task?
3. Do students continue to use performance support tools after learning a complex cognitive task?
4. Do students practice more efficiently by preventing errors than by first making, then detecting and correcting them?
5. Cognitively, is there a difference between preventing errors, and detecting and correcting them?
6. Does the students' tool use change after they become adept at using the tools and are given another complex cognitive task that uses the same tools?
7. Do students with mastery or performance learning orientations use the tools differently?

CONCLUSIONS AND FINAL WORDS

The findings from this study lent support to Ohlsson's theory of learning from performance errors by supporting the principles of his theory: that learners make errors because they use production rules that are too general for the task; that learners must

already know enough about the skill to be able to tell when they are doing something wrong and how to correct it; that learners recognize errors when there is a conflict between what they perceive is true and what they believe ought to be true; and that learners correct errors by making general knowledge structures more specialized so they are used only in appropriate situations.

It appears that performance support tools aid performance and learning from displacement errors in two ways: 1) by providing or enhancing initial competency in task or domain knowledge, which enables students to detect and correct their own errors, and 2) by providing an informative task environment, which enables students to make decisions about which options to select in which situations.

Performance support tools may also save instructors time and effort by reducing the number of errors they have to detect and by facilitating the writing of feedback.

Some instructors do not like providing such support for fear students will not learn to do the skill without the tools. In this study the participants' use of the tools decreased in the third session, which I interpreted as caused by a decrease in need due to having learned the skill. There may be alternate explanations for this decrease, such as the task was easier in session #3. In other research, however, participants' use of the support tools also showed a decrease as they used the machine (Sleight, 1995). Although more research is needed, it appears that students do not tend to use the tools after they have learned the skill, but stop using them when they are no longer needed.

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**USE OF PERFORMANCE SUPPORT TOOLS DURING
UNSUPERVISED PRACTICE OF A COMPLEX COGNITIVE TASK**

VOLUME II

By

Deborah Alpert Sleight

A DISSERTATION

**Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of**

DOCTOR OF PHILOSOPHY

Department of Counseling, Educational Psychology and Special Education

2000

APPENDIX A

ALAN'S STORY

OBSERVATION SESSION #1

Assignment: Diagram the course structure into the course goal and unit goals.

Orientation

Alan began observation session #1 by identifying the Form and the Example. Then he looked in the course pack for the phrase the instructor had used to describe the course goal: "real world performance." He explained aloud how to use the Form and the Example, mentioning the self-monitoring items at the top of the Form and the annotations on the Example.

Alan decided to "stick to the plan," that is, to do the assignment as it was sequenced in the Form. He looked through the course pack for a page of definitions, but because he had not familiarized himself with the course pack, he had trouble finding what he was looking for. He decided to start marking important pages, beginning with the examples on pages 87-90. He remembered from class that he had wanted to make sure he included a role, setting, behavior and purpose in his course goal, so he thought about this when he read the example on page 88. He did not realize that it was an example of the complete course goal in part 3, not the abbreviated course goal used in the course diagram.

Write Course Goal for Diagram

Alan had already been thinking about his course subject and how he would divide the course goal into units. From the Example of the course diagram Alan derived the rules for how to structure the diagram. He then patterned his course goal after the Example of the course goal in the diagram (which was the correct thing to do) rather than after the longer, spelled-out course goal in part 3 of the assignment.

Write Unit Goals

From the Example he was able to identify the course goal and the unit goals in the diagram. He wondered what the difference was between goals and objectives, but he could tell from the headings on the Form that they were different things. He studied the Example diagram again, then wrote his unit goals.

For the rest of the observation session he used the tools to attempt to detect errors in what he had written. Although the Example of the course goal in the diagram contained only a behavior statement (e.g., "Create digitized video files..."), Alan included an initial prepositional phrase and subject, which he should not have done ("Upon successful completion of this unit, the student...") He did not detect this error, although he used the Example for this purpose. The instructor later pointed the error out to him in feedback.

Select a Unit to Develop

Alan was not sure how many units he was to develop, but he determined he was to write one by reading the annotation "Unit to be developed" on the Example diagram. He thought that the practice and project were one and the same. After discussing it with the researcher and reading the instructions at the top of the Form, he realized that he had to create two different assignments on two Forms. Eventually he chose the more complex unit to write as his practice unit so he could get feedback on it, and the less complex unit as the project, which would be graded.

Revise Diagram

Alan decided to revise his diagram at home after the observation session, but agreed to revise it during the session. He compared his diagram to the Example and saw that his course goal was more specific than the Example. His course goal said: "Successfully set up and operate a computer system and display in a technology classroom." The Example course goal said: "Graduates solve division problems with whole numbers."

Alan studied the Example again and saw that each unit and subunit goal started with the same verb, in this case "solve." He made his course goal more general by deleting specific details such as "system" and "display." He then studied the Example again and saw that each unit and subunit goal contained the same phrase as the course goal: "solve problems," so he decided he would have to change his unit and subunit goals ("PC platform" and "Mac platform") to sound like his course goal. He looked to the Example for help in how to word the unit goals, and saw that each unit goal and subunit goal became more specific by adding another criterion.

We're using short division and then we're adding another criteria to that in each case. So we're doing the same thing here [in subunits] as we are here [in course goal] with just one other criteria added to it. [GLANCES BACK AND FORTH BETWEEN EXAMPLE AND PRACTICE] (F1, 486-490)

Alan kept referring to the Example as he revised his goals. He must have continued to revise them at home, because eventually he ended up handing in a totally different set of course and unit goals, shown below:

Upon successful completion of this unit, students will be able to digitize videotape optimized for multimedia applications.

- I. Create digitized video files optimized for use on the World Wide Web.
 - A. Create digital QuickTime files (PROJECT)
 - B. Create digital RealMedia files
- II. Create digitized video files optimized for CD-ROM applications
 - A. Create digital video QuickTime files for Macintosh applications (PRACTICE)
 - B. Create digital video for windows (.avi) files for PC applications

Alan did not use the Checklist at all during session #1. He derived much of it himself from the Example. One rule he derived by looking at the Example course goal was that all the goals should contain an action verb.

I was looking at this, the whole course goal, and it starts out with "solve." So it's, I mean, you're saying you're doing something, you're solving problems (F1, 381-384).

CHRONOLOGY OF TOOL USE

The actions Alan took while writing his assignment during session #1 are shown below in chronological order, followed by a model of the chronology and a summary of the model.

ORIENTATION

- Considers developing a unit that will have real world results.
- Explains how blank form and example are used.
- Confused about blank form and example because calls blank form the example.
- Considers disorganization when looking for definitions in course pack.
- Reads definition of "real world performance."
- Brings out blank form with headings.
- Explains how to use self-monitoring items at top of blank form.
- Looks for example of assignment in course pack, but can't find it.
- Considers disorganization.
- Decides to follow sequence of content in blank form.
- Decides to do the diagram, then see if the units are usable for the assignment.
- Think and write, but don't use the computer initially.
- Can't find definitions in course pack.
- Reconsiders his disorganization.
- Decides to put tabs on important pages in the course pack as he finds them.
- Reads numbers of important course pack pages he has written in his notes.
- Reads Example of Assignment but it isn't what he is looking for.
- Looks at other examples on pp. 88-89.
- Writes page number 87 down on note paper.
- Decides to use a different example (p. 88) as an overview of the entire assignment.
- Looks for different example (p. 88).
- Looks through entire example on p. 88 for components of course goal.
- Considers how difficult it is to find things in the course pack because it is so big.
- Decides to write all the components of the goals and objectives and to edit later.

COURSE DIAGRAM

- Looks for example of course diagram in course pack.
- Reconsiders disorganization.
- Finds example of course diagram on p. 74.
- Reads example of assignment.
- Writes course goal for diagram.
- Looks at example course diagram to learn structure and organization of example assignment.
- Feels ignorant because has no background in education, so doesn't understand educational use of some of the terms.
- Analyzes example of assignment to see what unit goals and objectives are.
- Reads example and realizes that unit goals and objectives are different because they have separate parts in the assignment.

- Writes unit goals for diagram.
- Considers what relationship is between unit and course.
- Decides to choose less complex unit for practice so can receive feedback and apply to more complex unit for project.
- Chooses units for practice.
- Considers how difficult it is to develop just one piece of the course.
- Thinks about developing a major unit as a resolution to problem above.
- Reconsiders disorganization as he tries to find in course pack where instructor talks about how to decide if a major unit or a subunit is more appropriate to develop.
- Reads example
- Considers problem of selecting a unit for development that is not too simple or too complex.
- Decides to choose unit with more potential students as project, reinforcing his earlier unit selection.
- Decides to choose dissimilar units for project and practice so can apply instructor's feedback to something new and different.
- Reads his course goal and decides it may need to be more general.
- Starts revising course goal in diagram.
- Reads example and realizes that all goals in diagram start with a verb: solve.
- Mistakenly thinks that project and practice are one and the same until he asks researcher.
- Reads example.
- Realizes that unit goals are subsets of the course goal.
- Rewords unit goals to sound like subsets of course goal.
- Compares example to his diagram.
- Reads note to learn what second level of diagram is called "major units."
- Reads note to reinforce that units are subskills to reach the course goal.
- Revises wording of unit goals in diagram.
- Reads example.
- Starts to rewrite diagram on clean paper.
- Compares example to his diagram.
- Writes subunits for PC unit.
- Chooses subunits as his practice and project.
- Compares example with his diagram to see if he is done.
- Decides to turn diagram in early to get early feedback.
- Again compares example with his diagram.
- Looks at later parts of example to see what will the assignment will require later.
- Wonders why title, course diagram, goal and terminal objective need to be repeated for second unit when same as for first unit.

Summary of Tool Use

Initially Alan thought about the course he wanted to design, then looked at the tools to get an idea of how the course goal should be written. He wrote the course goal, then followed the same procedure for the unit goals. He had to look at the Example to see that unit goals are different from objectives.

After he was finished with the diagram he went back and began revising it. He used the tools to help him know how to word the course goal. The unit goals were more difficult because they had to show their relationship to the course goal, so he looked at the Example again and was able to derive some rules on how to show that relationship. When he was done revising he used the tools to gauge the correctness of his diagram and was satisfied.

Model of Tool Use

Figure 40 below shows a model of Alan's tool use during session #1. The horizontal line represents time. The area above the line indicates the tools Dana used and the purpose for which she used them. The area below the line indicates which part of the assignment Dana wrote at that time. The abbreviations used in the model are:

FO = Form; EX = Example; CL = Checklist; AN = Annotations; explain = explanation;
ex = additional example; CG = course goal; CTO = course terminal objective; UG = unit goal;
→ = prevent error; ← = detect/correct error; | = division between parts

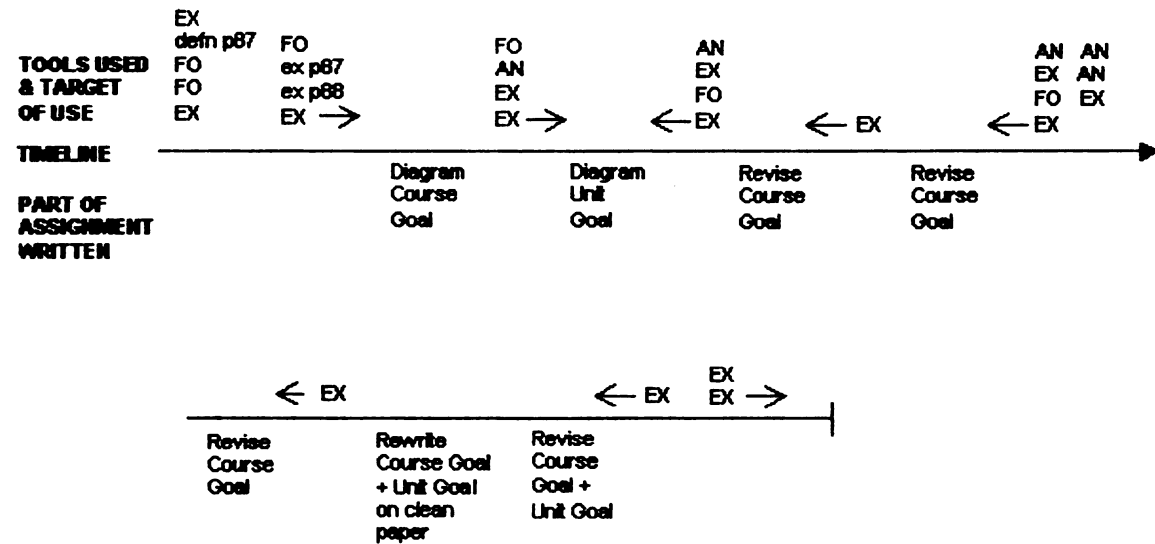


Figure 40: Model of Alan's Tool Use during Session #1

HOW ALAN USED THE TOOLS

In this section I will describe which tools Alan used, how frequently he used them, for what purpose he used them and what tasks he did with them, what cued him to use them, and what characterized his practice of the assignment and his use of the tools.

Alan used the tools 31 times: the Example 19 times, the Form 5 times, the Annotations 3 times, the other tools 3 times and the Checklist not at all. These numbers are shown in Figure 41 below.

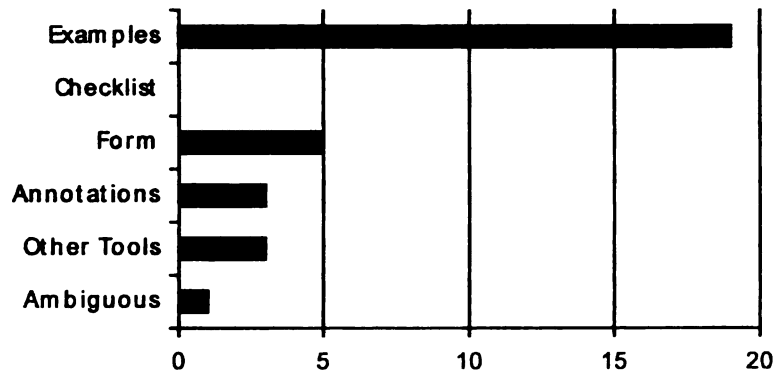


Figure 41: Alan's Frequency of Tool Use during Session #1

Almost all of Alan's total tool use during observation session #1 involved the Example. He used the Form a little more often than the Annotations, and the Checklist not at all. Alan used the tools at the beginning of the assignment to learn what course goals and unit goals were and how to write them. After he finished writing he used the tools to help him gauge the correctness of what he had written and to see what the future parts of the assignment were like.

Alan consciously responded to three cues to use the tools:

- 1) when he was uncertain what to write, such as when he started a new part or when he did not understand the tools or instructions,
- 2) when he had questions about the tools or instructions, and
- 3) when he wanted to check what he had written to see if it was correct.

Most of Alan's tool use during observation session #1 was for the purpose of preventing errors by resolving misconceptions and problems, and attempting to detect errors. He used the tools 15 times to prevent errors and 14 times to attempt to detect errors. These numbers are illustrated in Figure 42 below.

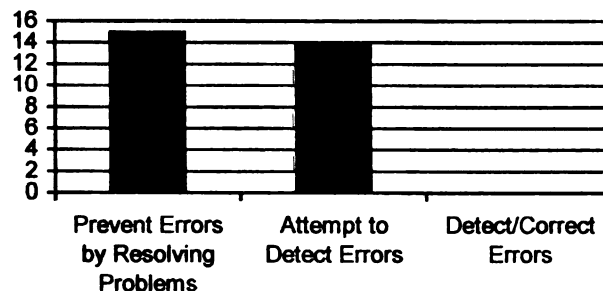


Figure 42: Alan's Frequency of Tool Use for Preventing, Attempting to Detect and Detecting/Correcting Errors during Session #1

Alan used the tools in various ways to help him prevent, attempt to detect, and detect/correct errors. Table 20 below lists the tasks he did to accomplish these purposes.

Prevent Errors By Resolving Problems	Attempt To Detect Errors	Detect/Correct Errors
Derive Rules – 4 Guide Writing - 3 Identify Components – 1 Learn Extent – 1 Use Tool - 5	Derive Rules – 7 Gauge Writing – 5 Identify Components – 1 Learn Extent – 1 Use Tool - 1	

Table 20: Alan's Tool Use Tasks during Session #1

Alan's main tasks for preventing errors were to learn to use the tools correctly and to derive rules from them, as shown in Figure 43 below. His main tasks for attempting to detect errors were to use the tools to derive rules and to gauge the correctness of his writing.

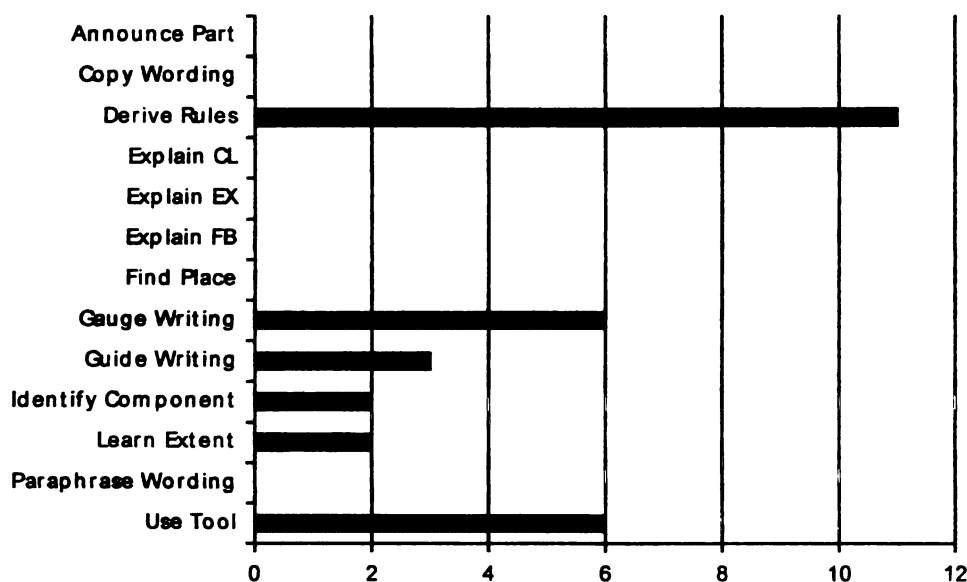


Figure 43: Alan's Frequency of Tasks during Session #1

Immediate Results of Tool Use

The immediate result of Alan's use of the tools during session #1 was that he prevented two errors by resolving misconceptions. The tool used is indicated at the beginning of the list of misconceptions resolved below:

- Example: How specific the wording should be (F1, 359-371)
- Example: How the practice and project are supposed to work (F1, 645-654).

Characterizations of Tool Use and Practice of Assignment

Alan's use of the tools was characterized by his not using the Checklist but instead deriving rules for writing and structuring the diagram from the Example. His practice during session #1 was characterized by his lack of confidence, caused by his minimal background in education, and his confidence, caused by his experience of taking a course in instructional design years ago, that he could "scoot through" the assignment. (F2, 38) The concepts presented in class sounded familiar to him, but he was either unfamiliar with or confused by much of the terminology he encountered.

OBSERVATION SESSION #2

Assignment: Revise course diagram. Write course goal, course terminal objective and unit goal. Alan did not have time to write the unit goal during session #2.

Alan had apparently decided to go with a different course than the one he worked on in session 1. During that session he had created a course on setting up and operating PC and Macintosh computers. The diagram he turned in, however, contained a course goal on "digitizing video for multimedia applications."

Revise Course Diagram

At the beginning of the session, after digressing about Macintosh computers, he decided to revise his diagram according to the feedback he had received from the instructor in class. The feedback pointed out that Alan had included in his diagram course goal information that should go into the more detailed course goal in part 3: "Upon successfully completing this unit, the student will..." He was told to move it to the course goal in part 3, then to change "student" to "graduate" and "unit" to "course." He did this, then thought he was done with part 3. He discovered later that he was far from done!

He liked the instructor's positive feedback of putting "OK" in front of everything he checked that was fine. Alan said it relieved his uncertainties about what he had written being correct.

Alan felt he would be able to "scoot through" the assignment, having looked through the Example earlier (F2, 38), because he had had some training in instructional design years earlier. He felt he "had a good grasp" of how to finish the assignment (F2, 72-73), that the writing the course goals and terminal objectives was "fairly straightforward." (F2, 73-74) He liked the fact that there were "lots of examples" in the course pack (F2, 81-82), if he could only find them. He finally started revising after two more digressions, one on notebook binders and one on another project for his class (FEI). He revised his course goal by removing the first phrase and moving it to part 3.

Then he looked at the top of the Form and realized he had to create two assignments, one for practice and one for project. "I just realized I have to do two of these. I have to do this twice" (F2, 128). He had a short discussion with the researcher

about why the instructor required both practice and project, then he finished revising his diagram.

He then read the heading for part 1, "Subject" then read the subheadings for part 3, "condition" and "behavior." He wondered why they were separated because he thought they should be written together into one statement. He looked for the Example, and after finding it, tabbed it so he could find it again.

Write Course Goal

Alan continued on by reading the heading for part 3, "course goal." He then read the Checklist, which listed the components the goal condition was supposed to have. He put his finger on the word "home" in the Example course goal condition ("As managers of resources, for any problems needing division of resources at home or in business") and noticed that he did not have a setting in his course goal.

Upon closer reading of the feedback, Alan realized he could not decipher one of the words. He thought the feedback said, "This need test say anywhere," but what it actually said was, "This need not say anywhere." It was referring to the phrase he had just deleted from his diagram course goal: "Upon successfully completing this course." Rather than spend more time on puzzling over the feedback, he moved on to the rest of the course goal in part 3.

He compared the Example with his course goal to see if he had all the components he needed. He noticed again that it had no setting and no purpose. Alan decided to look for the definitions again, and started leafing through the course pack. He came upon the course calendar, which he marked, then stopped to read the instructions and objectives for assignment #1. He commented that he appreciated the course pack, even though it was huge and hard to find pages in, because "there is so much stuff here but everything in here is like so important, it's like everything you read is, everything is here for a purpose" (F2, 263-265).

He read the definition for "objective," then realized he was working on the course goal, so he read the definition for "goal," which was: "Goals include the graduate's real world role, setting, purpose and behavior." He then understood that he was not simply able to cut and paste from his diagram course goal and be done with his detailed course goal in part 3, but needed to write a role, setting, purpose and behavior. In fact, the phrase he had cut and pasted was not even necessary, as the illegible feedback would have told him if he had been able to decipher it.

He wrote a setting ("on a Macintosh computer") then wondered if it was too general. To find out, he read the example on page 88 in the course pack and saw that the settings were more explicit ("at home"). He then read the directions on the page, which told him to "note the roles, setting, purpose and behavior in course and unit goals." He reread the example and identified each component, then identified the purpose in his course goal. He even realized that he did not have a role yet.

This is an example of a course goal. It says, "As a healthy adult." The role, that's the role, "adult" is the role. "Healthy adult at home." So it actually says "at home."

"The graduate student will plan a fitness program." "Plan a fitness program," that's the behavior. "So that he or she will maintain total body fitness." So "optimize for multimedia applications," so that's my purpose.

So gee, I don't even know if I have role." (F2, 291-295)

Alan read the example on page 88 again, then paraphrased it as he wrote a role ("As a student employee of the IMC"). He read the example and again paraphrased as he wrote the first part of the behavior ("graduates of this course will"). He then gauged his work by using one of the tools (it was impossible to determine which tool he was using).

I've got it all. I've got a setting, I've got a behavior, and I've got a purpose, and that's more than I had before. (F2, 304-305)

He revised his course goal so it would not be so long, then looked at the examples again on pages 87-90. After reading the example on page 90 he became confused because it did not show the condition and behavior separated, as the instructor wanted the students to do on the assignment, and as the Example showed. He read the Example, then two annotations that explained what the behavior was supposed to be, then decided what he had was good enough.

Alan wrote the subject of his course ("Multimedia Production Applications") in part 1, then read the heading for part 2, after which he typed the diagram he had created in session #1 into an outline on the blank assignment Form. He digressed three times while typing the diagram.

Write Course Terminal Objective

After typing the diagram he thought he had finished what he was supposed to write for during session #2, although he still had the course terminal objective in part 4 and the unit goal in part 5 to write. Continuing on, he first read the heading for the course terminal objective in part 4, then the annotations to the Example course terminal objective. Some of the annotations identified components of the objective and one said: "All skills from all units on course final exam." He realized from that that all his unit skills had to be included in the behavior statement of his course terminal objective.

He typed the objective, then looked at each of the four tools to gauge the correctness of what he had written. He discovered, from reading the headings on the Form, that there was now a criteria section, and that part of what he had typed into the behavior section was actually a criterion.

[READS FORM] Oh, that's optional. Oh, wait a second. [READS EXAMPLE] Oh, there's a criteria. Oh, it looks like I've kind of combined something here, maybe I shouldn't have done. [READS EXAMPLE] I'm talking about properly following checklists, and that would be a criteria rather than, well it seems to me that would be a behavior. [READS ANNOTATION] Oh, these are test behaviors. [READS ANNOTATION]: "Specific observable test behaviors." (F2, 459-469)

He deleted "Following the checklist provided in sequence, in completing their task" from the behavior statement and typed it into the criteria section.

Unit Goal

Alan looked through the Example and realized this was where his practice and project units diverged. Until then he had been able to write one course diagram, goal and objective, but starting with the unit goals, he would have to write two of each, one for the practice and one for the project. He looked through the Form and realized there were several section in the unit objective. He decided he was done for the evening and that he would write the unit goals at home later.

CHRONOLOGY OF TOOL USE

The actions Alan took while writing his assignment during session #2 are shown below in chronological order, followed by a model of the chronology and a summary of the model.

- Takes out the blank form.
- Reads feedback on Preliminary Assignment.
- Realizes he wrote part of the course goal for Part 3 rather than the short course goal for the diagram.
- Considers how he appreciates positive feedback (instructor has seen; yes it's good).
- Thinks he is done with Part 3 now.
- Thinks he will be able to "scoot through" Parts 1-5 because he has thought of what he wants to write.
- Considers what level of units below major units is called (subunits).
- Thinks he has a good grasp of how to finish assignment because he took a course years ago in instructional design and there are many examples in the course pack.
- Considers disorganization.
- Decides to mark important pages with labeled Post-It notes.
- Digresses on notebook binders, luggage and FEI assignment.
- Starts typing course diagram on blank form.
- Digresses on typing skills.
- Reads instructions on top of blank form and realizes he has to do two versions of the assignment, one for practice and one for project.
- Wonders why he has to do two assignments.

COURSE GOAL

- Reads first checklist item.
- Reads headings "condition" and "behavior."
- Wonders why they are separated.
- Looks for example of assignment.
- Reads heading for Part 3 on example: "course."
- Reads checklist for course goal.
- Reads example course goal.
- Reads annotation identifying "home" as "real setting."
- Points to "home" in example course goal.
- Realizes he does not have a setting in his course goal.

- Reads his course goal and realizes he doesn't have a behavior.
- Tries to read a certain sentence of feedback on Preliminary Assignment but cannot.
- Compares his course goal to example to see if he has all the required parts.
- Realizes he does not have a setting.
- Digresses about opening the office door.
- Looks for definitions in course pack.
- Wonders why the instructor requires that students check each other's work.
- Learns answer from researcher.
- Finds calendar in course pack and puts Post-It note on it.
- Reads Assignment #1 instructions on p. 71.
- Reads own work.
- Considers how useful entire course pack is.
- Reads example on p. 87 looking for definition of objective.
- Reads own work and realizes he should be looking for a definition of goal.
- Reads about goals on p. 87.
- Realizes he cannot just cut and paste the course goal he wrote for the diagram, because it does not have a setting.
- Types setting for course goal.
- Wonders if "on a Macintosh computer" is a setting.
- Reads example setting on p. 88.
- Learns what components course goal should contain by reading instructions on p. 88.
- Compares his course goal with example on p. 88.
- Realizes his course goal does not have a role.
- Types role.
- Uses p. 88 as a template for the beginning of the behavior section.
- Reads his course goal to check that it has all the required components.
- Decides he can edit it after he has all the components.
- Reads example assignment, then examples on pp. 87-90.
- Wonders about separation of condition and behavior.
- Reads example assignment again.
- Realizes condition and behavior are separated in the assignment.
- Reads headings and annotations about separate condition and behavior.
- Types behavior of course goal.
- Reads annotation.
- Realizes his course goal behavior is almost identical to the course goal in his diagram.
- Reads feedback and decides to type his course diagram into the Assignment #1 form.
- Realizes doesn't have graphics program to create diagram.
- Still wonders how relevant his topic is.
- Reads heading for Part 2, then reads his course diagram.
- Starts typing but has trouble tabbing in a table.
- Digresses about computers and autoformatting in Word 97.
- Types diagram in outline format into Assignment #1 form.
- Digresses on importing files.
- Types diagram while looking at his diagram.
- Digresses about food, birthdays and computers.
- Types.
- Digresses about copy machines at MSU.
- Finishes typing Part 4—Course Goal.
- Thinks he is done until researcher tells him different.

COURSE TERMINAL OBJECTIVE

- Reads heading and annotations for Part 4—Course Terminal Objective.
- Reads annotations, then his work, and he realizes behavior needs to include all units in course.

- Decides to simplify after typing whole objective.
- Types condition.
- Starts typing behavior.
- Reads his behavior to see if it makes sense according to annotation: "specific observable test behaviors."
- Reads checklist then heading for criteria section.
- Realizes criteria section is optional and that he has included criteria in behavior.
- Reads annotation and wonders if his "properly following checklist" is a criterion or behavior.
- Reads annotation and revises behavior by deleting criterion from behavior.
- Pastes criterion into criteria section.
- Reads whole objective aloud.

UNIT GOAL

- Realizes he will now have to start writing two different unit goals objectives for project and practice.
- Reads heading of Part 7—Realism of the Unit Test.
- Wonders if he has to write two of them, one each for practice and project.
- Decides to finish Part 5—Unit Goal at home, outside of observation session.

Summary of Tool Use

Alan read the instructor's feedback then revised the course diagram. He already had a draft version of the course goal, so he used the tools to gauge the correctness of it and discovered he had no role, setting or purpose in the condition part of the goal. He then used minor tools (an additional example and annotation) to help him learn how to write a role. He wrote the role then used the tools to gauge the entire condition part. He revised the condition, then used the tools to gauge the behavior part of the goal. He revised that and was done writing the course goal.

He then returned to the beginning of the Form and wrote part 1, the course title, and copied the revised diagram into part 2 of the Form. Alan skipped part 3, which he had just written (the course goal), and read the heading for part 3, the course terminal objective. He used the tools to tell him how to write it, then wrote the condition and behavior parts of the objective, then used the tools to check it. He finished the objective by writing the criteria.

Model of Tool Use

Figure 44 below shows a model of Alan's tool use during session #2. The abbreviations used in the model are:

FO = Form; EX = Example; CL = Checklist; AN = Annotations;
 explan = explanation; ex = additional example; CG = course goal;
 CTO = course terminal objective; UG = unit goal; → = prevent error;
 ← = detect/correct error; | = division between parts

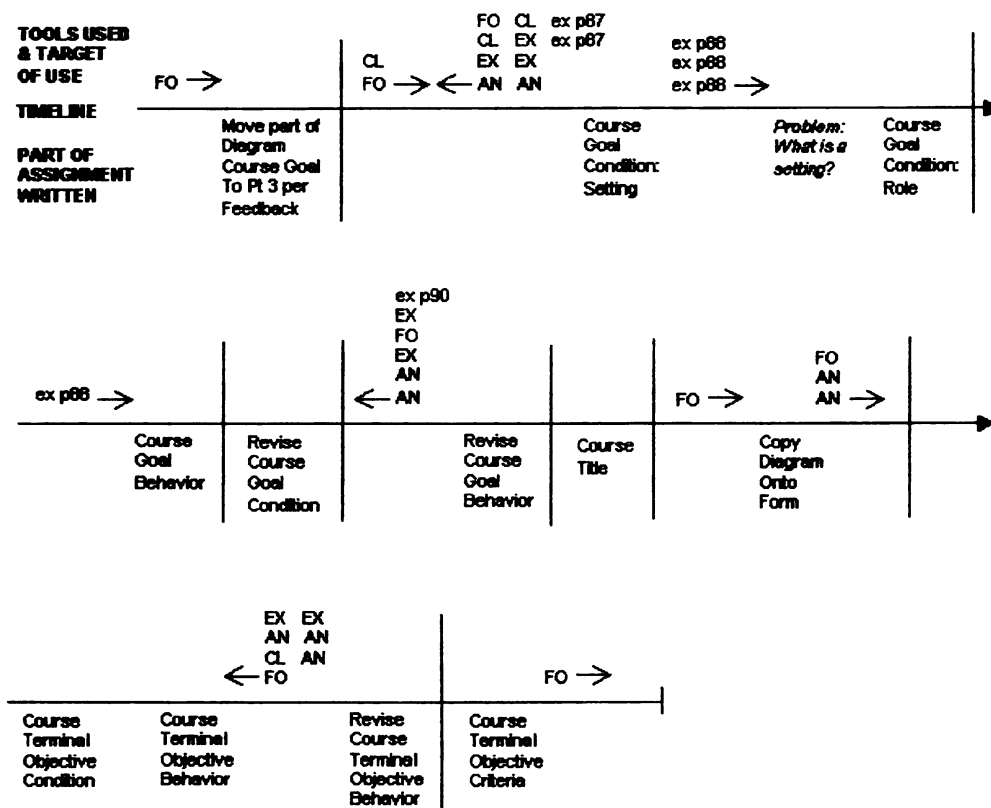


Figure 44: Model of Alan's Tool Use during Session #2

HOW ALAN USED THE TOOLS

In this section I will describe which tools Alan used, how frequently he used them, for what purpose he used them and what tasks he did with them, what cued him to use them, and what characterized his practice of the assignment and his use of the tools.

Alan used all the tools plus other tools from the course pack during session #2 a total of 43 times. He used the Example seven times, the Checklist four times, the Annotations ten times, the Form nine times and the other tools eight times. Five times his tool use was too ambiguous to identify in terms of tool used or task done or purpose for which it was used. These numbers are shown below in Figure 45.

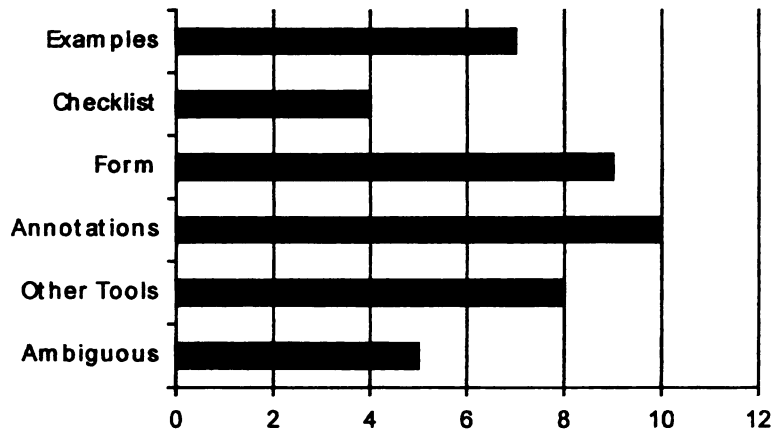


Figure 45: Alan's Frequency of Tool Use during Session #2

Alan used the tools at the beginning of the session to help him revise the course goal he had partially written as part of the diagram. He had moved that part of the diagram to his course goal in part 3, then used the tools to help him gauge the correctness of what he had written and to see what else he needed to include. He used the tools a little before he wrote the course terminal objective to see how to write it, then used the tools extensively afterward to check what he had written.

Alan consciously responded to three cues to use the tools:

- 1) when he was uncertain what to write, such as when he started a new part or when he did not understand the tools or instructions,
- 2) when he had questions about the tools or instructions, and
- 3) when he wanted to check what he had written to see if it was correct.

Most of Alan's tool use during observation session #2 was for the purpose of attempting to detect errors, as shown in Figure 46 below. He used the tools 13 times to prevent errors by resolving misconceptions and problems, 21 times to attempt to detect errors, and two times to detect and correct errors.

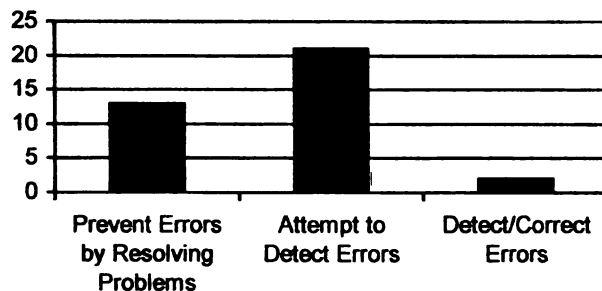


Figure 46: Alan's Frequency of Tool Use for Preventing, Attempting to Detect, and Detecting/Correcting Errors during Session #2

Alan used the tools in various ways to help him prevent, detect and correct errors. Table 21 below lists the tasks he did to accomplish these purposes.

Prevent Errors By Resolving Problems	Attempt To Detect Errors	Detect/Correct Errors
Announce Part – 2 Derive Rules – 4 Explain Example – 1 Guide Writing – 2 Learn Extent – 1 Paraphrase Wording – 1 Use Tool – 2	Announce Part – 2 Derive Rules – 5 Explain Example – 5 Gauge Writing – 7 Identify Components – 1	Gauge Writing – 1 Use Tool – 1

Table 21: Alan's Tool Use Tasks during Session #2

There was no main task Alan did to prevent errors; he did six tasks almost equally often. His main tasks for attempting to detect errors were to use the tools to explain the Example and to gauge the correctness of his writing. Figure 47 below shows how often Alan did the tasks during session #2.

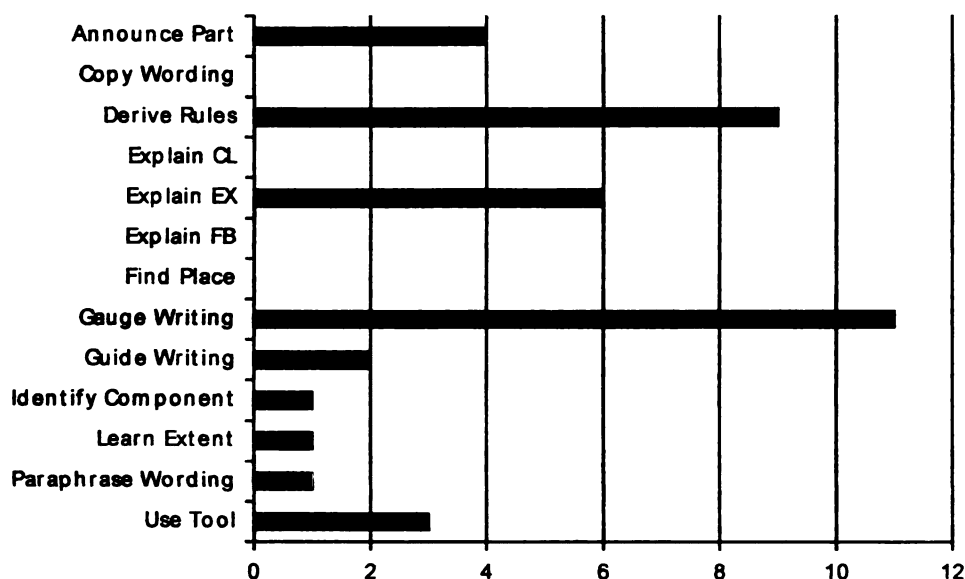


Figure 47: Alan's Frequency of Tasks during Session #2

Immediate Results of Tool Use

An immediate result of Alan's use of the tools during session #2 was that he was able to prevent two errors by resolving problems:

- Example on page 88: What is a setting (F2, 279-295)
- Example: Separation of condition and behavior (F2, 322-328).

He also detected and corrected two errors through using the tools, and corrected an error that had been detected earlier by the instructor:

- CL, EX, AN: Omitted the setting in the course goal (F2, 187, 220-227)
- Form to detect + Example to correct: Put a criterion into the behavior section (F2, 465-476).
- Feedback: Wrote the course goal in the diagram as if it were the more detailed course goal from part 3 (F1, 134-141; F2, 19-30)

Characterization of Tool Use and Practice of Assignment

Alan's use of the tools was characterized by his use of them as a source from which to derive rules for writing the assignment. He used the Annotations and Form more to help him write rather than relying on the Checklist. Alan's practice was characterized by the number of times he used the tools to help him gauge the correctness of his writing. Although he used the tools more often to detect in session #2 than in either of the other two sessions, he found none of the four errors that the instructor detected later.

OBSERVATION SESSION #3

Assignment: Revise course goal, course terminal objective and unit goal. Write unit terminal objective. Alan did not have time to write the unit terminal objective.

The third observation session started 35 minutes late. During the session Alan spent all his time revising the course goal, course terminal objective and practice unit goal so he did not have time to write the practice and project unit terminal objectives during the session. He digressed onto other subjects six times during the session.

Unit Goal

Alan was informed via feedback that he had written the unit goal (part 5) in the form of an objective. He had been too specific in his condition, had written "student" in the behavior instead of "graduate" and had included criteria for performance. (He had not had time to write the unit goal during session #2, so he wrote it afterward, on his own time.)

Alan realized that he had made the same mistake he had made in his course goal, that he had repeated the behavior in the condition of his unit goal. Prompted by the researcher, he stated what the difference was between a goal and an objective (general versus specific), deriving that knowledge from the Checklist.

He also wondered what the upper of the two boxes of feedback meant. Upon rereading it, he understood that the instructor was merely showing him what the unit goal should look like after revising it according to feedback.

He made the suggested revisions to the unit goal, then went back to read the feedback about the course goal.

Course Goal

Alan made several errors in his course goal in part 3. In the feedback to parts 1-5 of the assignment that Alan had turned in the previous week (see above) the instructor had said to delete the behavior statement “graduates of this course will successfully be able to digitize videotape optimized for multimedia applications” from the condition because it was already stated in the behavior. Alan had not realized that the condition and behavior were to be placed on the Form in separate sections, although in session #2 he had come across this same problem and had seemed to understand the required separation at that time. The instructor had also suggested in his feedback that Alan delete “student” from the role “as a student employee.” Alan wondered why, and decided after thinking about it that the role was too specific and that deleting “student” would make it more general.

Alan had trouble understanding the feedback about his setting. He had written the setting in two parts: “Digital Transfer setting at the IMC” and “working on a Macintosh computer” and separated them by the redundant behavior statement in the condition. The instructor had written “Part of setting. OK” under the second part, but Alan read it aloud as “Part of setting is OK.” What the instructor had actually done was to identify the phrase as part of the setting, and to state that it was written correctly and that it was all right where it was. Alan took this to mean, however, that that part of the setting was OK but unnecessary because he saw that the instructor had drawn an arrow from the Checklist item “setting” to the “Digital Transfer Facility at the IMC,” apparently identifying it as the main setting. Alan deleted the second, “unnecessary” part of the setting.

Alan on his own decided to delete “optimized for multimedia applications” because he said it was actually a criterion rather than a behavior. After revising the course goal he moved on to part 4, the course terminal objective.

Course Terminal Objective

The first thing Alan did was to read the Checklist to help him understand the feedback for the condition because the instructor had circled “all skills” in the Checklist and had written “OK” next to “all” and “yes” next to “skills” and had underlined “skills” twice (shown below).

He then saw that the instructor had circled part of his condition and had drawn an arrow from it down to the behavior section. Alan realized he had made the same error as in the course and unit goals: he had repeated the behavior in the condition. He deleted the behavior statement from the condition, then read the feedback written above the condition that pointed to the redundant behavior statement. The feedback said: “and make condition say ‘and asked to...’.” Alan read the explanation on the practice test on page 123 to help him gauge the correctness of his objective.

“Stating the conditions of an objective.” That’s exactly what we are trying to do here. And it should state what the student will be given, the number of situations. See, I didn’t have that either. (F3, 314-315)

Alan reread the feedback (“and make condition say ‘and asked to...’”) and the related feedback just below it (“as is, goes with behavior? or else change wording to say

‘... and asked to create...’”) and realized that appending “and asked to” to the behavior statement in his condition was a way he could keep the statement in the condition, if he wanted to. Inserting “and asked to” would turn the behavior statement into instructions. The condition would be:

(CONDITION) Given an A/V Macintosh Computer, appropriate digitizing software, VHS videocassette recorder (VCR) and a VHS videotape, and asked to create digital QuickTime (.mov) files for use for both the world-wide-web and CD-ROM applications for both Macintosh and “PC” platforms [*underline mine – auth.*]

Alan decided to enumerate the list of conditions, but had not yet decided what to do about the redundant behavior statement in the condition. He looked at the practice test again to see if the behavior would still be redundant, even with rewording. (He found the practice test quite useful and wished he could have gone through it before writing, but realized he probably would not have understood it as well.)

Before revising he decided to indicate how many QuickTime files his students were to create. He wondered if that number would belong in the condition or in the criteria section, so he looked at the Checklist and saw that number of situations belonged in the condition. He did not realize, however, that the course terminal objective does not require the number of situations because it pertains to the entire course.

He finally returned to the question of what to do with the redundant behavior statement. He did not think the change would “jibe in a sentence” (F3, 398). He read the course terminal objective aloud as it would be if he inserted “and asked to” and thought it did sound all right.

Alan compared the course terminal objective with the course goal and noticed that the goal referred to “graduates” and the objective referred to “students” in the behavior. He thought that was probably correct.

He then read the notes he had taken earlier in class when the instructor had gone through the practice test on page 131 with the class. The instructor had shown a checklist on the overhead projector and one of the items had been similar to an item on the Checklist (on the Form): “behavioral terms and object of verb clear.” Alan used the practice test and his notes to see what should be in the behavior statement and compare it with what he already had.

I’m comparing, I’m essentially testing what is stated here to what should be a part of this statement, making sure I’ve got this, I’ve got that (F3, 430-433).

At this point the session ended, so Alan revised his course terminal objective and wrote the unit terminal objective at home. His final version of parts 3-6 are shown below.

CHRONOLOGY OF TOOL USE

The actions Alan took during session #3 are listed chronologically below, followed by a model of the chronology and a summary of the model. During session #3 Alan was supposed to revise the course goal, course terminal objective and unit goal, then write the

unit terminal objective. Alan was able to revise the first three, but did not have time during the session to write the unit terminal objective.

- Digresses about supper.
- Wonders why feedback on Parts 1-4 says to delete "student" from "as a student employee."
- Talks it out with researcher and they decide it makes role wider.
- From feedback realizes mistakenly put a behavior in condition of course goal, course terminal objective and unit goal.
- Wonders if that mistake was caught by feedback to Preliminary Assignment.
- Interprets feedback and resolves confusion about separation of condition and behavior.
- Realizes he didn't understand headings "condition" and "behavior" previously.
- From feedback discovers he wrote unit goal in form of an objective. (He wrote UG at home, so don't know if he used CL when writing.)
- Tries to define difference between goals and objectives.
- Reads checklist for unit goal and unit terminal objective.

REVISE PART 3 - COURSE GOAL

- Realizes he can copy parts of course goal to put in unit goal.
- Reads general feedback: "Push on. Please check some notes carefully."
- Digresses on text file formats.
- Moves behavior from course goal condition to behavior section according to feedback.
- Confused about feedback, then understand instructor is giving complete example of course goal.
- Wonders if separated condition and behavior should read as one sentence or paragraph when they are combined.
- Talks to researcher and decides they should read as one sentence when combined, as feedback shows.
- Misunderstands feedback: "Part of setting—OK" as "Part of setting is OK."
- Decides feedback means he can delete part of setting: "working on a Macintosh computer" because it is not needed.
- Decides to punctuate course goal as one sentence, even though condition and behavior are separated.
- Digresses on chiropractors and doctors.
- Decides to delete "optimize for multimedia applications" from course goal behavior because it is a criterion.
- Digresses on Macintosh computers.

REVISE PART 4 - COURSE TERMINAL OBJECTIVE

- Reads checklist then looks at his course terminal objective.
- Realizes he made same mistake in course terminal objective as in course goal: putting behavior in condition.
- Reads feedback and figures out what it says.
- Remembers feedback he couldn't read earlier and decides it meant something unnecessary was in the course goal.
- Digresses about FEI.
- Revises course terminal objective according to feedback.
- Digresses about life before word processors.
- Confused about what feedback means: "make condition say 'and asked to'."
- Follows his own class note to look at p. 122 to determine what the feedback means.
- Reads p. 122 describing how to write goals and objectives.
- Wishes he had read the page before doing the assignment but feels he probably wouldn't have understood it.
- Reads p. 123 on stating the conditions of an objective.

- Realizes he does not have the number of situations in his course terminal objective.
- Realizes confusing feedback means he can put "and asked to" before behavior to make it a condition or leave it as is and put it in behavior.
- Decides to put it in behavior so it won't be redundant in condition.
- Confused about what belongs in condition.
- Digresses about toy soldiers, lunch and Antz.
- Decides to enumerate his lists in the conditions of the course terminal objective.
- Decides not to change items (un-enumerated lists) that instructor has said are all right.
- Reads unit terminal objective checklist when he wants to read course terminal objective checklist.
- Sees that "# of situations" goes in the condition (but of UTO, not CTO).
- Confused about meaning of feedback: "and asked to."
- Reads his objective with change according to above feedback and resolves problem.
- Compares his course terminal objective with his course goal.
- Notices he has "students" in objective and "graduates" in goal.
- Decides they are correct.
- Reads practice test on p. 131 on "Which of these is the best of these parts of an objective?"
- Uses pp. 131-132 as a checklist to see if he has all the components he should in the course terminal objective.
- Reads Preliminary Assignment checklist and suddenly realizes there are different checklists.
- Does not realize that the Assignment #1 checklist is what instructor told students he would give them to tell them what was in each part, and which would be available during the test. (F3, 1:20:13)
- Decides to talk to instructor before test.

Summary of Tool Use

Alan read the feedback for a component and looked at the Checklist and sometimes the practice tests to help him understand what the feedback meant. He then thought about how he would revise that component. He repeated the procedure for another component of the same part, and did not revise the part until he had thought about how to revise all its components. After he revised a part he repeated the whole procedure for another part.

Model of Tool Use

Figure 48 below shows a model of Alan's tool use during session #3. The abbreviations used in the model are:

FO = Form; EX = Example; CL = Checklist; AN = Annotations;
 explan = explanation; ex = additional example; CG = course goal;
 CTO = course terminal objective; UG = unit goal; → = prevent error;
 ← = detect/correct error; | = division between parts

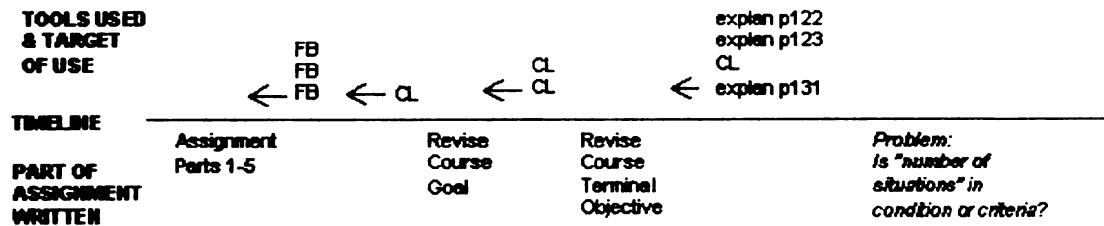


Figure 48: Model of Alan's Tool Use during Session #3

HOW ALAN USED THE TOOLS

In this section I will describe which tools Alan used, how frequently he used them, for what purpose he used them and what tasks he did with them, what cued him to use them, and what characterized his practice of the assignment and his use of the tools.

Alan use the Checklist four times and other tools in the course pack three times. These numbers are shown in Figure 49 below.

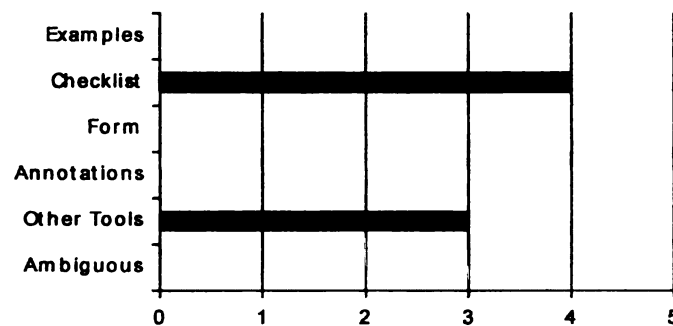


Figure 49: Alan's Frequency of Tool Use during Session #3

He used the Checklist after reading the feedback to help him understand what it meant. Before and after he revised his writing he used the Checklist to help him gauge the correctness of what he had written. He used the other tools to help him attempt to detect errors.

Alan consciously responded to two cues to use the tools:

- 1) when he was uncertain what to write, such as when he did not understand the feedback, and
- 2) when he wanted to check what he had written to see if it was correct.

He used the Checklist and the other tools to attempt to detect errors and to detect/correct errors. He wrote nothing new; the only thing he did during session #3 was to revise parts he had written previously, as shown in Figure 50 below.

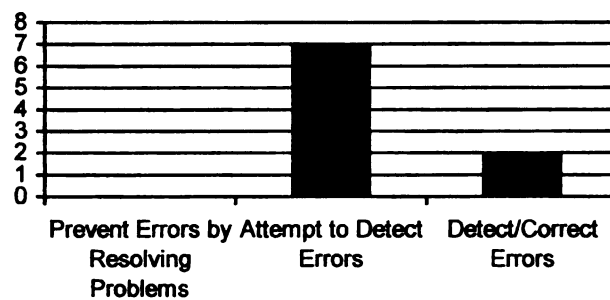


Figure 50: Alan's Frequency of Tool Use for Preventing, Attempting to Detect and Detecting/Correcting Errors during Session #3

Alan used the Checklist to detect errors by deriving rules, explaining the feedback and gauging the correctness of his writing. The tasks he did are listed in Table 22 and compared in Figure 51 below.

Prevent Errors By Resolving Problems	Attempt To Detect Errors	Detect/Correct Errors
	Derive Rules – 1 Explain Feedback – 2 Gauge Writing – 4	Gauge Writing - 2

Table 22: Alan's Tool Use Tasks during Session #3

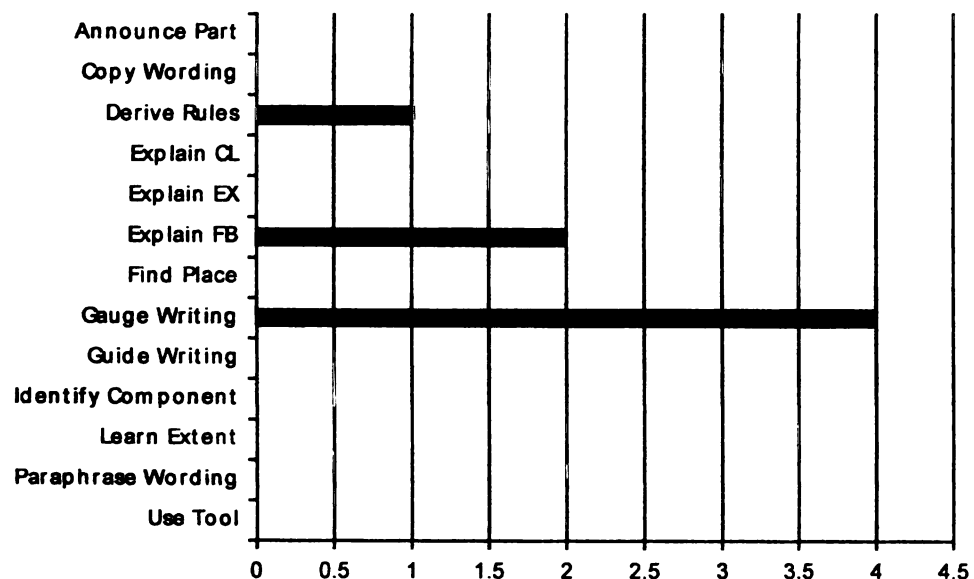


Figure 51: Alan's Frequency of Tasks during Session #3

Immediate Results of Tool Use

The immediate results of Alan's tool use during session #3 was that he prevented one error by resolving the problem of whether the component "number of situations" belonged in the criteria or condition (F3, 385-386) and corrected two errors, both of them detected by the instructor:

- 1) he had misinterpreted feedback (F3, 179-201)
- 2) he had put a behavior statement in the course terminal objective condition. (F3, 250-253)

Alan's tool use during this session was characterized by an increased facility in finding the tools in the course pack and using them. His practice, however, was characterized by getting a late start and digressing frequently. He was able to revise what he had written previously, but he did not have time to write the unit terminal objective.

ALAN'S VIDEO TRANSCRIPT

Observation Session #1

3 -52:20
4 R: Okay, you can start doing your assignment whenever you want to.
5 A: Okay.
6 R: I'll sit and watch, ask you a few questions every now and then.
7 A: Okay.
8 R: What I'd like you to do is tell me things you're thinking about and why you're doing what you're
9 doing.
10 A: Okay.
11 R: So, basically, you'll try to be talking almost the whole time.
12 A: Okay. As far as why I'm making certain decisions, and those kinds of things, what I'm thinking
13 about as far as the assignment and so forth?
14 R: Right.
15 A: Okay.
16
17 -51:37
18 A: Okay. Well, I think specifically one thing that you had mentioned again and repeated this evening,
19 which I want to try to take advantage of, is to develop, to do the assignment in a way that has some
20 real world results, and uh, both to the clients that I work with, and hopefully will make my life easier at
21 the end because I'll develop something that will be put into practice. That's my objective. My goal,
22 actually, as far as doing the assignment itself.
23 R: Now tell me what you've got showing here.
24 A: Um, this is an actual assignment format [MODEL] that Dr. ---- reviewed this evening. Um
25 [PAUSES]
26 R: This is the model?
27 A: This is the model assignment format for Assignment #1. And the first section that needs to be
28 completed is the little bubble map here that we talked about last week, actually. So since that time
29 I've been trying to, I initially had come up with a goal, an idea, for what to do, and I've since, I think,
30 I've since changed my mind as far as what specifically I want to
31 address.
32
33 -50:03
34 R: Why?
35 A: I'm getting back, I think, to more of the real world assignment, uh, [LOOKS THROUGH COURSE
36 PACK] uh, the specific words that he used at one point in describing the goals. There was a little
37 section that we looked at that had
38 the, uh, it's going to be, it's going to be this one, I guess. Definitions. Where was it at?
39 R: Here's Definitions.
40 A: Ah, there it is!
41 R: Is that it, page 87?
42 A: Yes. Yup. [READS PAGE 87]: "Real world performance," that's the phrase I was looking for.
43 Initially I was looking at something that again made sense, something that I would do in my job. Um,
44 we recently created a new service called Digital Transfer Facility, so I was looking at creating a unit
45 that, uh, would deal specifically with that, that I could use to train students that we hire. We've hired
46 one, and we need to hire another, for a specific application that they would need to learn.
47
48 -48:37
49 A: So, that in itself would be good. I think, I think it would cover
50 everything that we need here, but it would be fairly specific to just, you
51 know, one or two individuals, as opposed to faculty or TAs that I train on
52 real world performance applications in the classroom. So I think this would,
53 the other that I think I've decided to do has better application, or certainly
54 more worthy, uh, end result, and I can put it in place, hopefully.
55 R: And then what's that over there you brought out?
56 A: Um, this is just a handout that he had given us. [BLANK FORM] This is,
57 actually, this is the model, also, I believe, the blank sheet.
58 R: Oh, that's the format for the Preliminary Assignment?
59 A: The format. Yes, for the project, for the first assignment. And these are

60 actual items. In fact, this is, this, I'm assuming, is one of many that we
61 just copy to disc, in the lab?
62
63 -47:23
64 R: Yes.
65 A: I can just print these out, and then, um, although I think some of the
66 applications of these might actually be more applicable to handwriting to some
67 degree, rather than, or I think maybe a combination of both.
68 R: Or you can type it on the computer, print it out, and then paste it on a
69 paper with tape if [PAUSES]
70 A: Oh, oh, okay. So, these are actual things that he kind of went over this
71 evening, and we actually physically have to go through and check these little
72 items off [SELF-MONITORING ITEMS AT TOP OF BLANK FORM]. These are disciplinary
73 criteria that he has said that we need to do, enabling objectives, I would
74 suppose, that we actually have to do and check off to say that we had done
75 that.
76 R: So, did he explain how to use that form [BLANK ASSIGNMENT FORM]?
77 A: Yes.
78
79 -46:30
80 R: What did he say?
81 A: He, uh, he went over it briefly and he has in the notes here [COURSE PACK]
82 somewhere [LOOKS THROUGH COURSE PACK], in this same document [BLANK FORM] with
83 all his little notes next to it [MODEL]
84 R: Oh, like annotations?
85 A: Right. Yes, exactly like annotations. So, which is in here somewhere. I'm a
86 bit, if, I'm not real organized as far as this book. [LAUGHS]
87 R: I understand. [LAUGHS]
88 A: I probably haven't spent as much time as I should have kind of looking
89 through it, but, uh, there's a lot here to kind of get organized, and, um
90 [PAUSES]
91 R: Why don't you go ahead when you're ready.
92
93 *DIAGRAM
94
95 -45:33
96 A: [FLIPS BACK THROUGH COURSE PACK] So I thought that I would stick to the
97 plan here perhaps, and then as he described earlier as trying to get this
98 thing, this bubble, uh, this bubble something or other, whatever it was
99 called, completed first [TURNS TO MODEL ON PAGE 74], and then these little
100 things here [INDICATES PAGE 1 OF BLANK FORM], goals, units, objectives. So I
101 thought I'd work on that and see how far I get, and see if perhaps this is the
102 right decision that I made, that I think looking, and perhaps diagramming
103 this, I can maybe give you a better idea to see if this is really something
104 that is going to work for the assignment.
105 R: Okay.
106 A: So I need to come up with a whole course goal initially, and I will
107 probably simply write these out, and then later, on the computer I may very
108 well do the whole thing, but initially, I'm just going to think and write.
109 [WRITES AND MUMBLES AND LEAFS THROUGH COURSE PACK LOOKING FOR DEFINITIONS]
110
111 -43:52
112 *PRELIMINARY - DIAGRAM
113 R: Are you looking for the definitions?
114 A: Yes.
115 R: That was 84, I think.
116 A: Was it? Okay. Thank you.
117 R: No, 81?
118 A: I have it written down here somewhere.
119 R: Better turn that page corner down.
120 A: Yeah, Post-it notes might be good for this. Well, let's see, I had made

120 notes here of specific pages that I wanted to go back to, and that's, let's
121 see if this was one of them. Of course, I didn't write down what it was, but
122 this was 74, so this was, let's see, [UNINTELLIGIBLE] goals [PAUSES] Well,
123 that obviously wasn't it. Examples were on 88-89, goals, there's 87. [WRITES
124 PAGE NUMBER ON NOTEPAPER] [READS PAGE 87, THEN LOOKS THROUGH COURSE PACK]

125

126 -42:05

127 R: So what are you looking for now?

128 A: Um, I have, uh, I have a good idea for how to state this whole course goal,
129 but I seem to recall, and I may be incorrect, that there were some [PAUSES].

130 Oh, there it is right there. That's what I was looking for.

131 R: Is that page 88?

132 A: Page 88. [UNINTELLIGIBLE]

133 R: And what is it. Oh, this is an example?

134 A: This [PAGE 88] is an example of the course goals, unit goals, terminal
135 objectives and enabling objectives. So, the whole course goal, which I am
136 assuming this is the same [PAUSES] So anyway, I have a good idea how to write
137 this, but there were some specifics here that, uh, I recall that I wanted to
138 make sure that I indicated on the role, setting, behavior and the purpose
139 [POINTS TO ROLE, SETTING, BEHAVIOR AND PURPOSE IN COURSE GOAL ON PAGE 88]. So
140 I make sure that I am complete in doing that and try to think about those
141 while I'm writing. And, uh, I will go back and edit, probably several times.

142

143 -40:30

144 A: As I'm doing this, and, in fact, I'm probably, in writing I'm probably more
145 comfortable on the computer because I write on the computer now, and I find it
146 much more easy to edit because I seem to edit a lot, and so it's [PAUSES] And,
147 um, I have a difficult time writing any more writing. [LAUGHS]
148 [UNINTELLIGIBLE] Okay, so there's my, there's that [EXAMPLE ON 88] and those
149 in [UNINTELLIGIBLE] I'll take this example. This is what I'm having the most
150 difficulty with, just [PAUSES]

151 R: Finding?

152 A: Just finding this stuff, in this document. That's way far, that's an
153 example back there [UNINTELLIGIBLE]. Where's that bubble map? There we go
154 [PAGE 74]. Okay. Um. [READS MODEL THEN WRITES] My printing's just about as
155 good as my signature.

156 R: [LAUGHS] Now, what did you just write?

157

158 -38:00

159 A: Ah, I wrote "Successfully set up and operate a computer system and display
160 in a Technology Classroom."

161 R: And this is the what, course goal?

162 A: That's the course goal. And I have a feeling that's probably not what I'm
163 going to end up with.

164 R: And I see you are looking at that bubble thing. Tell me why you are looking
165 at that.

166 A: Um, I guess actually I wasn't really thinking when I was looking at that,
167 but, um. As I do look at this I'm looking for structure and organization of
168 how this is set up, and I'm starting to think, am thinking more about actually
169 the unit goals and [LOOKS CLOSELY AT MODEL]

170 R: Tell me! [LAUGHS] You suddenly got carried away by this.

171 A: [LAUGHS] Well, I guess I was. This is, okay, course goal. Okay. So this is
172 just course goals and these are unit goals.

173

174 -36:11

175 *[ISSUE-ignorance of ed. terms]

176 A: See, I'm not, see, I, I don't have an education background, and I know
177 that, like teachers, they know about unit plans and lesson plans, and all
178 those kinds of things and I really don't know that much about that. I know my
179 background and training and so forth has been more in the business and
180 industry kind of thing. So I know about goals, and I know about objectives,
181 and when we start talking about units, and we talk about lesson plans and

182 those kinds of things I get kind of lost a little bit.
183 R: So what do you think a unit is?
184 A: A unit is a, is a, part of a plan.
185 R: What kind of plan?
186 A: A plan of instruction.
187 R: What's a course?
188 A: A course is the [PAUSES]
189 R: It's hard to answer, isn't it?
190
191 -35:05
192 A: A course is the sum of the parts. [LAUGHS] Um, that's the whole course
193 goal. I don't know. See, I'm not real familiar with that. I haven't had any
194 real education in that, just kind of an overview. I should, I'd like to find
195 more out about that, teaching courses and those kinds of things. So anyway,
196 when I look at this [MODEL DIAGRAM], when I think of goals and I think of
197 objectives, I think goals, objectives, objectives to reach your goals. So I
198 don't know what unit goals are. I don't specifically know what that means. I
199 know what's being stated here, so [READS MODEL]
200 R: Are course, are goals and objectives the same thing?
201 A: To some degree they are, but objectives are much more defined and specific,
202 and essentially that's what these are. I mean, that's what, these are more
203 well defined and specific objectives of whole course goal, but I don't know
204 why they're called units, unit goals as opposed to objectives. So anyway,
205 that's my personal problem. [LAUGHS]
206 R: You know I'm dying to tell you, but [LAUGHS]
207 A: [LAUGHS] Because they're obviously different, because here [FORM HEADINGS
208 P. 74] we have unit goals, and here [FORM HEADING P. 76] we have objectives,
209 so it's a whole different thing, so perhaps I just need to read, read some
210 more about what those are. [TURNS BACK TO PAGE 74] I think I can come up with
211 that very easily. The first class I was already envisioning what this thing
212 [DIAGRAM] was when he first talked about it.
213
214 -32:43
215 A: I was able to figure out what that was. So anyway, if this [ALAN'S COURSE
216 GOAL] will change, but, uh. Essentially what's happening here is [WRITES]
217 number one, there are different platforms in the technology classroom. There
218 are PC platforms, there are Mac platforms, um, operating displays, so we're
219 talking about a video data projector, as part of this. And you get, um, get
220 down to both the PCs, you're talking about start-up, I don't know, procedures,
221 which are a little bit different on both platforms. We're talking about
222 identifying and using specific applications, programs. Um, [PAUSES] I would
223 probably branch off, even though it's a part of programs, um, of. I don't know
224 how to write this, but, uh, internet connectivity applications, that may fall
225 down here somewhere, but essentially they would be, I would think the same for
226 both different platforms. Um, under here [IN UNITS] we have things like remote
227 controls, we have things like display resolutions, um.
228
229 *CHOOOSE PROJECT AND PRACTICE
230 So essentially I was
231 looking at this and then having one of these defined as, as, which we have to
232 do, as practice and one as project.
233
234 -29:40
235 R: And which ones would you choose?
236 A: [LOOKS AT HIS DIAGRAM] Um, I thought initially of the PC as being, I guess
237 it really makes no difference. I was originally thinking of the PC as being
238 the project, but here I just wrote down "practice." Because there are a little
239 bit more complexity in the system, and in the steps and so forth, so I thought
240 that it would make more sense for the real one, you know if this is the
241 practice one, I'll get feedback on that, then I can apply it to the one that's
242 more complex.
243 R: And which level are you going to be at? This level [MAJOR UNIT GOAL] or

244 this level down here [SUBUNIT GOALS]?
 245 A: Um, I'd like to be up here [MAJOR UNIT GOAL]
 246 R: Why?
 247 A: Because it would be more comprehensive. R: Get it done during class?
 248 A: Um, well, I mean, it just seemed to make sense to me. I mean, these are,
 249 you know, maybe smaller unit goals. Um, you know, each of them are important
 250 to the overall course goal, um. So it's hard for me to take just one piece of
 251 the pie and develop that.
 252
 253 -28:00
 254 A: Even though I know it has to be done, but to me, I would feel, um, that,
 255 um, it just wasn't a finished piece. So it seemed to me if I am going to do
 256 this, to try to do as much as I can to have a finished product at the end.
 257 R: Did Dr. — say anything about this assignment, about how you select what
 258 you want to do, besides the real world performance?
 259 A: You mean between making a decision on practice or project or [PAUSES]
 260 R: Or level.
 261 A: Actually, I believe he did, and I think it's down here [IN ALAN'S
 262 DIAGRAM]. I think that's what we're supposed to do.
 263 R: Did he say why?
 264 A: Um, I don't recall that.
 265 R: Is there anything in the notes?
 266 A: I'm sure he did, [LAUGHS] I'm sure he did.
 267
 268 -26:50
 269 R: Is there anything in the notes that might tell you?
 270 A: In these notes? [COURSE PACK] Phew! [LAUGHS]
 271 R: Well. [LAUGHS]
 272 A: Yeah, I'm sure there are, where they're at I have no idea! Um, well,
 273 actually, I'm sure there are. [FLIPS THROUGH COURSE PACK] I mean it's, we
 274 actually have this, the, uh, uh, what the heck were those? Okay, there's the
 275 definitions [PAGE 88]. [READS PAGE 88] There's, um, yes, he did, and I recall
 276 it now, and I recall it up on the overhead. And it's specifically, it's right
 277 there, it says "unit goal one." So we're just taking, oh, let's see. Ah.
 278 [READS MODEL ON PAGE 75]
 279
 280 -25:31
 281 R: Is that the model?
 282 A: So I know he had an asterisk here [IN MODEL DIAGRAM NOTES] and it said:
 283 "unit to be developed." So, uh, yes, we are supposed to just select one of
 284 these, I'm almost sure of that, and [TURNS TO PAGES 75-76] create the
 285 objectives from that [DIAGRAM]. And, uh, criteria, and justification and
 286 motivation, all those kinds of things. So, it seems like a lot to do for just
 287 one little unit goal, but [READS MODEL] I'm sure that I can come up with
 288 something. That's why I just, I, I don't want it to be so simplistic that,
 289 you know, [PAUSES]
 290 R: So [PAUSES]
 291 A: But I also know that, I mean, these could get, you know [PAUSES]
 292 R: Big.
 293 A: Yeah. [LAUGHS]
 294
 295 -24:12
 296 R: So, um, is what you have now are, down at this level here [SUBUNIT GOALS]
 297 you have, PC? What's that? Data? Video?
 298 A: No, these are just video data projector.
 299 R: Video data projector, and the Mac?
 300 A: Display.
 301 R: And then at this level [SUB-SUBUNIT] for the two platforms, you have
 302 startup procedures.
 303 A: Startup procedures.
 304 R: Applications and internet?
 305 A: Yes.

306 R: For both platforms?
 307 A: Yes.
 308 R: Okay. Anything different for either platform that's not, or are they pretty
 309 much parallel in terms of what you'd want to teach?
 310 A: Um, they're pretty much parallel.
 311
 312 -23:24
 313 R: So you said you would do the Mac for practice?
 314 A: Um hm.
 315 R: And the PC for project?
 316 A: And another thought I had, my reasoning behind that is, out of the 54 or so
 317 technology classrooms that we have on campus right now-I don't know the exact
 318 numbers off the top of my head-but probably 42-45 are PC based as opposed to
 319 Mac, so there's going to be more users on the PCs than there are on the Macs.
 320 So it just seemed to make sense.
 321 R: Are you going to do the same lower level unit for both? Like startup for
 322 both? Or internet for both, or are you going to vary them?
 323 A: Um, I think I'll vary them.
 324 R: Why?
 325 A: Um, I think it will depend on which unit goal I selected. I don't want them
 326 to be that similar, where one can just, you know, if I just, if I get [PAUSES]
 327 R: Why? Why don't you want them to be similar? That similar?
 328 A: Um, because I want to use the feedback, um, I want to take as much
 329 advantage as I can of the feedback that I get from Dr. —, to apply it to
 330 something new and something different.
 331
 332 -21:06
 333 R: Are you going to put it on your format, your blank form, right now or are
 334 you going to do that with the computer?
 335 A: This part of it [DIAGRAM]? I'll end up doing it on the computer. So I'll
 336 use the , the [PAUSES]
 337 R: Zip disk?
 338 A: Of this [BLANK FORM] and just, you know, fill-in-the-blank kind of thing,
 339 leave space here [IN PART 2] and put these [DIAGRAM BUBBLES] in.
 340 R: Are you going to make any changes to this [DIAGRAM]?
 341 A: Yes.
 342 R: What will you change?
 343 A: Um, I will probably just, probably mostly wording. Not so much concepts of
 344 what's here, but maybe just the wording and how it's written. I might use the
 345 same unit for both, if I were to use, like, the internet connectivity
 346 applications, because they're utterly different on both platforms, and it's
 347 something that's important and it's something that people always want to know
 348 how to do when I'm working with them.
 349
 350 -19:35
 351 A: And I often, because even though I work it with both platforms, usually
 352 almost everyday in the tech classrooms, I probably work on the PCs more often
 353 than the Macs. So sometimes, I can't. Boom! You do it this way on the Mac, or
 354 you do it this way on the PC. Sometimes I kind of draw a blank with that so.
 355 So maybe going through that process with each, that will help me to learn as
 356 well. And, uh, just be me as well as to gain something.
 357 R: Can you rewrite what you want to rewrite now?
 358 A: Uh, sure, I can probably do that. [TEARS PAGE OUT OF NOTEBOOK]
 359 R: So, what does your course goal say right now?
 360 A: Uh, it says, "Successfully set up and operate a computer system and display
 361 in a technology classroom." And I don't like the way that sounds. It's perhaps
 362 not quite as general as maybe a whole course goal should be.
 363
 364 *REVISE DIAGRAM
 365 -18:16
 366 R: How does that compare to the form [MODEL] that you were looking at?
 367 A: It's a little more complex perhaps, and I think maybe it needs to be

368 simplified a little bit. If I start using words like "successfully," that's,
 369 you know, we're getting into objective [sic] areas here, which doesn't really
 370 seem to have a proper role in the whole course goal. So that's probably the
 371 first thing I'll scratch. [ERASES "SUCCESSFULLY" THEN CROSSES OUT "SYSTEM"]
 372 R: And now what did you cross out?
 373 A: I crossed out "system."
 374 R: Because?
 375 A: Again, I think it's, it's, uh, uh, it's not necessary. We're setting up an
 376 operating computer. It's not necessarily a computer system. [READS PRELIMINARY DIAGRAM THEN
 377 WRITES]
 378
 379 -15:30
 380 R: What are you writing now? Tic tac toe? [LAUGHS]
 381 A: [LAUGHS] Well, I'm back to "successfully" again. Um, I was looking at this
 382 [MODEL COURSE GOAL], the whole course goal, and it starts out with "solve."
 383 So it's, I mean, you're saying, you're saying you're doing something, you're
 384 solving problems. So, um, I'm trying to think of something, of some cute way
 385 of, of, um, generalizing with the overall goals, by coming up with something
 386 like "integrating computer technology into classroom instruction," but that
 387 doesn't work. Perhaps just, just say, "Set up and operate a computer and"
 388 [PAUSES] Maybe I should just scratch the display stuff, too. [ERASES] It's
 389 something that needs to be done, but for this assignment I don't think it's
 390 really necessary. Because that's just kind of out there, you know. I'm really
 391 talking about, there's, I mean, there's a lot of, there's a lot more than
 392 just this that needs to go into, you know, learning how to do these kinds of
 393 things, but, uh, I guess I'm just trying to limit it to some degree, um, try
 394 not to get too complex.
 395
 396 -13:38
 397 A: Because I have a feeling that it's going to get [LAUGHS] um, more complex
 398 than what I'm initially thinking right now anyway. So, um, so I'll just say
 399 [READS SCREEN], "Properly set up and operate a computer. Properly set up and
 400 operate a computer in a technology classroom at Michigan State University."
 401 Now, one other thing I was [PAUSES] I meant I should have asked him and, um,
 402 and you mentioned earlier you can't answer questions. So [LAUGHS]
 403 R: I'm dying to, believe me! [LAUGHS]
 404 A: But, um, the practice and the project, if I understand correctly, just you
 405 do them both and they both get turned in the same time.
 406 R: Mm, yeah. I can answer that. Yeah.
 407 A: Okay. Right?
 408 R: Um hm.
 409 A: Okay.
 410 R: Are you wondering why?
 411 A: Well, I mean, I guess it's an efficient use of time.
 412
 413 -11:53
 414 R: People would leave the project one for last, then rush through it. That's
 415 why he does that, to sort of force people to keep up.
 416 A: But you're paralleling, you're doing the exact same work for both, right?
 417 R: Yeah.
 418 A: You're doing two of them.
 419 R: Right.
 420 A: I mean, irregardless [sic] of what you call it, you're doing two of the
 421 same.
 422 R: But you don't get a grade until after all the assignment parts are done, so
 423 that you can use the feedback he gives you to change the project.
 424 A: Right, right.
 425
 426 -11:03
 427 R: He likes to look at the project to make sure you're not getting too far off
 428 track.
 429 A: Right, but, I mean, the practice is the project, it's one and the same.

430 R: Uh uh, no, that's why you have two different units.
 431 A: **But** essentially it's the same thing. [LAUGHS] I mean [PAUSES]
 432 R: **Well**, [PAUSES]
 433 A: **It's** not exactly the same, I mean you're just choosing something different
 434 **to go** forward with.
 435 R: **Right**.
 436 A: **Other** than that [PAUSES]
 437 R: [LAUGHS] That's why he doesn't want them to be exactly the same, or too
 438 **similar**.
 439 A: **Okay**. Right.
 440 R: **But** related is okay.
 441
 442 -10:20
 443 A: **Okay**. Well, that's why I guess I appreciate the fact that we'll just turn
 444 **this** [DIAGRAM] in. I need to turn this in because that will tell me right away
 445 if I'm way off course here with this goal. Because I think I probably am, a
 446 **little bit**, and I may change some things with this, I don't know, if I think
 447 **some** more about it. [READS MODEL COURSE GOAL]: "Solve division problems whole
 448 **numbers**." [READS PRELIM DIAGRAM]: "Properly setting up an operating computer
 449 in a technology classroom."
 450 R: **And** what were you thinking as you were reading that [READS MODEL COURSE
 451 **GOAL**] up here just now?
 452 A: **Um**.
 453 R: **Or** why were you reading it?
 454 A: **I was**, I was looking at. I was looking at each of these [MODEL DIAGRAM
 455 **BUBBLES**] where they start out: "Solve division problems with whole numbers."
 456 **And then** each of these [MODEL UNITS IN DIAGRAM] says: "Solve problems, solve
 457 **problems**, solve problems, solve problems, solve problems, solve problems." So
 458 **they're** all essentially identifying with this [MODEL COURSE GOAL]. They're
 459 **just a subset** of this whole issue. So when I was doing that, I read that
 460 [MODEL DIAGRAM] and I looked at this [PRELIMINARY DIAGRAM], and I'm thinking,
 461 **these two** really don't make any sense now. I need to come up with some
 462 **terminology** that [PAUSES]
 463
 464 -8:57
 465 R: **Do** you mean, do you mean the wording?
 466 A: **The** wording, yeah. I mean, I can't just write "PC platform, Mac platform."
 467 **I've got** to come up with something that is recognizable as part of this goal.
 468 **But that** could be very simple. That could be, um, you know, "Set up and
 469 **operate a PC**" and "Set up and operate a Mac." Basically that's how I'd do
 470 **that**.
 471 R: **And** is this one [PRACTICE COURSE GOAL] "Set up and operate" up here?
 472 A: **Yes**. So [POINTS TO PRACTICE DIAGRAM] we're setting up and operating a
 473 **computer**, just like [POINTS TO MODEL DIAGRAM] we're solving division problems
 474 **with whole numbers**, and here [POINTS TO MODEL DIAGRAM] we're solving problems
 475 **using short division**. Here [PRACTICE DIAGRAM] we're setting up and operating a
 476 **Mac**. So, part of a computer.
 477
 478 -7:47
 479 A: **Now**, this unit, these units here [PRACTICE DIAGRAM SUBUNITS], so those
 480 [MODEL DIAGRAM SUBUNITS] are little subsets of the actual short division.
 481 [READS PRACTICE DIAGRAM] I don't know if this will work or not. I thought it
 482 **made sense**, but I'm not sure.
 483 R: **This lower level** here? [PRACTICE DIAGRAM SUBUNITS]
 484 A: **Yes**.
 485 R: **Why** do you think it doesn't make sense now?
 486 A: **Well**, because it's, um. Again, this is just, um. We're using short division
 487 [IN MODEL MAJOR UNIT] and then we're adding another criteria to that in each
 488 **case** [EACH MODEL SUBUNIT]. So we're doing the same thing here [IN MODEL
 489 **SUBUNITS**] as we are here [IN MODEL COURSE GOAL] with just one other criteria
 490 **added** to it and [GLANCES BACK AND FORTH BETWEEN MODEL AND PRACTICE]. Ah, maybe
 491 **it does**. I could write it so that it would mean the same thing, I guess.

492 [LOOKS AT WATCH]
 493
 494 -6:17
 495 R: See, you're going to get this done tonight whether you want to or not!
 496 [LAUGHS]
 497 A: [LAUGHS] Damn. It's only eight o'clock. [LAUGHS]
 498 R: Time flies.
 499 A: Yeah. Gee, I thought this, I had this all done last week. I had all this
 500 done last week with my little digital video stuff. Maybe I should go back to
 501 that. [LAUGHS]
 502 R: [LAUGHS] Well, tell me what you're going to do with this layer [MAJOR
 503 UNITS] then?
 504 A: Um.
 505 R: These are the, what's it called, the major units? These [SUBUNITS] are the
 506 regular units, I guess.
 507 A: Yes. See, I don't know what these [MAJOR UNITS] are called. [READS MODEL
 508 NOTES]: "Major unit goals A and B."
 509 -5:06
 510 A: [READS MODEL NOTES]: "Subskills to reach the goal." These are obviously
 511 subskills to reach the goal. I mean, they are subskills to reach the goal. In
 512 order to accomplish this [COURSE GOAL], you have to know how to do this, this,
 513 this and this [INDICATES SUBUNITS]. So to me [READS MODEL] they work. I just
 514 don't know [WRITES] Now you can see why I use the computer.
 515 R: So what were you writing? "Set up and operate"?
 516 A: I just wrote "computer" actually.
 517 R: Oh, next to "Mac" and "PC."
 518 A: And I spelled out "Mac" to "Macintosh."
 519 R: Did you spell out "PC" to "personal computer"?
 520 A: No, I don't give them that respect. [LAUGHS] I'll let the PC users try to
 521 figure it out.
 522 R: [LAUGHS] There you go.
 523 A: Just like they figure out everything else about them.
 524
 525 -3:49
 526 A: [READS MODEL] Okay, maybe it's time to get a little more neat here. So I
 527 think this is what I'm going to end up with as my goal. And I have a feeling
 528 I'm going to have lots of little notes from Dr. —. [WRITES ON CLEAN PAPER]
 529 R: Everybody does, and he writes in light blue instead of red so you don't
 530 feel bloody. [LAUGHS]
 531 A: I'm just going to change this [COURSE GOAL]. [WRITES] Still rolling?
 532 R: Yes, still going, at least it says it is. So, is that your course goal now?
 533 A: Yes.
 534 R: What's it say?
 535 A: It says, "Properly set up and operate a technology classroom computer at
 536 Michigan State University." I don't know if people will understand what that
 537 is. A lot of people don't even know what a technology classroom is.
 538 R: What is it? [LAUGHS]
 539 A: [LAUGHS] Well, you had to ask, didn't you!
 540 R: I thought it was a come on. [LAUGHS]
 541
 542 -1:29
 543 A: [LAUGHS] Um, it is a classroom specially designed and set up for easily
 544 integrating computer and other multimedia applications in a classroom.
 545 R: Hm, instead of just have a computer stuck in the corner?
 546 A: Right. It contains, uh, specific pieces of hardware and software that allow
 547 you to do that.
 548 R: Like that video data recorder, er, projector.
 549 A: Yes. The multimedia cart and the technology cart, which contains the
 550 computer and VCR and monitor and a couple other little pieces. [WRITES]
 551
 552 [Clock goes to zero as Alan is writing, then reverses and goes positive.]
 553

554 0:14

555 R: So, what are your major units there?

556 A: It just says [READS PRACTICE]: "Set up and operate a PC computer. Set up
557 and operate a Macintosh computer." [READS MODEL] So I guess perhaps
558 technically I would say [WRITES]: "Set up and operate a PC computer and"
559 [PAUSES] You know, there really is no set up involved in this. I think I'm
560 going to scratch that. [SCRATCHES OUT "SET UP"]

561 R: So the computer already comes set up for them?

562 A: Yes, it's not like you have to put pieces together or [PAUSES] Well, see,
563 there are, it just depends on how complex I want to get. I mean, there're,
564 there are [sic] cabling in the classrooms that, in some classrooms you
565 actually have to make connections. You have to plug the ethernet into
566 different ports and those kinds of things. That would be a part of setting it
567 up, but it just depends on how complex I want to draw this whole thing out. I
568 mean, there's a hundred, I mean, there's lots of things that you need to take
569 into consideration before [PAUSES] Um, oh, the cabling I guess is the main
570 thing. But there are many classrooms where that's taken care of as well, so
571 the only set-up necessary would be, is basically looking and checking to make
572 sure things are plugged in, those kinds of things, before you start working on
573 the computer.

574

575 2:33

576 A: But, to say set up, I don't think that's probably appropriate. So I think
577 just say, "Operate. Properly operate." See, I could, I could just keep going.

578 R: Um hm. What are you writing?

579 A: [LAUGHS]

580 R: [LAUGHS] Now are these [PAUSES]

581 A: Picky, picky, aren't we?

582 R: And you were going on and on.

583 A: [WRITES] Ah.

584 R: Read what you've written. These are all coming out of the PC [SUBUNIT] or
585 both [SUBUNITS]?

586 A: This is just the PC [SUBUNIT], so we're just simply "Operating a PC
587 computer," and we are "Operating a PC computer using appropriate start-up
588 procedures." And we're using, "operating a PC computer using applicable
589 programs for presentation in the classroom," and then we're "operating a PC
590 computer using applications appropriate for internet file sharing and
591 connectivity."

592

593 5:35

594 R: And what will you have for the Mac?

595 A: Same thing.

596 R: Have you decided then on which is the practice and which is the project?

597 A: [READS PRACTICE DIAGRAM] Um, I think I'll stick with the Mac as the
598 practice.

599 R: Which one of those units are you going to do for [PAUSES]

600 A: I don't know.

601 R: Are you going to do this level [MAJOR UNIT] or this one [SUBUNIT]?

602 A: No, this one [SUBUNIT].

603 R: Ah. Which one?

604 A: I think I'm going to, I think I might select the same one for both because
605 they're actually quite different. I'm not sure yet. I could do both with that
606 one because they would be quite different.

607

608 6:55

609 *CHOOSE PROJECT AND PRACTICE

610 R: So, how do you feel about that? Are you satisfied?

611 A: Um. [LOOKS AT PRACTICE AND MODEL DIAGRAMS] I think it's doable. What I
612 think about it is that I think I should get this done and get it turned in
613 like tomorrow. [LAUGHS]

614 R: [LAUGHS]

615 A: So I can get all this great feedback back before, why wait, why wait till

616 next Monday to turn this in and then realize it needs a lot more polish than I
 617 may think?
 618 R: I think he accepts them early, doesn't he?
 619 A: Um hm. Although I don't think he ever said where. Do we just drop them off
 620 at his door?
 621 R: Yeah. Send him an email that it is coming or something.
 622 A: Uh, I think I'll do that because I feel okay about it, but I thought it
 623 would come much easier to me.
 624 R: Do you think you'll make any further changes before you hand it in to him?
 625 A: Uh, [READS PRACTICE DIAGRAM] if I do it would be minor, minor wording
 626 changes. I think other than that it's, uh, [READS MODEL] close to what it
 627 should be.
 628
 629 9:06
 630 R: And as you look at this model [MODEL], what are you thinking?
 631 A: I was just starting to expand a little bit beyond the [PRELIMINARY
 632 ASSIGNMENT].
 633 R: Forging ahead?
 634 A: Beyond the bubbles now.
 635 R: Boy, you're eager. Okay. Well, if you're done, then we'll be done.
 636 A: Okay. [READS MODEL]
 637 R: Are you looking ahead for how it's going to fit, or what?
 638 A: I was, yeah, perhaps. Uh, oh, that's right.
 639 R: What's right? You say these little tantalizing bits.
 640 A: [LAUGHS]
 641 R: What are you looking at, page 75?
 642 A: Yeah. See, and I had started that [THE UNIT GOAL], um [PAUSES]
 643 R: For the unit goal?
 644 A: So essentially now I have to take, yeah, I'm sure this will all fit
 645 together eventually, but I was wondering why we were, we were doing that. It
 646 seemed like we were repeating this whole thing here [PAGE 74] just for one
 647 unit goal. You know, we are coming up with another goal for this [MODEL
 648 SUBUNIT] just like we came up for this goal.
 649
 650 10:53
 651 R: Yeah. It seems redundant?
 652 A: A little bit. [READS MODEL] So if I'm understanding this correctly, all of
 653 this other work, other work that we're doing here is going to be associated
 654 just with this [SUBUNIT TO BE DEVELOPED] if I choose that.
 655 R: Um hm.
 656 A: So that, uh, I'm getting right down to the nitty kind of stuff. [READS
 657 MODEL] I'm hoping that this isn't too simplistic now. I mean, there are a
 658 number of steps, but they're not, you know, a large number of steps to
 659 accomplish this.
 660 R: Very few people make mistakes that way, the other way.
 661 A: Okay.
 662 R: That's my little secret. Now it's on video. [LAUGHS]
 663 A: Okay. Yeah, you're probably right. I recall many, many years ago when I was
 664 at RIT, I had taken a couple of graduate courses on instructional design. And
 665 one of them was called Criterion Referenced Construction. It was basically,
 666 this is different, but it was close to the same.
 667
 668 12:30
 669 R: I think this is also criterion referenced, sort of a general category.
 670 A: And I can recall when I was, um, putting my little [PAUSES] And I've got it
 671 down in the basement somewhere where I was actually doing flow charts, you
 672 know, and things like that that were whoosh, whoosh, whoosh [MOVES HAND HIGHER
 673 WITH EACH WHOOSH TO INDICATE LEVELS]. And it was on something stupid like how
 674 to draw a circle in a whatever and it was very simplistic and it, so,
 675 whatever. I don't think I have to worry about that.
 676 R: I think you've got it. I think you've got that concept.

Observation Session #2

- 3 R: So this is observation session #2 with Alan.
 4 [Digression about Macintosh computers]
 5 R: So what is this you're looking at here?
 6 A: This is the format of the segment # 1. [BLANK FORM]
 7 R: Okay.
 8 A: I thought I would go ahead and just retype this stuff [COURSE DIAGRAM FROM PRELIMINARY
 9 ASSIGNMENT], but why should I do that? I don't think I'll do that. I just [PAUSES] Well, I've got to
 10 change it anyway, so maybe I will.
 11 R: That's your Preliminary Assignment?
 12 A: Yes, this is the one I completed and got back.
 13 R: How will you change it?
 14 A: I will just do what he's noted on here.
 15 R: And what is that?
 16 A: Um, well, you know, it's interesting. As I was struggling with this, um, what it is it, the, um
 17 [PAUSES]
 18 R: The course and unit goal?
 19 A: With the goal, with the unit goal and, uh. What I had actually done was, by using the condition or,
 20 actually, what I actually did was create a course goal which was item # 3 instead of item #1, so I
 21 added more to it than what I needed to.
 22 R: Did he say something about that?
 23 A: Yeah, yeah. So basically he, so basically he very specifically said just basically start here ["digitize
 24 applications" IN COURSE GOAL IN DIAGRAM] and uh, just delete the rest ["Upon successful
 25 completion of this unit students will be able to"] and, and use the entire thing ["Upon successful
 26 completion of this unit students will be able to"] down to #3 [PART 3--COURSE GOAL].
 27
 28 A: So I was actually making it more complicated that what it needed to be, which I guess I have a
 29 tendency to do anyway. So, um. Actually I have #3 done now. I just need to copy and paste what I
 30 originally created. And delete part of the first one for the actual #1. And every thing else basically
 31 was okay, he actually wrote "OK" next to everything, which I thought was kind of cool.
 32 R: He does it in blue so that it doesn't look bad.
 33 A: Right, right, but it's, that's nice because if you're, if there's nothing next to it, then you're always
 34 maybe uncertain, perhaps, of [PAUSES]
 35 R: If he's seen it or [PAUSES]
 36 A: Yeah, right, if it's good or not. So actually I was very pleased with how it turned out. So that's
 37 good, so actually this next one for Monday, we're just supposed to go through #5 [UNIT GOAL]? But
 38 I have a feeling that I'm going to be able to kind of scoot through this.
 39 R: Why do you think that?
 40 A: Well. Oh. Although I thought I was going to scoot through the other one too, very quickly, right?
 41 But that didn't happen. Then I ended up changing it again.
 42 R: Okay, read what you have now, you know, because I don't know what you changed it to.
 43
 44 A: Okay, okay. Well, so, okay, so .
 45 R: You can just read the bubble, whatever .
 46 A: Subject. Yeah, sure. So on the top, the first [PAUSES] Essentially what it will become when it is
 47 edited would simply be "digitized video tape optimized for multimedia applications." Okay.
 48 R: "Digitized video tape optimized for multimedia applications"?
 49 A: Yes, all right, and then coming down into each subunit...I've got to get my terminology correct
 50 here. Subunit, that's correct. Um, then breaking down the two areas, "create digitized video files
 51 optimized for use on the world wide web." And then the other one was, "create digitized video files
 52 optimized for CD-ROM applications." And then from there that [WWW MAJOR UNIT] was broken down
 53 into "create digital" [PAUSES]
 54 R: This is the world wide web one?
 55 A: Yes, and that one just said simply "create a digital QuickTime file," and the other one said "create
 56 digital Real Media files." And these are just two different types of formats. And then under the CD-
 57 ROM side was "create digital QuickTime files for Macintosh applications." and the other one was
 58 "create digital video for Windows, in parentheses AVI, which is a format for files for PC applications.
 59 And my practice is going to be "creating digital QuickTime files for Macintosh applications."
 60 R: That's practice?
 61 A: That's practice.
 62 R: Okay.

63
64 A: And my project is going to be creating digital QuickTime files for the world wide web.
65 R: That's your project?
66 A: Yes. Now lately, um, I can just kind of relay to you some things I have been thinking about.
67 R: okay.
68 A: Primarily today because of the, at the same time here we're working on the F.E.I. [FORMATIVE
69 EVALUATION OF INSTRUCTION] thing, right?
70 R: Right.
71 A: And that's.. I'll have to look at my notes, but I think Monday there's some things due on that too.
72 Um, so I've been a bit more concerned with that, I think, that this. Because I think I have a pretty
73 good grasp of how to finish this document. Putting down the course goals and the terminal
74 objectives, and those kinds of things, those are fairly straight forward.
75 R: Why do you think they're straight forward?
76 A: Well part of this is because I've had, I think a part of it is because I've had some training in this
77 already, although it's been a number of years ago, but I'm familiar with what they are and so forth so
78 it's not the first time I've seen these things.
79 R: Uh huh.
80 A: Albeit, there's, you know, different, not much different, but some different information that Dr.
81 — has in his package, and so forth. But I think there's, and there's also lots of examples and so
82 forth there in the handouts.
83
84 A: So my biggest challenge is just finding where they're at, and I started using the Post-It notes
85 today.
86 R: Where's your... Is this it [FRANK'S COURSE PACK]?
87 A: Yes, I just did one [POST-IT NOTE], when he mentioned that we had a test. The test is October
88 5th, and he mentioned practice tests a certain page so BOOM, practice test, it says right there [ON
89 POST-IT NOTE IN COURSE PACK]. So that's what I am going to start doing now. For every page
90 that I find that I think is going to be very worthwhile, and I'm going to need to refer back to, I'm going
91 to use Post-It notes and mark them up here so I can see them as I am looking at this thing, and I still
92 need to find another binder for the rest of this stuff.
93 R: Are you going to put it in a separate one or try to find a big one for everything?
94 A: You know, I was going to try to find a big— Oh I forgot to ask that guy—I went Sunday to Staples
95 to try to find something else that would accommodate this whole thing [ENTIRE COURSE PACK],
96 but, I couldn't find anything.
97
98 [Digression on notebook binders and luggage]
99
100 A: So anyway, I maybe got a little bit concerned because Monday night [IN CLASS] I heard there
101 were some people saying they already interviewed their teachers. So I'm thinking, oh, I've got to get
102 cracking on this stuff. And I was a bit concerned about it initially, but obviously not enough to do
103 anything about it. So anyway, I spoke today with a teacher who is a professor at MSU, a person I've
104 worked with in the past, just with media stuff, helping him, and those kinds of things, so he
105 accepted the challenge, and uh.
106 R: So you've got someone?
107 A: I have someone, and he's sounds extremely interesting. I might email Dr. — on this idea that
108 we talked about. I think its going to be just fine. It sounds very interesting to me and I'm sure it will be
109 very interesting for Dr. Mackey as well. I think its going to be a good project.
110
111 [Digression about FEI and Dr. Cecil Mackey]
112
113 A: So, do I have to start working now?
114 R: Um hm, because you're going to breeze through it, you said.
115 A: [LAUGHS]
116 R: You're going to whip this thing off tonight.
117 A: I didn't say tonight!
118 R: I have it on tape. [LAUGHS]
119 A: Did I say tonight? I don't remember saying tonight. Well, I can breeze through this one [COURSE
120 DIAGRAM]. [TYPES]
121
122 [Digression on typing skills]
123
124 A: [LOOKS AT FEEDBACK ON PRELIMINARY ASSIGNMENT]

125 R: What are you looking at? Is that your, uh? [PAUSES]
 126 A: Here. [POINTS TO INSTRUCTIONS AT TOP OF BLANK FORM]
 127 R: Oh, the feedback.
 128 A: I just realized I have to do two of these. I have to do this twice.
 129 R: You mean practice and project?
 130 A: Yeah.
 131 R: That's right.
 132 A: You know, I don't quite get that.
 133 R: Why he does it that way?
 134 A: Yeah.
 135 R: He doesn't want to give you feedback on the thing you're going to get a grade on.
 136
 137 A: But he is, because he gives feedback on both, doesn't he?
 138 R: No.
 139 A: Oh, from now on he'll just be giving feedback on the practice?
 140 R: Yeah, because this, really, the preliminary is just so that you can choose an appropriate size [OF INSTRUCTIONAL UNIT].
 141
 142 A: I see. Got you. Okay, so from now on it's just going to be feedback on practice.
 143 R: You turn in two, but you only get feedback on the practice. And at the end [PAUSES]
 144 A: So then he keeps [PAUSES]
 145 R: No. So at the end he gives you both back and you combine all project pieces into one, and give it
 146 to him and he'll grade it. And you'll get feedback on that.
 147 A: Okay. All right, I guess I can figure that one out now. Actually, that's pretty nice, because you've
 148 already got it just about all done anyway.
 149 R: Exactly. And that's part of the reason, to help you keep up.
 150 A: Okay. Yeah, I can do that. [TYPES]
 151
 152 A: You know, it is really cool of him [DR. —] to let us do this [OBSERVATION SESSION] in here
 153 [—'S OFFICE], you know.
 154 R: Um hm.
 155 A: Let us work on the computer.
 156 R: Yeah. Yep, he's doing everything he can to make sure I graduate. [LAUGHS]
 157 A: [LAUGHS]
 158 R: [LAUGHS] I've been his advisee for nine years!
 159 A: [TYPES] Breezing through, breezing through. "COURSE TITLE[READS CHECKLIST]: "Subject."
 160 R: Now what are you looking at?
 161 A: Um, I'm reading the first column here.
 162 R: On the left?
 163 A: Yeah, and uh, I'm trying to figure out, and I'm indicating here [UNINTELLIGIBLE] [HEADING] We're
 164 talking
 165 about condition, and we're talking about behavior. I didn't think those were just two separate things. I
 166 thought this was all combined into one statement here, that we need this or we need this. Um, I'm
 167 trying to [PAUSES] I think I'll go try to find my sample [MODEL] in here [COURSE PACK] again.
 168 Without my Post-It notes it could take awhile.
 169 R: You know, you could borrow some [POST-IT NOTES] from Dr. —.
 170 A: I have them, I have them. Oh, here we go.
 171 R: That's the annotated model for Assignment #1?
 172 A: Yes.
 173 R: What page is that on?
 174 A: 74. I have, I keep Post-It notes here [CASE FOR SPARE LAPTOP COMPUTER BATTERIES].
 175 R: Oh, look at you!
 176 A: That's my little spare battery [UNINTELLIGIBLE]
 177 R: You're too cool.
 178 A: So. [WRITES ON POST-IT NOTE] There we go. I'll just tab these little babies. Okay. Now I'll know
 179 exactly where it's at. All right. So let's see. [READS FORM]: "Course."
 180 R: So which part are you reading?
 181 A: I'm reading down here on the course goal.
 182 R: Number 3?
 183 A: Number 3. [READS CHECKLIST FOR COURSE GOAL]: "Goal has real role, setting, time, place,
 184 purpose after course." Okay, so. Hm.
 185 R: So, what's your finger on?

186 A: The word "home" [IN MODEL COURSE GOAL CONDITION]. [NOTES] We're talking about settings
 here. I
 187 don't have a setting. [CHECKLIST] "Time and or place." So "upon successful." Oh, I didn't make that
 completion.
 188 "Completion of this course, graduates will be able to digitize videotape optimized for multimedia
 189 applications." [READS FEEDBACK TO PRELIMINARY ASSIGNMENT] Oh, maybe that's the one
 190 thing that I. Can you read that? That's the question I had I should have asked him.
 191 R: This top?
 192 A: Yeah, see what that says.
 193 R: "Test. This need test say anywhere." Does that make sense? "This need?" It's this third word
 194 you're wondering about, isn't it?
 195
 196 [FEEDBACK SAYS: "This need not say anywhere." REFERRING TO TEXT IN COURSE GOAL IN
 197 DIAGRAM: "upon successful completion of this course."]
 198
 199 A: This needs a test? And say it anywhere? In the? [PAUSES]
 200 R: That could be. I [PAUSES]
 201 A: Oh, I should have asked him that.
 202 R: I don't know. It could say "test."
 203 A: It doesn't look like "test" to me.
 204 R: Well. [LAUGHS]
 205 A: It's pointing towards "successful," so maybe the word "successful" is relatively ambiguous.
 206 R: "This needs something say anywhere." Oh, maybe [PAUSES]
 207 A: "This needs something."
 208 R: Hm. I don't know.
 209 A: See, that's the problem with doing it on the computer, because once you bring it in there, it's like.
 210 Now see, if I just wrote it in pencil, if I came in next Monday or found out what it [THE ILLEGIBLE
 211 FEEDBACK] was, I could erase or add something immediately.
 212 R: Well, you could still add it, just give it to him at the beginning of class so that he doesn't, you
 213 know. I don't think he'd care if you changed it a little.
 214 A: Yeah, that's true. I like things being just neat, though, turned in. Oh, man.
 215 R: I'm waiting for the breezing part! [LAUGHS]
 216 A: [LAUGHS] Need a fan in here. [READS ILLEGIBLE FEEDBACK AGAIN]: "This needs something."
 217 What does it need? "Say it anywhere." Add something and say it anywhere. What could that be?
 218 R: You know, the word "successful" can fit into different places in this sentence. "On successful
 219 completion of this course, the student successfully, whatever, can graduate successfully, whatever.
 220 'COURSE GOAL: Mm. Mm. [READS MODEL AND PRACTICE] [SIGHS]
 221
 222 R: So what are you pondering?
 223 A: [READS SCREEN] I'm just looking to see if I've got all the right pieces in this that are needed.
 224 Talking about a purpose.
 225 R: What's your purpose up there [ON SCREEN]?
 226 A: [READS PRACTICE ON SCREEN] The purpose is to use for multimedia applications, but it's not
 227 real clear in saying that. It's got setting in here [MODEL & NOTES] and I've got no settings here
 whatsoever.
 228 Whew! Do you think we can crack that window open?
 229
 230 [Digression about the office door]
 231
 232 [Time code disappears from tape at -19:12 or when VCR counter = 51:47]
 233
 234 A: See, I think I need to get out my Post-It notes again—that's not mine—and find that other page,
 235 back to those definitions again. What was that, 84 or something?
 236 R: I think it was earlier. In the Overview?
 237 A: Yeah. [LEAFS THROUGH COURSE PACK] You know another thing, talking about getting it
 238 [ASSIGNMENT] checked by someone else, by that time it's too late, you've already done it. What are
 239 you going to do, not turn it in?
 240 R: Yeah, that's never worked too well.
 241 A: So I didn't even bother last time. He didn't mark anything on there.
 242 R: I actually think it's to your benefit to look at someone else's.
 243 A: Oh. Mm.
 244 R: That puts a new light on it!

245 A: There's always an angle to this. He's got an angle for everything.
 246 R: That's right. That nobody's seen before.
 247
 248 A: Okay. Well, I'm back to tying loops here [SAMPLE LESSON ON TYING BOWLINE KNOTS], so I
 249 think we're behind that.
 250 R: Is it 55? I don't know, but that number sticks in my head for some reason.
 251 A: No.
 252 R: Oh, that's the calendar, that's why.
 253 A: Oh, that's a good one, better mark that. [PUTS POST-IT NOTE ON PAGE 55 THEN READS
 254 CALENDAR] Now lets, see. Oh, the formative evaluation is not till the 30th. I was thinking parts of
 255 that was [sic] due next week, too. [LEAFS THROUGH COURSE PACK] Oh. Let's see here.
 256 R: Did you find it?
 257 A: Um hm.
 258 R: What are you looking at?
 259 A: Objectives for Assignment #1.
 260 R: Oh, what page is that?
 261 A: 71. [READS PRACTICE ON SCREEN]
 262
 263 A: You know what I find unique about all this is that there is so much stuff here [IN COURSE PACK],
 264 but everything in here is like so important, it's like everything you read is, everything is here for a
 265 purpose. You wouldn't think so, seeing the huge thing, but actually everything is here and so it's, um.
 266 [READS PAGE 87] Okay. Page 87.
 267 R: Is that the definition? [UNINTELLIGIBLE]
 268 A: Okay. No, this isn't going to help.
 269 R: So which definition are you looking at?
 270 A: An objective. [READS PRACTICE ON SCREEN] See, this is goals, I should be looking at goals.
 271 [READS PAGE 87]: "Real world performance. Graduate will eventually exhibit, in some real world
 272 context. See role, setting, purpose and behavior."
 273 R: Those are what?
 274 A: Those are what should be included in a goal. [READS PAGE 87]: "Goals include the graduate's
 275 real world role, setting, purpose and behavior." So, in actuality. I just can't cut and paste like I
 276 thought I was going to be able to because it's not quite there, most of it is there, but not all of it.
 277 More than what I needed earlier, but not enough for. So I don't have a setting, so [TYPES]
 278
 279 R: So did you just add a setting?
 280 A: Well, maybe. I added "on a Macintosh computer." [READS PRACTICE]: "Upon successful
 281 completion of this course, graduates will be able to digitize the videotape on a Macintosh computer,
 282 optimized for multimedia applications." [READS PRACTICE] [READS PRACTICE ON SCREEN] That
 283 could possibly be construed as an environment. It's not a setting. How would you say that? At a
 284 computer desk or in a computer lab setting? I don't know. [SIGHS] Okay. [READS PAGE 88] Well,
 285 these are pretty explicit here. This one says "at home."
 286 R: Are these examples?
 287 A: This one is, yeah. Example 1. [READS DIRECTIONS ON PAGE 88]: "Note role, setting, purpose
 288 and behavior in course and unit goals."
 289 R: So what page is that?
 290
 291 A: 88. And it says, so this is an example of a course goal. It says "As a healthy adult," the role,
 292 that's the role, adult is the role, "healthy adult, at home," so it actually says "at home", "the graduate
 293 will plan a fitness program, "plan a fitness program," that's the behavior, "so that he or she will
 294 maintain total body fitness," so optimize for multimedia applications, so that's my purpose. So, gee, I
 295 don't even know if I have a role. Hey, maybe that says role. (PICKS UP PRELIM?) It doesn't say role.
 296 Um, [READS PAGE 88] okay. [TYPES]
 297 R: So, what did you just add?
 298 A: I added a role: "As a student employee of the IMC." [READS PAGE 88] Okay, all right, just a
 299 second. [TYPES]: "Graduates will, graduates of this course will." [TYPES] Done.
 300 R: Okay, what does it say now?
 301 A: "As a student employee of the IMC working at a Macintosh computer in the Digital Transfer
 302 Facility, graduates of this course will successfully be able to digitize video tape optimized for
 303 multimedia applications." I think I've got it all covered now. Ah ha! It sounds a little long and stuff,
 304 but maybe I can work on editing it. [READS CHECKLIST?? - F2, 1:02:40] I've got it all, I've got a
 305 setting, I've got a behavior, and I've got a
 purpose, and that's more than I had before. [READS PRACTICE ON SCREEN] All right, I can edit

306 that a little bit. "As a student employee" [READS SCREEN, TYPES, THEN SHAKES HEAD] I should
 307 have left it.
 308 R: Why, what does it say now?
 309 A: It doesn't make any sense. [READS SCREEN] Okay, that will work.
 310
 311 R: What's it say?
 312 A: "As a student employee of the Digital Transfer Facility at the IMC, graduates of this course will
 313 successfully be able to digitize videotape optimized for multimedia applications working at a
 314 Macintosh computer." That sounds better. So, that's my course goal, real world performance. That's
 315 the condition. Now I need a [READS MODEL]
 316 R: What were you looking at? Oh, were you looking at the annotated model?
 317 A: Yeah. [TURNS TO PAGES 87-88] Where was that?
 318 R: Those are the definitions?
 319 A: No, these are. This is the example. Oh, see I forgot all about these. There's like two, three, four,
 320 four of these.
 321 R: Are they all examples of the same, for the course goal?
 322 A: Yes. [READS PAGE 90] Now I'm confused.
 323 R: Why?
 324 A: I don't understand if we are supposed to have a [READS MODEL] Oh, okay.
 325 R: What?
 326 A: Well, there's two sections to this [POINTS TO BLANK FORM ON SCREEN]. One says conditions,
 327 the other says behavior. [READS MODEL] The behavior is part of the course goal, but according to
 328 this [MODEL], it says you have to, it's a separate item you indicate here for behavior. [READS NOTE
 329 ON MODEL COURSE GOAL]: "What the graduates will be able to do after this course, thus general
 330 description of the final exam." [READS MODEL] I mean that's [PAUSES] Okay. [READS NOTE ON
 331 MODEL COURSE GOAL]: "General solve rather than specific behavior." So I guess that is pretty
 332 easy. Maybe I'm making more of it, so that could simply say. This is basically what I think I had
 333 before. [TYPES THEN READS PRACTICE ON SCREEN]
 334
 335 R: So what's your behavior now?
 336 A: I just put "digitize video tape for multimedia applications." You know, that's
 337 [READS NOTE ON MODEL COURSE GOAL]: "What the graduates will be able to do after the course,
 338 thus a general description of the final exam." In fact, it's almost identical to the first course goal, this
 339 one up here [IN COURSE DIAGRAM IN PRELIM], where I've just [PAUSES].
 340 R: Your original one?
 341 A: Yes, exactly, actually it is, so he [—] indicated on here [FEEDBACK TO PRELIMINARY
 342 ASSIGNMENT], just to leave "optimize," so I'll [PAUSES]
 343 R: To leave "optimize" in?
 344 A: Yeah, on this he did, so I guess that's not too specific. Okay. You know what, I think I'll go
 345 ahead and type this [COURSE DIAGRAM] in. I'm going to have to do it anyway. My little diagram, I
 346 did on a little graphics program anyway, so I can't...unless he's got illustrator on here?
 347 R: I doubt it.
 348 A: Okay.
 349 R: We'll paste that in later, huh?
 350
 351 A: Okay. I got it at home, so I just, I don't have this file. I'll remember next week to bring everything
 352 on disk. I didn't think about doing it on the computer.
 353 R: But you're saving this on your zip disk?
 354 A: Oh yeah, definitely. [TYPES] Okay, so this is simply, You know, I almost went up and asked him,
 355 I almost wanted to change this again [LAUGHS] but I didn't.
 356 R: Why did you want to change it?
 357 A: Just, I don't know, I didn't know how relevant it would be, but I don't think that's the real crux of
 358 why we're doing this. Once we learn how to do it, we can apply it to anything we need.
 359 R: So what's your course name?
 360 A: Multimedia Production Applications, so that's obviously pretty general.
 361 *PART 2 - COURSE DIAGRAM[READS FORM?? F2, 1:15:00] Okay, number 2. Okay. [READS
 362 PRACTICE COURSE DIAGRAM ON SCREEN] So this is
 363 what I'm going to say. [UNINTELLIGIBLE]
 364 A: So, how am I doing as a test subject?
 365 R: I think you're doing very well. You're able to verbalize what and why.
 366 A: I talk a lot to myself, by the way, if you didn't notice that. [LAUGHS THEN TYPES] [COMPUTER

367 BEEPS] Whoops! Hush. Okay.
 368 R: Was there anything there, in that cell on the left in the course goal, or was that blank?
 369 A: No, that was blank, I think. Well, I don't know how to do that, so [PAUSES]
 370 R: What were you trying to do?
 371 A: I was just trying to TAB over [IN A TABLE ON THE SCREEN.
 372
 373 [Digression on computers and autoformatting in Word 97]
 374
 375 A: Okay.
 376 R: Now where are you?
 377 A: I am copying.
 378 R: Oh, you are in number 2 [COURSE DIAGRAM]. You are going to do an outline?
 379 A: So I'm basically just retyping this [COURSE DIAGRAM] so I have one file. Which reminds me, I
 380 should save this before something happens. Okay. I'll just save it there. I hope this comes through
 381 okay.
 382
 383 [Digression on importing files]
 384
 385 [TYPES DIAGRAM ONTO SCREEN WHILE LOOKING AT DIAGRAM IN PRELIM]
 386
 387 A: [READS COURSE DIAGRAM IN PRELIM] Ah, let's see. What am I doing?
 388 R: Are you looking at the preliminary feedback?
 389 A: Oh.
 390 R: Oh, you're looking at your diagram. Oh, outline?
 391 A: Yeah, but I was thinking of something else. [LAUGHS]
 392 R: [LAUGHS] Okay, where's that whip?
 393 A: [READS DIAGRAM HE JUST TYPED]: "Fioles. Video Fioles."
 394
 395 [Digression about food, birthdays, computers]
 396
 397 [TYPES]
 398
 399 [Digression on copy machines at MSU]
 400
 401 A: [TYPES] Oh, okay. [READS PRACTICE COURSE DIAGRAM] I forgot what I just said. [TYPES]
 402 R: [UNINTELLIGIBLE]
 403 A: Okay. [TYPES]
 404 R: When you did a save, it's going to happen each time, isn't it?
 405 A: I guess so, when you're working in WordPerfect, it doesn't, it just automatically saves whatever
 406 format you were using before.
 407 R: You're using WordPerfect for DOS?
 408 A: No, for Mac at home.
 409 R: Didn't you just click on the one that said [PAUSES]
 410 A: Oh, yeah, yeah. I am [PAUSES]
 411 R: Because you said that can be opened by a MAC WordPerfect.
 412 A: Yes, and it can also, it also works very nicely in WORD 97.
 413 R: Because it's all DOS, maybe?
 414 A: Who knows, but it works.
 415 R: Huh! Okay.
 416 A: All right. Are we done?
 417 R: No, we're not. I see a blank #4 and a blank #5.
 418 A: Geez! [LAUGHS] Ah [PAUSES]
 419 R: Okay, so this is the course terminal objective you're going to work on?
 420 A: Oh, this should be simple. I'll breeze through this one!
 421 R: Never say die!
 422 *COURSE TERMINAL OBJECTIVE
 423 A: Okay. [READS FORM]: "Course terminal," okay. [READS NOTES FOR MODEL COURSE
 424 TERMINAL OBJECTIVE]: "Description of course final exam. All skills from all units on course final
 425 exam." Okay, so that's [PAUSES]
 426 R: So what are you reading? The annotated model, but what part of it?
 427 A: The condition right there. [INDICATES TOP OF PAGE 75] This one.
 428 R: You're reading the actual example?

429 A: Yes, the course terminal objective and his annotated notes.
 430 R: Those are his notes?
 431 A: I'm reading his notes more than anything.
 432 R: Okay.
 433 A: [READS MODEL COURSE TERMINAL OBJECTIVES CONDITIONS]: "Given a written description
 434 of any common" [READS SILENTLY]
 435 R: So what did those notes tell you?
 436 A: [READS NOTES] Well, it just says that, it points to specific parts of what's written,
 437 and it describes what they are. Like it says, like here it says [READS MODEL ON PAGE 75]: "All skills
 438 from all units on course final exam," so [READS SCREEN] I have to make sure that I'm going to be
 439 dealing with all of these areas here [UNITS IN COURSE DIAGRAM], so I have to make sure these
 440 are all included in the terminal objective, in the course terminal objective.
 441 R: What's all included?
 442 A: Well everything that, As far as creating files, includes creating QuickTime files for both CD-ROM
 443 and the World Wide Web, and creating Windows files, PC files for CD-ROM, and it includes creating
 444 Real Media files for the World Wide Web.
 445 R: So all the unit skills?
 446 A: Yes, all the unit skills. Exactly. That's going to be a lot to pack in there. Okay, so, [TYPES] Oh,
 447 lets see. Now we'll simplify it. [TYPES CONDITION AND STARTS TYPING BEHAVIOR]
 448
 449 R: That's the behavior of the terminal objective?
 450 A: Um hm. [READS MODEL ON PAGE 75]
 451 R: You're looking at the annotated model?
 452 A: Um hm.
 453 R: Why are you looking at that?
 454 A: Just to see if what I wrote makes sense. It [NOTE] talks about "specific
 455 observable test behaviors."
 456 R: Is that the part on the left [CHECKLIST], or is that an annotation?
 457 A: That's his annotation.
 458 R: Um hm.
 459 A: [READS CHECKLIST ON MODEL PAGE 75]: "Test of students." Yeah, there's a, [READS FORM]
 460 oh, that's
 461 optional. Oh, wait a second.
 461 R: What's optional?
 462 A: [READS MODEL] Oh, there's a criteria. Oh, it looks like I've kind of combined something here,
 463 maybe I shouldn't have done.
 464 R: What did you do?
 465 A: [READS MODEL] I'm talking about properly following checklists, and that would be a, perhaps,
 466 criteria rather than [PAUSES] Well, it seems to me that would be a behavior. Oh, these are test
 467 behaviors.
 468 R: Where does it say "test behaviors"? It that his annotation again?
 469 A: Yes. [READS NOTE]: "specific observable test behaviors." So in reality [TYPES] Could I have
 470 done [PAUSES THEN TYPES]
 471
 472 R: How did you change the behavior?
 473 A: I didn't really, I just took one out.
 474 R: Which behavior did you take out?
 475 A: This one, which is "Following the checklist provided in sequence, in completing their task," which is
 476 actually a criteria and not a behavior.
 477 R: Oh, okay, so you just moved it down?
 478 A: Yes, so I created. See, the criteria wasn't there, that was an option, so, but it was something I
 479 had already thought about, that they would have a checklist, that they would be going through
 480 specific steps in proper sequence. That's going to be very important. And there's some other things
 481 in there too, that it's almost going to be like a flow chart, sort of, because there's going to be decision
 482 making that has to be made based on what output the student's looking for.
 483 R: So it's a [PAUSES]
 484 A: So there's going to be, like, resolutions, decision, and those kinds of things.
 485 R: Um hm.
 486 A: Quality versus speed, those kinds of decisions that they'll have to make in order to optimize it for
 487 the output they desire. So that checklist would probably include that, so it would be more like a,
 488 almost like a flow chart, but hopefully I would simplify it. [TYPES]
 489 R: So before you start that, read to me all you have in number 4 [COURSE TERMINAL OBJECTIVE].

490 A: Okay. [READS COURSE TERMINAL OBJECTIVE ON SCREEN]: "Condition: Given a Macintosh
 491 computer"—Oh, yeah, I didn't really read this, did I? — "Given a Macintosh computer, appropriate
 492 digitizing software, VHS video cassette recorder (VCR) and a VHS videotape, digitize the videotape for
 493 use on the World Wide Web and CD-ROM applications for both Macintosh and PC platforms." Under
 494 Behavior it says "students will test their final product on the applicable application and platform."
 495 And under criteria it should say, "and students will, students will properly follow the checklist provided
 496 in sequence in completing their task."
 497
 498 R: Okay.
 499 A: [READS SCREEN] So now I'm down to unit goal, and now this is where I'm going to have to, to
 500 do two of everything, I think.
 501 R: Yep, if that's at the level of your [PAUSES] You have units and subunits?
 502 A: You mean we have to do it for both of them? What's number 6?
 503 R: What do you mean do it for both of them? No.
 504 A: Just the one I picked, right?
 505 R: Do you have your practice and project coming from the [PAUSES]
 506 A: Those are the units.
 507 R: Oh, those are the units?
 508 A: Aren't they? [POINTS TO COURSE DIAGRAM] That's my unit, project unit, practice unit.
 509 R: Mmm.
 510 A: So from here on out, I have to have a practice and project?
 511 R: Um hm. I think you'll want them on separate pages, although it may not be necessary.
 512 A: What do you mean? Oh, a whole thing just for practice and a whole thing just for [PAUSES]
 513 R: It may not be necessary, but that's how I've seen them. I don't know. If it's clearly identified, he
 514 may not care.
 515 A: Well, I guess that might be better. It probably gets, kind of, whatever, I guess. Somewhere I have
 516 to define what it is.
 517
 518 R: Define what "what" is?
 519 A: Which one is practice and which one's the project.
 520 R: Oh.
 521 A: I'm going to try it this way [BOTH PRACTICE AND PROJECT ON SAME PAGE OF FORM] and
 522 see if it gets too [PAUSES] They're not going to be all that different. Gosh. [TYPES] I don't know if I'll
 523 get through this whole thing or not. There is quite a bit here.
 524 R: You promised. Didn't you say you were going to breeze? I've yet to feel any breeze. [LAUGHS]
 525 A: [LAUGHS] It is still pretty hot in here. What's all this? [READS PART SEVEN OF BLANK FORM]:
 526 "Realism of the unit test"?
 527 R: Oh, that's later, that's part 7 or something, isn't it?
 528 A: I don't know.
 529 R: Yeah.
 530
 531 A: When he says the whole assignment, is that part of the whole assignment?
 532 R: It's the last part.
 533 A: What is it?
 534 R: The realism? That's part of that part 7.
 535 A: Oh, it is?
 536 R: Yeah.
 537 A: So I have practices for both of these?
 538 R: Yes, but you don't have to do those right now.
 539 A: Right, right.
 540 R: [LAUGHS] Unless you think you can get them done in five minutes.
 541 A: [LAUGHS] I really wasn't planning on doing anymore tonight.
 542 R: Really?
 543 A: Yeah.
 544 R: It's fine with me, you are probably starving and my contacts are drying out.
 545
 546 A: What I am down to, I'm down to the last [PAUSES]
 547 R: Yeah, the last one [LAST PART OF ASSIGNMENT 1, PARTS 1 THROUGH 5].
 548 A: That's pretty good, isn't it?
 549 R: Yes, and it's only Wednesday.
 550 A: I know. That's pretty amazing for me.
 551 R: So now you can wait till Sunday night [LAUGHS]

552 A: Oh, what did I do?
553 R: What? You'll give me a heart attack!

Observation Session #3

3 R: So this is Alan's Observation Session # 3.
4 [Digression about supper]
5 *COURSE GOALR: So, What feedback did he give you, that you were wondering about all the blue?
6 A: [PRACTICE FEEDBACK ON 1-5] Essentially, as I mentioned earlier on the course goal, um,
7 basically... I thought this was kind of unique.--I didn't ask him about this, but, I don't know why he
8 asked me to delete that, but I will ask him that. I said "as a student employee" and he wanted that
9 deleted, the word "student," to just say "as an employee." Maybe, I'm thinking, well, maybe because
10 that's more real world, but this is real world too. I mean, these are student employees.
11 R: Yeah. Are there non-student employees that this might benefit?
12 A: Yeah, there are.
13 R: So maybe that's it...more general.
14
15 A: This would be more... that would be too specific then. You just answered my question.
16 R: Now I don't know if I should have.
17 A: Well, I mean--
18 R: Why it might be the answer?
19 A: Yeah, I mean, I kind of answered it myself, so that makes sense. And then, essentially it was just
20 needing editing, um, putting one section, moving sentences.
21 R: Not just changing wording, but actually moving parts to different parts of the objective?
22 A: That plus, plus, another problem was the fact that I actually had a behavioral statement in my
23 condition. [OF CG]
24 R: Uh huh.
25
26 A: Because, again, I was essentially, it was redundant, I was actually duplicating, my behavior
27 statement here was essentially already stated under my condition, which, of course, doesn't make
28 any sense. And that's where I was getting, and I did the same thing back here. [IN UG]
29 R: Oh, the unit goal?
30 A: Everywhere, actually. And I'm trying, I want to go back to my previous one because I thought
31 perhaps that would have been caught last week. You know, but, uh, I did the same thing here under
32 the [COURSE] terminal objective.
33 R: Ahh
34 A: Under my condition I have behavioral statements, that, uh. So he says, "As example, under this
35 behavior, this is OK with the addition of above" that he has a big circle around.
36 R: Ah, so it looks like most of...
37 A: Most of my condition goes down..
38 R: Goes down...
39 A: Goes down under behavior.
40
41 R: What's the part he has circled, what does that say?
42 A: It says "create digital QuickTime MOV files for use for both the world wide web and CD Rom
43 applications, both Macintosh and PC platforms."
44 R: Ah.
45 A: So that's a behavior, that something that they are doing.
46 R: Um hm.
47 A: Be able to create. It's not a condition. And I think partly, not, well. Now, I obviously have a clear
48 understanding of why that says "condition" and why that says "behavior."
49 R: Hm.
50
51 A: But on the original form where you just had those words, I guess at one point I, I must not have
52 realized that he wants just the condition there, and just the behavior there, that it was all one.
53 R: One objective divided into parts.
54 A: And it just contained a condition and a behavior, you know, not necessarily realizing that they
55 should have been broken down like that. So I didn't do that.
56 R: Hm.
57 A: So that was obviously a problem. [PRACTICE COURSE DIAGRAM FEEDBACK] Hey, look at that.
58 "Fine, fine, fine!"

59 R: Well now it's captured for history, posterity. [LAUGHS]
60 A: [LAUGHS] So.
61 R: And it's quite lovely.
62 A: As you can see, I'm graphically oriented, so anything I can do visually or with graphics. If I was
63 just able to put circles and arrows around these things, then they would have been perfect.
64 R: Dr. — does it. You could do it too. You'd have to use different color ink, though.
65 *UNIT GOAL: And this one, I don't know what happened here [PRACTICE UNIT GOAL].
66 R: What?
67 A: The unit goal. For the unit I wrote objectives, I wrote an objective.
68 R: Yeah. What was his feedback? What do you mean?
69 A: He says, "Set this up like a goal. This is set up like an objective. Check the criteria." Somehow I
70 just totally screwed this up.
71
72 R: Read the, read what you've got there.
73 A: Under this whole thing?
74 R: The whole thing, yeah.
75 A: Under Condition [READS PRACTICE UNIT GOAL]: "Given an AV Macintosh computer,
76 appropriate digitizing software, VHS videocassette recorder/VCR, and a VHS videotape, create a
77 digital QuickTime MOV file for use on a mastered CD ROM." See. So, under Behavior I said:
78 "Students will test their final product by playing back their QuickTime digital file from a mastered CD-
79 ROM." Under Criteria I say: "Using the checklist provided, students will properly follow the steps in
80 sequence when completing this task." Well.
81 R: So, what's the difference between a goal and objective in terms of content?
82 A: Well, in terms of content, a goal is.. is simply...a single very generic description of... uh.. the
83 behavior, I believe. Whereas an objective are [sic] very specific elements of that, which includes [sic]
84 condition, behavior, criteria, and uh, lower limits. [READS PRACTICE COURSE GOAL] But we also
85 have conditions and behaviors under goals, as well.
86 R: So what's the difference there then?
87 A: I don't know, its just that this [CHECKLIST] says the behavior is generally stated, and it is related
88 to the subject, whereas the objectives are specifically stated, and includes [sic] the behavior as a
89 test on the students at the end of the course, the final exam, if you will.
90 R: So, the most important thing from that, then, the feedback, is to break the objectives into their
91 parts, put the parts where they belong. Would you say that?
92 A: Yes, I would say that's the main crux.
93
94 R: That and the difference between the course, between the goal and the objective.
95 A: Yes, that was an obvious blunder on my part, because it's [UNIT GOAL] essentially, it's the same
96 basically, it's the same as the course goal except it's specific to that unit. Instead of the course, it's
97 specific to the unit. So it's, I can basically say the same things as I said in the course goal.
98 R: Um hm.
99 A: Once I get that correct. And then, make it specific to the subject, which is the unit.
100 R: So—
101 A: So, I'll just be able to breeze through this. Feel that air! Swish!
102 R: Hold onto your chair, it will blow you out the window.
103 A: Yeah. So I'll just have to keep. Every few minutes I'll look at this document just to give you that
104 positive feedback and keep me going- Persevering.
105 R: I like that word "fine".
106 A: I like that word "fine" and also have a "good" here.
107 R: Oh, highlight that.
108 A: I used an asterisk to define something, he said "good." Asterisks are good.
109 R: He likes that stuff. [LAUGHS]
110 A: Ha. Oh.
111 R: Sometimes it doesn't take much to cheer you up, does it?
112 A: That's true. It says to push on. "Please check some notes carefully." Why not check all notes
113 carefully, not just [PAUSES]
114 R: Yeah, some notes, it doesn't matter. [LAUGHS]
115 A: Yeah, right. [LAUGHS]
116
117 A: So before I persevere and push on I obviously have to get this done, straightened out before I
118 can move forward.
119 R: So is this file visible because it is not in WordPerfect?
120 A: Yeah. This file is visible because it was saved as a WordPerfect DOS file.

121
122 [Digression on text file formats]
123
124 R: So now you're changing your previous work?
125 A: Right. [READS PRACTICE FEEDBACK, THEN TYPES FOR 3 MINUTES]
126
127 *COURSE GOALR: So what are you reading?
128 A: I'm reading the, my [COURSE GOAL] condition here [ON SCREEN].
129 R: By?
130 A: There's a section here [PRACTICE FEEDBACK CG 1-5] that it says, "Put graduates below." And
131 cross that, it out and move it. Put graduates below, and it says "graduates will," so I [PAUSES]
132 R: What do you have?
133 A: What did I have where?
134 R: Initially, where he says "graduates will" under the behavior there.
135 A: Um.. I had, um, "Graduates of this course will successfully be able to digitize videotape." And
136 basically that's a behavior.
137 R: Yeah.
138
139 A: So, he said "Delete redundant part." Delete "Graduates of the course will successfully be able to
140 digitize videotape optimized."
141 R: Hmmm.
142 A: So I deleted that and I put that down here under behavior. Now, graduates of this course will
143 successfully be able to digitize videotape optimized for multimedia applications.
144 R: So what's the, what are you confused about?
145 A: I'm confused because in a big box down here below, he says "as an employee of the DIF for
146 multimedia applications graduates will." Oh. Oh. Well. OK.
147 R: Do you understand it now?
148 A: Yes, I think so.
149 R: What does it mean?
150 A: He was giving, I think he's giving a full example of a course goal, including condition and
151 behavior, in one statement.
152 R: Ahh.
153 A: So I think this is correct to have graduates in this section. See, this is what's happening. I'm
154 coming back again to breaking this thing out.
155
156 R: Um hm.
157 A: So in other words, should this just be one flowing paragraph here? I mean [PAUSES]
158 R: Broken apart though.
159 A: After they're combined.. I mean when you write a course goal, it's going to include a condition
160 and behavior, right?
161 R: Um hm.
162 A: So, if I was writing it, if I was actually writing a course goal, I don't think I'd be breaking that up,
163 and giving that to a client saying, "This is your condition, this is your behavior." I'm saying this is your
164 goal, and it would include a condition and behavior.
165 R: that's not a complete sentence under Condition, is it?
166 A: No, it's not.
167 R: Yeah.
168 A: No. It's, that's, it's what it ended up to be.
169 R: Sure, I think you're right. I think you can put them together.
170 A: So it should be a naturally flowing document-goal.
171 R: Yeah.
172 A: In other words, this ends and boom! you go to that.
173 R: Or it might be one sentence.
174 A: Or it could be one sentence.
175 R: Just like he's got in the box down there [PRACTICE FEEDBACK FOR COURSE GOAL].
176
177 R: I have a feeling I shouldn't have said that.
178 A: [LAUGHS] Well, no, that's OK. But still I have a setting here [PRACTICE FEEDBACK 1-5
179 COURSE GOAL]: "Working on a Macintosh computer," and he says "Part of setting is OK."
180 R: What part was it?
181 A: He didn't say.
182 R: He crossed something on the setting out?

183 A: No, he didn't. Oh. Yeah, I guess. Well, no, but he, ah. Ok, I think I know what he's saying.
 184 Although he didn't say to delete it, but I think that's what he's referring to. In other words, I'm saying
 185 it's at the Digital Transfer Facility. This is providing a setting right here. Is it necessary to say "working
 186 at a Macintosh computer"?
 187 R: Is that what he's saying?
 188 A: I think that might be what he's saying, because setting [IN CHECKLIST], he's got pointed towards
 189 here [PRACTICE COURSE GOAL CONDITION], with an arrow, says "Digital Transfer Facility at the
 190 IMC."
 191 R: Ahh.
 192 A: That's the setting. So he puts this in brackets that says: "Part of setting is Ok." So the purpose is
 193 Ok. The purpose is for multimedia applications. So I could possibly combine that, and I think what
 194 he's saying is that it is probably really not that necessary. And that's kind of what we talked about
 195 tonight at one point, too. I mean, you could get down to, you know, in a room, you know, 20 foot by
 196 20 feet, with fluorescent lighting, you know, and this and this and this. Which has real no, not really
 197 any value to the instruction.
 198 R: Um hm.
 199
 200 A: So maybe that's what he's saying. And I've already outlined, you know, I've got Macintosh,
 201 Macintosh, Macintosh. So I think maybe that's what he's saying.
 202 R: OK. So what changes have you made so far?
 203 A: The only changes that I've made is I deleted this section that he had crossed out [PRACTICE
 204 COURSE GOAL CONDITION], and I determined that the graduates.. ah.
 205 R: Oh, goes down.
 206 A: Basically go down.. (mumble..)
 207 R: Under Behavior.
 208 A: So not a whole heck of a lot so far, but this [PRACTICE COURSE GOAL CONDITION ON
 209 SCREEN] is not a coherent sentence even though "as an employee of the Digital Transfer Facility of
 210 the IMC for multimedia applications." So this shouldn't even really even have a period; maybe a
 211 comma. And this should not be capitalized. See, this is how I'm going to work this. I'm going with the
 212 assumption that, although these are being broken out, that they're one sentence, or they're one
 213 paragraph.
 214 R: I think that's reasonable.
 215 A: To choose the course goal. So," As an employee of the Digital Transfer Facility at the IMC for
 216 multimedia applications, graduate of this course will successfully be able to digitize videotape
 217 optimized for." Okay, I don't need to do that. Oh.
 218
 219 [Digression on chiropractors and doctors]
 220
 221 [Stares at screen]
 222
 223 A: I'm just going to take this completely out.
 224 R: What is that?
 225 A: "Optimize for multimedia application".
 226 R: Ah. Why are you taking that out?
 227 A: Because in reality that's actually a criteria. That's a criterion, it's not, it's more than a behavior.
 228 R: Hm.
 229 A: See, there again, I'm adding things to this.
 230 R: Well, that's why he wants you to be able to identify which is which.
 231 A: And it's interesting too, because I never had a criteria under that one, I only started with my
 232 criterias under the objectives. And even though I'll probably get in trouble for doing this, causing
 233 myself more pain, um, well, no, no. I don't know. As I remember, the criteria was an option. Under
 234 the objectives, but I don't know if it specifically. Maybe I'll just leave it. Nah, I'll just leave it, I'm just
 235 going to leave it. In fact, I don't even talk about optimizing anything down here, so it doesn't fit
 236 anyway. Now, that wasn't too bad.
 237 R: No, it didn't take you an hour, we didn't get started [UNINTELLIGIBLE] and that includes talking
 238 about doctors and Bill Gates. [OBSERVING SESSION STARTED 35 MINUTES LATE]
 239
 240 A: Did you know that Apple Computer sold more Imac computers in the month of August than any
 241 other computer in the world.
 242
 243 [Digression on Macintosh computers]
 244

245 *COURSE TERMINAL OBJECTIVER: So, are we moving on?
 246 A: Ah... yeah.
 247 R: What are you on? Part 4?
 248 A: Way up to #4 now.
 249 R: Course terminal objective okay?
 250 A: Course terminal objective okay. Let's see. [READS CHECKLIST FOR COURSE TERMINAL
 251 OBJECTIVE]: "All skills." [LOOKS AT PRACTICE 1-5 FEEDBACK] Yes, I did the same thing.
 252 R: As what?
 253 A: I included my behavior in my condition statement.
 254 R: Mm. So you just move it down?
 255 A: Um hm. Something like that. See, I found another word now, that I'm not sure what it is.
 256 [PAUSES] Oh.
 257 R: You found another word?
 258 A: Oh, I thought I found something I didn't recognize, but I figured it out.
 259 R: What was that?
 260 A: "Goes." The word "goes." I wasn't sure if it said "goes" or "goals."
 261 R: Oh, you mean reading his handwriting?
 262 A: Uh, just, uh [PAUSES]
 263 R: Did you ever figure out that other word [WRITTEN FEEDBACK]?
 264
 265 A: No, and I forgot to ask him again tonight. I figure it's kind of a mute [sic] issue now.
 266 R: Yeah.
 267 A: Maybe I should look at that and [LAUGHS]
 268 R: [LAUGHS] That was probably the key, and because you couldn't read it,
 269 A: It just threw everything else off course.
 270 R: That one word.
 271 A: I kind of doubt it. No. Oh, that was in this thing [PRELIMINARY ASSIGNMENT].
 272 R: Oh, the one [FEEDBACK] that said "fine"?
 273 A: Yeah. Oh, what is that?
 274 R: The one in the course, course goal.
 275 A: Well, yeah.
 276 R: So, what do you think it was? Still don't know?
 277 A: I'm not sure, but it was basically, again something that was there that didn't need to be there.
 278 R: Oh.
 279 A: I think that's what it was. Well I'm glad he said my formative evaluation thing would work. I was
 280 worried about that.
 281 R: Because you wouldn't be able to do it the way it's described in the course pack?
 282 A: Yeah, and I didn't know if it was appropriate. You know, because I don't know how much
 283 evaluation I'm going to be able to do with people not there. You know.
 284
 285 R: You mean because it's online?
 286 A: Yeah. But it should be actually pretty [PAUSES] We'll see. [REVISES PRACTICE COURSE
 287 TERMINAL OBJECTIVE ACCORDING TO FEEDBACK]
 288 R: Thank goodness for cut and paste.
 289
 290 (Digression about life before word processors)
 291
 292 A: Just like I'm not sure where all this stuff goes, but I'm sure eventually it'll be where it's supposed to
 293 be.
 294 R: Now, which part are you reading?
 295 A: It says annotations here. It says [PRACTICE 1-5 FEEDBACK COURSE TERMINAL OBJECTIVE]
 296 to "make condition say and ask to" [PAUSES]
 297 R: Now what does that mean? Where is that note?
 298 A: See, I made a note here tonight during class to go to page 122 to help me figure out what that
 299 means.
 300 R: What's 122 ?
 301 A: I don't know, we'll find out right now.
 302 R: Forget your magic Post-It notes?
 303 A: You know, somehow I took them out and I don't know what happened to them. So, I had to write
 304 it down.
 305 R: What is that? Is that the practice test?
 306 A: [READS PAGE 122] No, it's the practice, uh, just writing goals and objectives. All the things,

307 how you state the conditions of an objective, all these things here. And as we were going through
308 this [PAGE 122] tonight, I was thinking this would have been helpful to try to do this earlier, but I
309 probably wouldn't have understood it. Oh, I must have said something good, you're writing it down.
310
311 R: [LAUGHS] Really, I'm just writing "Alan is a nut."
312 A: [LAUGHS] All those notes will be shredded, right?
313 R: You can have them for. [LAUGHS] So what does that say on 123?
314 A: Yeah, "Stating the conditions of an objective." That's exactly what we are trying to do here. And it
315 should state what the student will be given, the number of situations. See, I didn't have that either.
316 Well. And computer, actually I thought about expanding that. I probably should put some numbers
317 down. So, what we were talking about tonight [IN CLASS]. A description. Instructions. Okay, so it's,
318 um, so when he's saying "and ask to" is, um, that's a description of the instructions. Oh. And the "as
319 is" [PAUSES]
320 R: What?
321 A: As we were going through these, um, it's basically they're giving an example of what they're
322 expected to be doing under what conditions. They give an example of what that condition, in their
323 description of what they would be doing. Which I don't have.
324 R: Is that one of his notes up there [PRACTICE 1-5 FEEDBACK COURSE TERMINAL OBJECTIVE]?
325 A: Yes, at the end it says, "as is" and then he says, "goes with behavior," with a question mark, and
326 then he says, "or else change wording to say 'and asked to create' to make condition," and then he
327 says take that and use it down here [IN BEHAVIOR]. So I'm wondering if he's, you know, "ask to
328 create digital files." Da da, da da, da da.
329 R: Yeah.
330
331 A: But he's got that all circled, and then an arrow here, and he says Okay, this is fine, with the
332 addition above. But wouldn't that be redundant, like I had here, where redundant, delete redundant
333 part? [LOOKS AT PRACTICE TEST] So this is a goal, this is an objective. So as I'm looking at this,
334 and trying to realize this, I think, trying to go back to basics here [PAUSES]
335 R: Uh huh.
336 A: Of what the condition should include, what it shouldn't include. And it seemed very easy to figure
337 that out in class tonight. I was just answering, um, answering the questions just like I should. Which
338 of these parts is a condition? Ok, that's a condition. No.
339 R: Are those the practice items for the test?
340 A: Ah, no. Yeah, well, maybe.. sort of.. I don't know. I guess so. We were going through these
341 tonight.
342 R: Yeah. When's the test?
343 A: Next Monday. No wait a second, what's the date today?
344 R: The 23rd.
345 A: We figured that one out, didn't we?
346 R: We talked about this earlier.
347 A: It's a week from Monday, the 5th.
348
349 R: Oh, yes, he doesn't have a test and assignment due at the same time.
350
351 [Digression about toy soldiers, lunch and Antz]
352
353 R: Ok, now what are you doing?
354 A: One thing we talked about tonight was, um, what was the word he used? Enumerate. Enumerate
355 things. So they were a real clear, and so you don't, so I thought I would, what is it enumerate [sic] or?
356 R: Enumerate.
357 A: Enumerate. So I thought I would enumerate some of these lists here of this stuff.
358 R: The conditions for the course terminal objective?
359 A: Yes. I'm trying to remember the. Ah. [UNINTELLIGIBLE] No this doesn't make any sense.
360 R: What are you looking at now?
361 A: Uh.
362 R: His feedback?
363 A: [UNINTELLIGIBLE] His notes. [PRACTICE 1-5 FEEDBACK FOR COURSE TERMINAL
364 OBJECTIVE]
365 R: That was the one about the conditions?
366 A: Yes, still on that one. Let's print this, I guess. [UNINTELLIGIBLE] [SIGHS]
367 R: So what do you have so far?
368 A: Crap!

369 R: [LAUGHS] Do you want me to put that in my notes?
370 A: Crap! C-r-a-p. Crap! [LAUGHS]
371 R: [LAUGHS]
372
373 R: So what does it say? "Given one Macintosh computer, real media [PAUSES]
374 A: [HOLDS UP SIGN THAT SAYS "CRAP"] [LAUGHS] I'm getting cute, and it doesn't even make any
375 sense.
376 R: Real pro, real media pro digitizing software 232nd..2--
377 A: You know, he didn't say that. He said that was okay, but I guess I shouldn't mess with that. I
378 shouldn't change the things he says is [sic] okay.
379 R: He says what is okay? Oh, you had it [PRACTICE CONDITION OF COURSE TERMINAL
380 OBJECTIVE] without it being enumerated before? Is that what you're saying?
381 A: Well, it was non-enumerated, and also I didn't specify what software is appropriate, which seems
382 kind of ambiguous. But I don't even know that the digitizing software has to be there. Macintosh
383 computer. And then I'll start making more work for myself and figure out what I got to do to begin with
384 just to get it. So. "Given an AV Macintosh computer with digitizing software." I think that, and I'm
385 going to indicate some numbers here. Well, see, is that condition or is that criteria? [LOOKS AT
386 CHECKLIST] No. "Number of situations" should be in the condition. Yeah. Should be in there. See
387 what happens, see, when you do this and it's wrong again. It's just like, what's the mathematical
388 term for that? Exponentially?
389 R: Or geometric progression that does not get there?
390
391 A: Or I would say, snowballs! So you have more work, you know, next time. I got to do more of,
392 then I'll have to go back and fix this again, and then keep going, and then [PAUSES]
393 R: Do you know how to fix this [PRACTICE COURSE TERMINAL OBJECTIVE] from his feedback?
394 A: I'm having difficulty with this one.
395 R: Difficulty understanding the feedback?
396 A: Yes.
397 R: Is that the part about "and ask to create"?
398 A: And I understand that, but it just doesn't seem to jibe in a sentence.
399 R: What would it be, what would the sentence be, taking that advice?
400 A: Well, it would say, "Given computer software, video clips, etc., given this, and asked to create this,
401 such as this." I think that's what he's looking, I think, that's what he wants. Where you have, you
402 know, description. You have "such as," and a medium.
403 R: So, do you think you have an example now?
404 A: Well, Yeah. [READS PRACTICE]
405 R: What are you doing? Comparing it [PRACTICE COURSE TERMINAL OBJECTIVE] with the
406 course goal?
407 A: Yes, which I probably shouldn't.
408 R: Why?
409 A: Well, yeah, I just noticed I have "students" here [IN PRACTICE COURSE TERMINAL
410 OBJECTIVE], and over here I have graduates [IN PRACTICE COURSE GOAL].
411 R: Hm.
412 A: But that's correct, I guess.
413
414 R: Now, what part of his feedback are you reading?
415 A: Actually, I'm looking at part of the practice that we went through this evening.
416 R: Oh, the practice questions?
417 A: Yes.
418 R: Which ones? Which one are you looking at?
419 A: I'm looking at "Which of these is the best of these parts of an objective?" And this is the
420 behavioral section. And he had a checklist that he put up on the board, well, no, actually, this is just,
421 he had his annotations on his transparency, and that's what I was writing those down here.
422 JR: What do they say?
423 A: It says, "behavioral terms and object of verb clear." No question mark, I guess. So I guess I was
424 looking at action verbs here [PAGE 131]and [PAUSES]
425 R: And that's on page 120?
426 A: 131
427 R: 131?
428 A: 131 and 132.
429 R: So, what did that tell you? Or how will you use what you just read?
430 A: I'm comparing, I'm essentially testing what is stated here, to what, to what should be a part of this

431 statement.
432 R: Ah.
433 A: Making sure I've got this, I've got that.
434 R: And is that that checklist that you were talking about that he had on the transparency?
435
436 A: Well, no it's not. In fact I asked him about that afterwards because it wasn't in our notes. It wasn't
437 anything I had, and he said it's just that, it's just this, and he swung back here, and page 66.
438 R: What is that?
439 A: It's just the, uh, the unit "Preliminary Choice of Course and Unit Goals for Assignment."
440 R: Oh, it the blank [PAUSES]
441 A: I don't [PAUSES]
442 R: It's the blank format for the Preliminary Assignment.
443 A: Yes, but I don't think that's what it was, now that I Look at it. He had very specific, it was almost
444 like these things [CHECKLIST ITEMS] for condition, behavior, criterion, and lower limits. It was like,
445 what should each of those include, ba ba BOOM, ba BOOM. And he said we were going to be
446 given that on our test. When we did our test on the 5th, he said we would have that information.
447 Have that checklist. Man, look at this test!
448 R: Yes.
449 A: Geez, I think I'm going to have to meet with him.
450 R: Hm.
451 A: Outside of class. Oh, he's got the answers here, I shouldn't have looked at those.
452 R: Oh, yes.
453
454 A: You know, the thing is, though, it's like when we were going through the practice questions
455 tonight.
456 R: Hm.
457 A: It was like, it was clear to me, I was answering them. Boom, Boom, you know? It was "A," it was
458 "B." Oh, that's da da da. It seemed to be very logical to me.
459 R: Is it now, is it different now?
460 A: It's very different now, trying to do this. Oh, just information overload.
461 R: I'll tell you what. It's getting late, so we'll call this a day.
462 A: All right.

ALAN'S FINISHED ASSIGNMENT WITH FEEDBACK

CEP 808 ASSIGNMENT

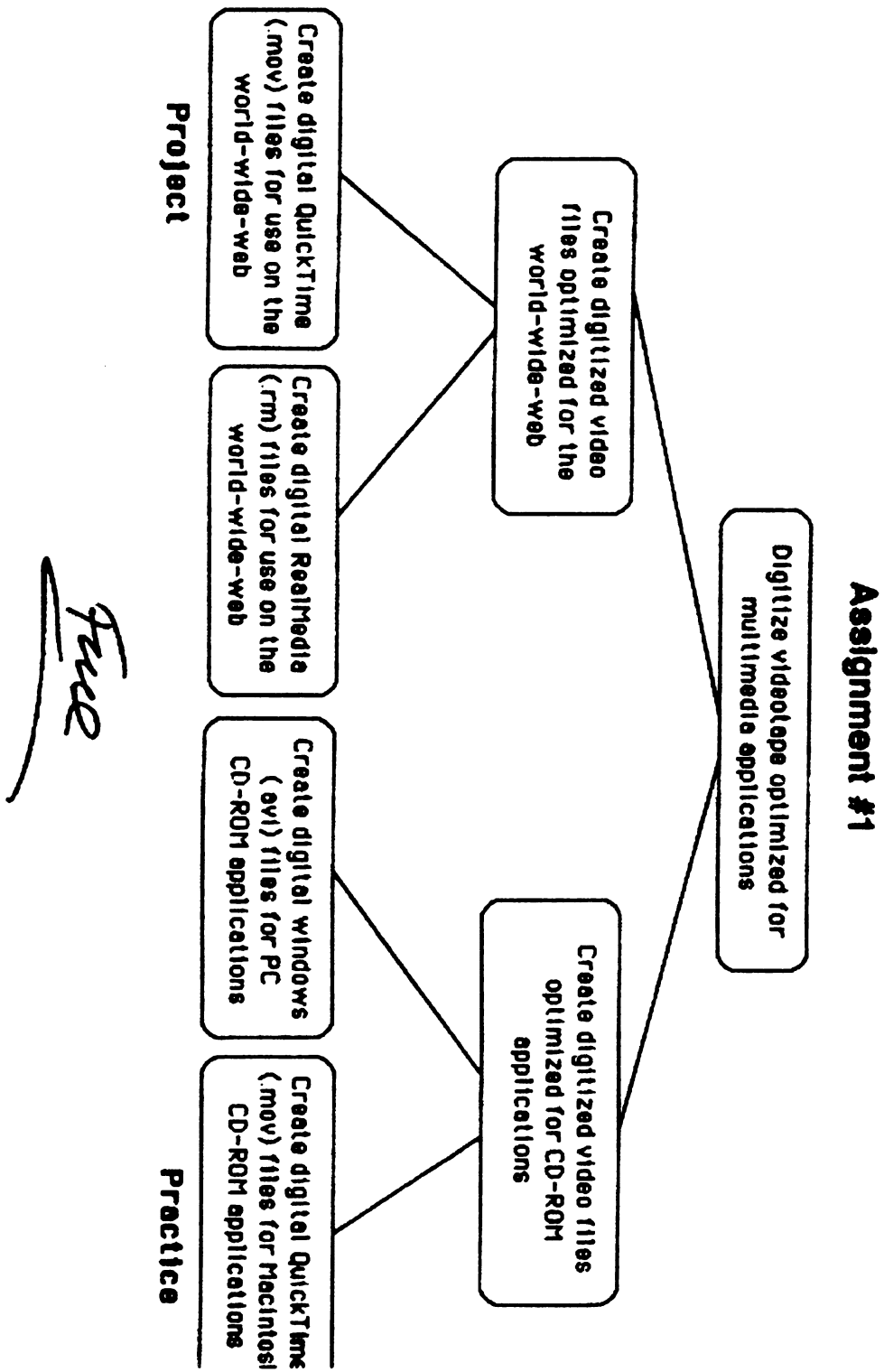
*Good
Please check use & consequences carefully in this section!
Thank
you*

PROJECT
PRACTICE

- ☒ I have read the assignment
☒ I have read the model
☒ I have read the annotations on the model
☒ I have a physical or mental skill whose steps and decisions I know well enough to describe step by step in assignment 2

School subject	1. COURSE/SUBJECT NAME Multi-media production applications <i>OK</i>
Course = whole Unit = parts Each unit is a skill Star unit developed	2. DIAGRAM or OUTLINE SHOWING COURSE GOAL & UNIT GOALS Digitize videotape optimized for multi-media applications. A. Create digitized video files optimized for use on the world-wide-web. 1. Create digital QuickTime files <i>OK</i> 2. Create digital RealMedia files <i>OK</i> B. Create digitized video files optimized for CD-ROM applications 1. Create digital video QuickTime files for Macintosh applications 2. Create digital video for Windows (.avi) files for PC applications • Project • Practice <i>[what sort of employee?]</i>
Goal has real role (setting time for place before course after course) Real Grad. behavior (generally stated Related to subject)	3. COURSE GOAL - REAL WORLD PERFORMANCE Condition As an employee of the Digital Transfer Facility at the IMC for multi-media applications. Behavior graduates (of this course) will (successfully) be able to digitize videotape. <i>OK</i> <i>Had student before?</i> <i>M.H. Tetter</i>

on project too some to make diagram too. Sorry - found it back



ALAN'S FINISHED ASSIGNMENT WITH FEEDBACK - PAGE 3

	4. COURSE TERMINAL OBJECTIVE (Course Final Exam)
Close representation of real conditions & real behavior for all skills Specifically stated version of course goal "Test" of students at end of course	Condition Given an A/V Macintosh Computer with digitizing software, VCR, VHS videocassette, oral instructions, sample CD-ROM, sample electronic web page, and a written checklist (see attached); Behavior Students will digitize videotape for use on the world-wide-web and CD-ROM applications for both Macintosh and "PC" platforms and test their final product on the applicable application and platform. Criteria Students will follow the checklist handed out in class (see attached) in completing their task.

	5. UNIT GOAL - REAL WORLD PERFORMANCE -
Unit goal is one whole piece of the real world course Real role & setting Generally stated goal performance Real grad. behavior	Condition As an employee of the Digital Transfer Facility at the IMC for multi-media applications; Behavior graduates of this course will be able to create a digital QuickTime (.mov) file for use on a mastered CD-ROM.

	6. UNIT TERMINAL OBJECTIVE (Unit Final Exam)
# of test situations Complete descriptions of "givens" The way situation is presented on this "test" medium "Such as" Describes "test" situation Close representation of real conditions: time and place in unit goal	Condition Given an A/V Macintosh Computer with digitizing software, VCR, VHS videocassette, oral instructions, sample CD-ROM, written checklist entitled "Creating Digital Files for CD-ROM Production" (see attached), and two 30 second video clips containing both video and audio such as: One clip demonstrating an interview situation with an emphasis on voice quality, and one clip with emphasis on a music soundtrack and video motion.

(LIST + summarize these) for clarity of presentation
 1.
2.
3.
 JUST COME UP w/ a NAME?
 [name _____]
 [name _____]
 Riv-Domine

ALAN'S FINISHED ASSIGNMENT WITH FEEDBACK – PAGE 4

Behavioral task Object of the action verb clear If more than one behavior, then listed and numbered Close representation of real performance in unit goal	Terminal behaviors: students will digitize videotape for use on CD-ROM applications for both Macintosh and "PC" platforms and test their final product on a mastered CD-ROM. NEW ① ② OK
According to or so well that or time Built-in checklist Criterion for each behavior If more than one criterion, then listed and numbered	Criterion: Students will follow the checklist entitled "Creating Digital Files for CD-ROM Production" handed out in class (see attached) in completing their task. Both digital files will be done so well that each will meet specific standards as demonstrated in the checklist and the sample CD-ROM. OK OK Run now (I'll show you soon how to make a checklist - EACH ENTRY is a question - Does the person do... Does the product have...)
# of times done on the test Quality cutoff: # of errors within a situation/item	Lower limits: Students will complete the process of digitizing two 30 second clips so that: 1. Final standards such as recommended CODEC and audio sampling rates will meet those as specified in the checklist. 2. When played back on a mastered CD-ROM both the audio and video meet those standards represented in the sample CD-ROM. Each file created must meet the above standards. OK

APPENDIX B

BETH'S STORY

OBSERVATION SESSION #1

Assignment: Write a diagram of the course structure in terms of a course goal and unit goals and select units to develop for practice and project.

The sessions with Beth were held where she worked, at the Technical Education Center at the university.

Orientation

At the beginning of the session she got out the form for the Preliminary Assignment and said she was supposed to draw a diagram of a course structure and hand it in the following Monday. She also got out the Example on page 74 and said she was supposed to create a diagram like it, then pick a unit to do for project and one for practice. She said that she thought the Checklist would help her “satisfy a requirement” and “get a good grade,” but she hoped it would help her while she wrote the assignment as well as at the end.

Course Structure Outline

Beth had already decided what her course topic would be: Constructing and publishing a web page. She decided to write an outline of the structure before drawing it in a diagram because she wanted to make sure she had followed the guidelines before actually drawing it. She looked at the Checklist and wrote the course goal, then followed this procedure for the two units and for the subunits for unit 1. She was not sure how many levels of units and subunits she should write, but she knew she had to arrive at a level where the skill would not take more than 20 steps or fewer than eight steps to do. She read page 65, the instructions for the Preliminary Assignment, and thought there would surely be more than 20 steps for analyzing the fat content of a menu, so perhaps she did not have to break the unit goals down so far for the Preliminary Assignment. She then decided that she did have to break the units goals down further in order to select units to develop for practice and project, so she wrote the subunits for unit 2.

She looked at the Checklist and saw that she needed to select the two units. She decided to select a more challenging and interesting one for the project so she would be motivated, and to select an easier one for the practice.

Course Structure Diagram

Before she selected them, however, she drew the diagram because she felt it would be easier for her to choose if she looked at the units in a diagram rather than in an outline. She read the Checklist about the course goal, then drew the diagram with the course goal, two unit goals and their subunits. She read the Checklist again, then drew the sub-subunits

to one of the subunits. She decided to wait to choose which units to develop until just before she handed the assignment in.

Beth explained that she would hand in only the diagram, but that outlining helped her conceptualize because when organizing in words she could jot down little notes and was not afraid to make mistakes. She said that if she drew a diagram first she would not know what she was drawing. In answer to the researcher's question, Beth explained that she found the Example and the Checklist useful when doing the assignment. The Checklist told her what the instructor was looking for in the assignment, what he was trying to teach them and what the structure of CEP 808 was. She had no trouble understanding the Checklist, but felt that someone unfamiliar with the course or the assignment and who had not heard the instructor's explanation of the tool would likely not understand it. Beth's completed diagram is shown in the appendix.

This ["Each entry has a verb and object"] actually goes with this part right here ["Each unit is a skill after the course"], but they're separate, so if you give it to another person, they might not know, after doing this part [latter], they need to do another part [former], that needs an entry with verb and object. But actually saying that each unit, when you really have to do something, you need to include a verb and an object. So it's a little bit unclear, but since I've been to classes and he has explained it, it doesn't confuse me. (11, 272-278)

CHRONOLOGY OF TOOL USE

The actions Beth took while writing her assignment during session #1 are shown below in chronological order, followed by a model of the chronology and a summary of the model.

ORIENTATION

- Brings out Form and states she is to draw a course structure on it.
- Displays Example and states she is to draw a diagram like it and select units to develop.
- States her understanding of what Checklist is for.
- Decides to write outline first, then draw diagram from it.

COURSE OUTLINE

- Reads Checklist: "Course goals=whole skill after the course."
- Writes course goal.
- Reads Checklist: "Units=parts of the whole skill."
- Writes unit goals.
- Reads Checklist: "Each unit is a skill after the course. 'How to...' Each entry has a verb and object."
- Writes subunit goals for first unit.
- Decides to break second unit goal into subunits otherwise too many steps.
- Considers if she needs to break units into subunits for Preliminary Assignment.
- Looks for examples of diagram.
- Reads page 65 (instructions for Preliminary Assignment).
- Decides to break units into subunits so can select small enough unit to develop.
- Writes subunits for second unit goal.
- Decides to select units to develop for practice and project.
- Reads Checklist about selecting unit to develop for practice and project.
- Decides to choose easier one for practice and more difficult but more interesting for project because she likes a challenge.
- Decides to convert outline to diagram because then easier to select units to develop.

COURSE DIAGRAM

- Draws course goal.
- Looks at Checklist: "One practice noted. One project noted."
- Draws two unit goals.
- Reads Checklist: "Course goal."
- Draws sub-subunits.
- Decides she might select "how to upload and download files" as one unit to develop and "how to make tables" as other, but decides to wait until the last minute to choose.
- States that outlining first helps her see relationships so she can then draw a diagram without "messing it up."
- States she found Example and Checklist most helpful in doing Preliminary Assignment.
- States Checklist tells her what the instructor is looking for in assignment and what he is trying to teach.
- States she found Checklist clear and easy to use but others who had not had instructor's explanation would find it difficult to use.

Summary of Tool Use

At the beginning of the session Beth familiarizes herself with the tools. For the rest of the session she used just the Checklist and referred to it once before she wrote each component of her course structure outline and then drew the corresponding diagram. She used an additional example on page 65 when she wondered how to determine how many levels of units her structure should contain. After she had drawn the first two levels of her diagram, she used the Checklist to gauge the correctness of what she had written. Then she finished drawing the third and final level of the diagram.

Model of Tool Use

Figure 52 below shows a model of Beth's tool use during session #1. The abbreviations used in the model are:

FO = Form; EX = Example; CL = Checklist; AN = Annotations; ex = additional example;
 → = prevent error; ← = detect/correct error

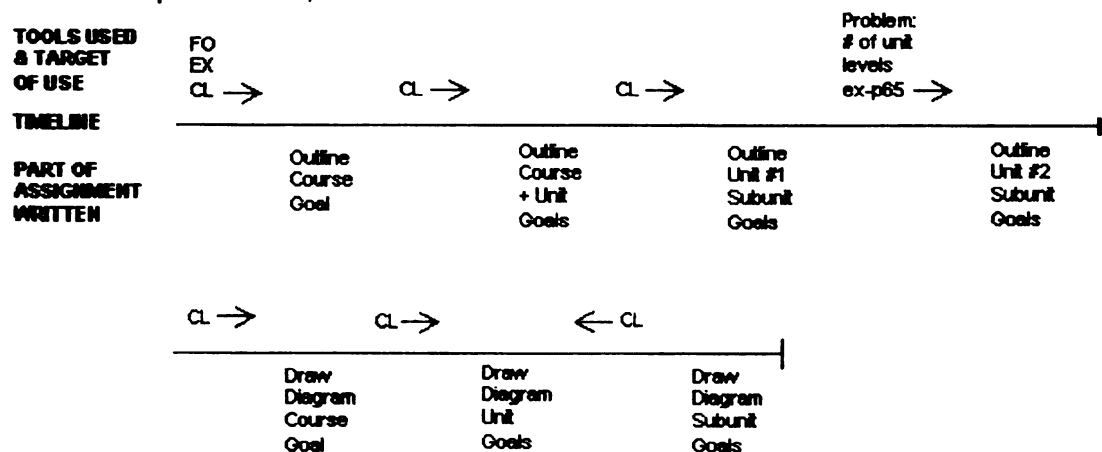


Figure 52: Model of Beth's Tool Use during Session #1

HOW BETH USED THE TOOLS

In this section I will describe which tools Beth used, how frequently she used them, for what purpose she used them and what tasks she did with them, what cued her to use them, and what characterized her practice of the assignment and her use of the tools.

Beth made use of three of the four tools during observation session #1: the Example, Checklist and Form. She did not refer to the Annotations at all. She used the tools nine times: the Example one time, the Checklist six times and the Form one time. She also used an additional example she found on page 65. More than half of Beth's total tool use during observation session #1 involved the Checklist. Figure 53 below shows how often she used each of the tools.

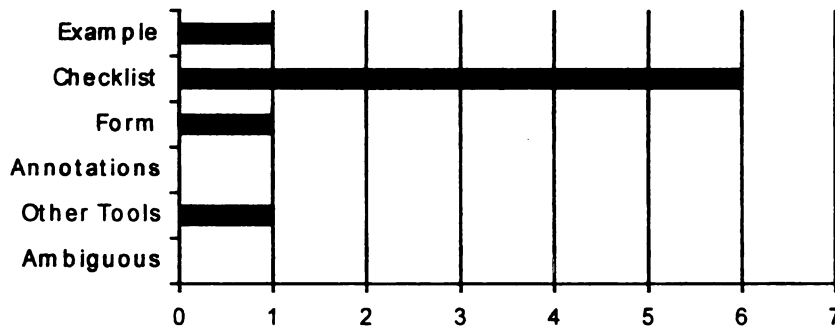


Figure 53: Beth's Frequency of Tool Use during Session #1

Beth used three of the tools (the Example, Checklist and Form) at the beginning of the assignment to familiarize herself with them. Before she wrote each component she referred to the Checklist for guidance. After she finished writing the entire diagram she used the tools to help her gauge the correctness of what she had written. Beth consciously responded to three cues to use the tools:

- 1) when she was uncertain what to write, such as when she started a new part or when she did not understand the tools or instructions,
- 2) when she had questions about or disagreements with the tools or instructions, and
- 3) when she wanted to check what she had written to see if it was correct.

Most of Beth's tool use during observation session #1 was for the purpose of preventing errors. She used the tools eight times to prevent errors by resolving problems she encountered before or while writing. She used the tools one time to attempt to detect errors, and not at all to correct errors. Figure 54 below shows the number of times Beth used the tools to prevent, detect and correct errors.

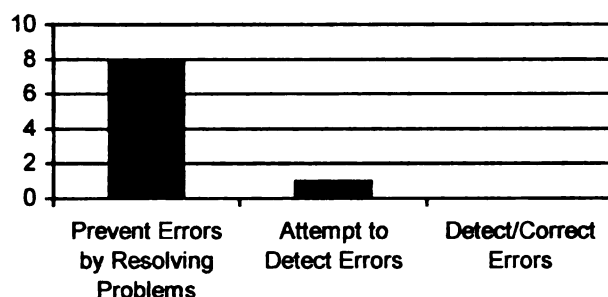


Figure 54: Beth's Frequency of Tool Use for Preventing, Attempting to Detect and Detecting/Correcting Errors during Session #1

Beth used the tools in various ways to help her prevent, attempt to detect and detect/correct errors. She did two tasks to help her prevent errors and one task to help her attempt to detect errors. Table 23 below lists the tasks she did to help her prevent, attempt to detect and detect/correct errors.

Prevent Errors By Resolving Problems	Attempt To Detect Errors	Detect/Correct Errors
Derive Knowledge - 1 Guide Writing - 4 Use Tool - 3	Gauge Writing - 1	

Table 23: Beth's Tool Use Tasks during Session #1

Beth's main task for preventing errors was to use the tools to guide her writing. Her task for detecting errors was to use the Checklist to gauge the correctness of her writing. Figure 55 below shows the tasks she did and how often she did them.

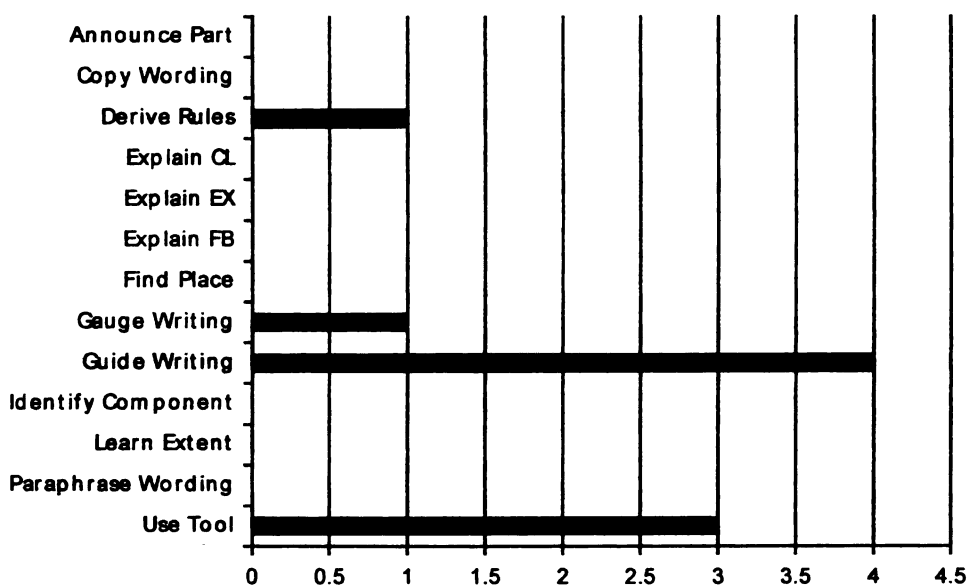


Figure 55: Beth's Frequency of Tasks during Session #1

The immediate result of Beth's use of the tools was that she prevented one error by resolving the problem of how many levels of unit goals she needed in her diagram. She did not make any errors during session #1 so she had none to correct.

Beth's use of the tools was characterized by her understanding of how to use the tools and her reliance on the Checklist. She had no trouble understanding what the tools were to be used for and how they were to be used. She thought the Checklist would be difficult to understand if the instructor had not explained how to use it, but because he had, she had no trouble with it. Beth's practice of the assignment was characterized by her preparedness and understanding of her topic. Her preparedness was shown by her understanding at the beginning of the session of what the tools were for and how to use them and what she was supposed to work on. Her understanding of her topic was shown by the course structure she had already determined. Because she was prepared, she was able to write an error-free assignment quickly with a minimum use of the tools.

OBSERVATION SESSION #2

Assignment: Write the course title, revise the course diagram, write the course goal, course terminal objective and unit goal.

Beth started out session #2 by taking out the Form with her course diagram printed on it. She wanted to refer to it while writing the course title, goal, terminal objective and unit goal. She looked at the diagram and decided to work on her practice unit.

Part 1 - Course Title & Part 2 - Course Diagram

From the Form she read the heading for part 1 (course title) then thought about whether to call her course “Web Page Design” or “Web Page Development.” She decided on “Web Page Development” because she felt it was more inclusive than the other, and she was teaching more than design. She wrote the course title.

Part 2 - Course Diagram

She then read the Checklist for part 2 (course diagram), and noted that she had already starred the unit she would be developing: “Uploading and downloading HTML files to the internet.” At this point the researcher asked her what feedback she had gotten on her diagram, and she responded that there were just a lot of OKs. Because of time constraints she was writing only what was required for that session, but normally would have looked ahead to see what was coming.

Part 3 - Course Goal

Beth read the heading for part 3, then the corresponding part of the Checklist. She then looked through the course pack for examples of the course goal. She decided to read the Example and the additional examples on pages 88-91 before writing her own course goal. She wrote the role and setting, then read the Checklist for the components of the course goal, checking off role and setting because she had already written them.

She wrote the purpose and checked it off on the Checklist. She wrote the behavior, then looked at the example on page 88 to gauge the correctness of what she had written. She noticed that the instructions on page 88 said to note the role, setting, purpose and behavior in the course goal example on that page, but in that example the components appeared in the order of role, setting, behavior, then purpose. She thought it sounded “weird” and “backward” to put purpose after behavior but decided to leave it as she had written it, with purpose in the condition before behavior, as shown in the Example.

Part 4 - Course Terminal Objective

Beth moved on to the course terminal objective in part 4. She read a Checklist item for the course terminal objective: “‘Test’ of students at end of the course” and noticed it said “text” (in the Macintosh diskette version of the Checklist on the Form). She read the heading and purpose for part 4 on the Form, and thought her objective would have a lot of “givens” in the condition. She read the Annotation describing the condition: “All skills from all units on course final exam” and verified that her course final exam needed to include both her unit skills.

A problem Beth encountered was what behavioral verb to use instead of “create a web page.” She read the Example then looked through the course pack for examples of course terminal objectives but was unsuccessful because she was “stuck” on the verb “create.” She read the Example again to help her word the condition because she knew it

was “hard for me to pick the right words,” presumably because she was a non-native English speaker. (I2, 200-208)

She wrote the first part of the conditions, then started thinking about behavioral verbs again. She continued to write the conditions, then used some tools to help her word the conditions correctly. She read the Checklist for the condition: “Close representation of real conditions” then read the subheading on the Form: “Behavior” then read the Annotation: “Description of course final exam” that described the condition. She noted that she already had a description of the final exam, and read her condition aloud.

Given a written description of a computer project involving creating HTML code, and publishing a web page, students will... (I2, 229-230)

Beth prepared to write the behavior by first reading the Example then the Annotation to the Example behavior: “Specific observable ‘test’ behaviors.” This Annotation told her she needed to resolve the problem of how to replace the verb “create” with an observable (behavioral) verb. She started writing, then read the Example again, then wrote again. She talked out the problem aloud, asking the researcher which words were observable and which ones were not. She finally decided to look through the course pack for more examples of observable verbs, and started reading the explanation on page 72: “Unit Goals Related to Course Goals.”

She said she had not gotten much sleep the night before, so she was having trouble thinking straight. She finally wrote the behavior as: “Students will use Notepad or Netscape Composer to make a web page, and use FTP to publish the web page on the internet.” Then she digressed about educational psychology, volcanoes and movies before returning to the task.

She reread the behavior and decided to change “FTP” to “upload and download HTML files to their Pilot account.” After adding “submit URLs to search engines” she read the Example again, then realized she was describing her course units in the course terminal objective behavior. She read the Checklist about behavior (“Test of students at end of the course”), then read the Example behavior and noticed the behavior had nothing to do with the units in the diagram. They said: “students will: 1) write out all steps; 2) write out the solution.” From this she was able to derive a rule about how to write the behavior. She decided to say: “Students will be able to use Netscape Composer and Notepad to make a web page” then realized she was confused. She looked back and forth between the Example and her assignment, then decided to work on it later and to end the session.

Part 5 - Unit Goal

Before she quit, though, she read the heading for part 5 on the Form, then wrote the unit goal condition. She read the Example, then the role of her unit goal and realized she currently had business people uploading files to a university account. She wrote the behavior, changing it so they would be using an internet account. She then read the Example and the Checklist: “real graduate behavior.” She read an Annotation that told her she was on the right track. The Annotation was: “A whole skill which makes up one portion of the course goal”; she knew that uploading files was one portion of her course

goal and that it was a real graduate behavior. She read the Example again, noticing the criteria section, and thought of a criterion she could use: "so well that there will be an increase in the customers visiting the web site." She decided that because the criteria section was optional, and because she was so tired, she would not include criteria in the unit goal, and would end the session.

CHRONOLOGY OF TOOL USE

The actions Beth took while writing her assignment during session #2 are shown below in chronological order, followed by a model of the chronology and a summary of the model.

ORIENTATION

- States she is to write parts 1-5 (title, course goal, course terminal objective and unit goal) during session #2.
- Reads her diagram and decides to develop the unit for practice during the session.

COURSE TITLE

- Reads Form and announces her course subject is web page development, which sounds more encompassing than development.
- Writes course title.
- Reads Checklist: "Star unit developed."
- States she had already started the unit she was going to develop for practice.
- Shows researcher instructor's feedback to her Preliminary Assignment, which was only "OKs."
- States she does not know what is coming in next session because she has no time, but wishes she could look ahead.

COURSE GOAL

- Reads Form and announces title of part 3: "Course Goal."
- Reads Checklist: "Course goal has real role, setting."
- Tries to find examples of course goal in course pack.
- Finds example of unit goal on page 97, then example of course goal on page 88.
- Decides to look at Example on page 74 and other examples to see what is required.
- Writes course goal condition (role and setting).
- Reads Checklist and checks off role and setting.
- Writes purpose.
- Checks off purpose on Checklist.
- Starts writing course goal behavior.
- Reads example on page 88 and notes order of components: role, setting, behavior, purpose.
- Reads instructions for example and notes different order of components: role, setting, purpose, behavior.
- Considers backwardness of putting purpose before behavior.

COURSE TERMINAL OBJECTIVE

- Reads Checklist: "'Test' of students at end of the course." to see if course terminal objective is supposed to be a test.
- Reads Form and announces title and purpose of part 4: "Course Terminal Objective. Course final exam."
- Considers that writing CTO will be difficult because her unit will have many "givens."
- Reads Annotation: "All skills from all units on course final exam."
- Derives rules about what skills final exam should contain.
- Considers problem of finding a behavioral verb to replace of "create."
- Reads Example then looks through course pack for more examples of CTO.
- Still concerned about finding behavioral verb for "create."
- Reads Example for guidance in writing condition of CTO because "it is hard...to pick right word."
- Writes CTO condition.

- Still considering problem of verb "create."
- Writes CTO condition.
- Reads Checklist: "Close representation of real conditions."
- Read Form: "Behavior."
- Reads Annotation: "Description of course final exam."
- Derives rule from Annotation that she needs to write the condition as the description of the course final exam.
- Reads Example and decides to write CTO behavior.
- Reads Annotation: "specific observable test behaviors" and decides to go back to word "create."
- Reads Example.
- Writes CTO behavior and checks it to make sure each verb is observable.
- Still considering problem of what verbs are behavioral (observable) and what are not.
- Looks through course pack for examples of behavioral verbs.
- Looks at the examples on page 72, "Unit Goals Related to the Course Goals."
- States she had little sleep last night, going to bed at 6:00 am, so her mind is not functioning well.
- Still considering problem of behavioral verbs.
- Writes CTO behavior.
- Digresses on educational psychology, volcanoes and movies.
- Reads her practice and wonders if she needs criteria.
- Revises CTO behavior.
- Reads Example and wonders if hers is correct because it seems she is "describing the units in the behavior."
- Reads Checklist: "Test of students at end of the course."
- Reads Example and notes its behavior does not mention unit skills.
- Is confused about writing unit skill in CTO behavior.
- Compares practice to Example and decides to leave it as is for now.

UNIT GOAL

- Reads Form for part 5: "Unit Goal. Real world performance."
- Writes UG condition.
- Considers problem of role being business people but having them upload and download files to their university account.
- Rewrites unit goal.
- Reads Example.
- Reads Checklist: "real grad. behavior."
- Reads Annotation: "A whole skill, which makes up one portion of the course goal."
- Decides she is on the right track because her unit skill, upload, is part of the whole course goal.
- Reads Example criteria and states what her criteria would be.
- Decides not to include criteria but to quit for now.

Summary of Tool Use

Beth read the heading on the Form for each part of the assignment as she began it. She used the Checklist to both guide and gauge her writing. When she was confident she understood what she was supposed to do, she referred to fewer tools than when she had problems and questions. Then she referred to multiple tools for both guidance before she wrote and to gauge her assignment after writing it. She used the tools to gauge each component she wrote except the unit goal condition, which she paraphrased from her course goal.

Model of Tool Use

A model of how Beth did the assignment is shown below in Figure 56. The abbreviations used in the model are:

FO = Form; EX = Example; CL = Checklist; AN = Annotations; explain = explanation;
ex = additional example; CG = course goal; CTO = course terminal objective;
UG = unit goal; → = prevent error; ← = detect/correct error; | = division between parts

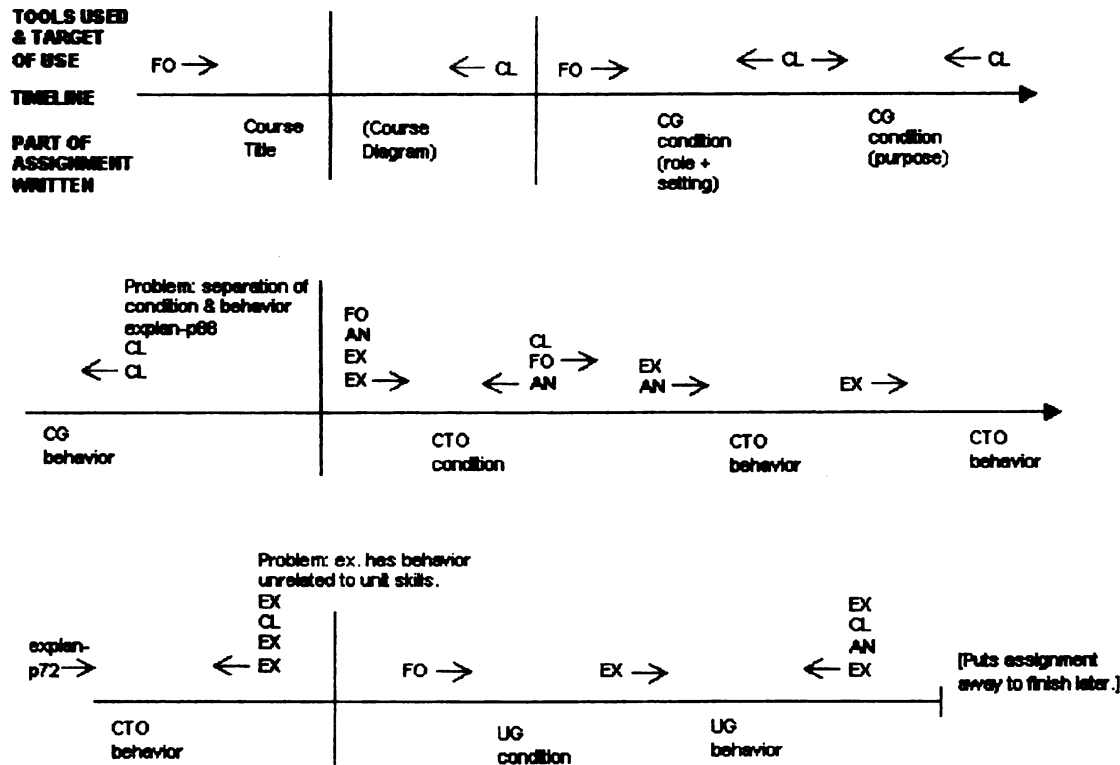


Figure 56: Model of Beth's Tool Use during Session #2

HOW BETH USED THE TOOLS

In this section I will describe which tools Beth used, how frequently she used them, for what purpose she used them and what tasks she did with them, what cued her to use them, and what characterized her practice of the assignment and her use of the tools.

Beth used all the tools during session #2: the Example 9 times, the Checklist 10 times, the Annotations 4 times, the Form 5 times, and the other tools 2 times. (One of the times she used the Example it was unclear which task she was doing because she looked at the Example then talked about something else.) Figure 57 below shows how often she used each tool.

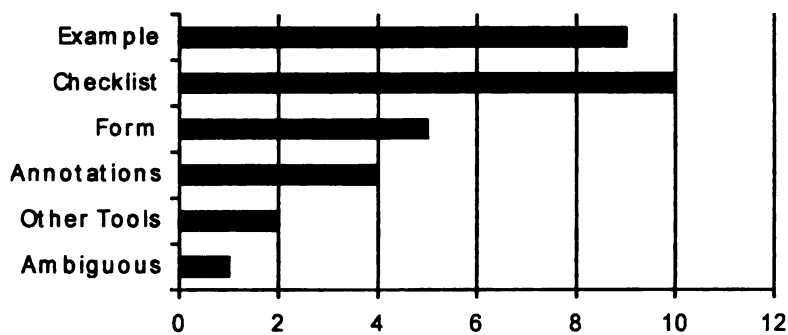


Figure 57: Beth's Frequency of Tool Use during Session #2

She used the tools for guidance before beginning to write a specific component, then used them after writing it to gauge its correctness. She consciously responded to three cues to use the tools:

- 1) when she was uncertain what to write, such as when she started a new part or when she did not understand the tools or instructions,
- 2) when she had questions about or disagreements with the tools or instructions, and
- 3) when she wanted to check what she had written to see if it was correct.

Beth used the tools almost equally to prevent and detect errors, 16 times to prevent errors and 14 times to detect errors. She did not make any errors during session \$2, so did not use the tools to correct errors. Beth's frequency of tool use for preventing, attempting to detect and detecting/correcting errors during Session #2 is shown in Figure 58 below.

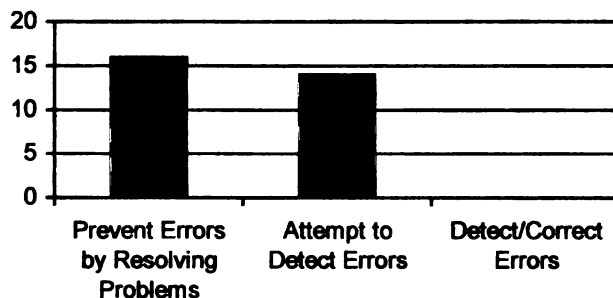


Figure 58: Beth's Frequency of Tool Use for Preventing, Attempting to Detect and Detecting/Correcting Errors during Session #2

She did five tasks, shown in Table 24 below, to help her prevent, attempt to detect and detect/correct errors.

Prevent Errors By Resolving Problems	Attempt To Detect Errors	Detect/Correct Errors
Announce Part - 4 Derive Rules - 2 Guide Writing - 9 Paraphrase Wording - 1	Derive Rules - 1 Gauge Writing - 13	

Table 24: Beth's Tool Use Tasks during Session #2

Beth's main tasks for preventing errors were to use the tools to guide her writing and to use the tools correctly. Her main task for detecting errors was to use the tools to gauge the correctness of her writing. Beth's tasks are compared in Figure 59 below.

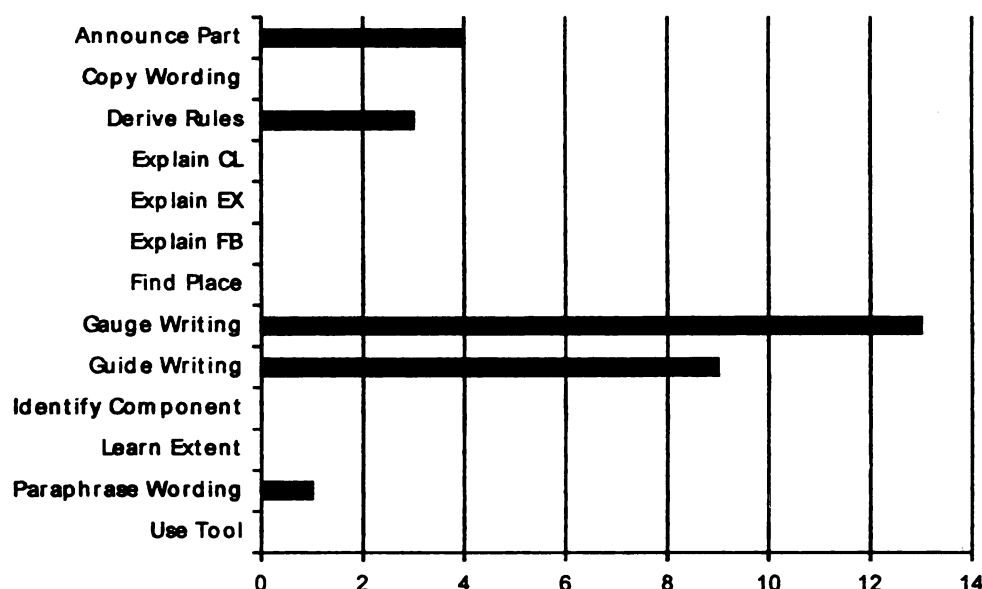


Figure 59: Beth's Frequency of Tasks during Session #2

The immediate result of Beth using the tools was that she was able to prevent an error by resolving the problem whether she was supposed to be describing the unit skills in the behavior of her course terminal objective. She read both the Checklist and Example to reassure herself that she was correct in doing that. She did not make any errors during session #2 so she had none to correct.

Beth's tool use was characterized by her increasing facility with and extensive use of the tools. She used all the tools often, for both preventing and detecting errors. She knew where to find the tools and how to use them. Her practice of the assignment was characterized by the accuracy of her work and the amount of work she did, even though she was tired from having only two hours sleep the night before. She wrote each component in one try except for the behavior of the course terminal objective, which took her three tries.

OBSERVATION SESSION #3

Assignment: Write the unit terminal objective.

To begin session #3, Beth stated what she would be working on: the unit terminal objective.

Revise Parts 1-5 According to Feedback

Beth received all “OKs” as feedback, but she did question the instructor’s suggestion on the project to “Please check this against practice.” The researcher explained it simply meant apply the feedback received on the practice to the project.

Beth was pleased to note the instructor had accepted her use of the verb “create” as a behavioral verb as long as she followed it with a gerund phrase, so that it would look like: “create something using something.” Among all the “OKs” in the feedback the instructor had written “purpose OK” next to the condition of the course terminal objective. Beth wondered if, because it was different from all the other “OKs,” that it meant the purpose was adequate but could be better. She wondered if the course terminal objective even needed a purpose, but decided to leave it in, since it was already there.

She decided to write the unit terminal objective, but for the project rather than the practice. As she looked through the course pack she recalled the instructor had talked about parts of an objective in class earlier. She looked at the Form to help her recall what else he had talked about. She thought it had been justification, but she was not sure. She had just found page 109 in the course pack, which talked about justification, so she marked it for later use. She also marked page 118, which talked about how parts of an objective are written.

Beth reread the unit goal for the project, which is about creating HTML tables. Realizing she had to write the condition of the unit terminal objective first, she turned right to page 123, which was the practice test and explanation that the instructor had gone over in class earlier. She read the Checklist and noted that conditions contained number, description, “such as” and medium. She then started looking through the course pack for an example of the condition, but decided to look at the Example to see how the “such as” was written.

I was looking for the example, what kind of example that that person put in “such as,” that section. Are they asking questions or is he describing the final or the test, or what is in the “such as” example? (I3, 87-89)

She wrote the “such as,” but mistakenly wrote it for a knowledge test instead of a skill test. Beth's project unit terminal objective condition is shown below.

Given three written web page design projects involving using tables, such as, “You just got back from Europe and want to share pictures with friends around the world. They all have different monitor sizes and web browsers. How will you ensure that your web page will display the same for all of them?” (I3, 94-97)

Beth read page 123 but said it did not help her, then read page 125 but said the example was not good because: "It's not listed and it's not indented in a paragraph so it'll be clear. The whole thing is crammed altogether in one paragraph." (I3, 109-111) She then compared the examples on pages 121 and 122. The example on page 121 contained a "such as" that sounded like a question on the final exam: "Suppose you had 14 kumquats and you gave your sister 6 of them. How many did you have left?" But the example on page 122 did not sound like a test question at all: "a pending return of an expense..." Beth thought the "such as" was supposed to describe the test, but after talking it out, she decided it was supposed to be an example of what is given to the students to do the test. She reread her "such as" and saw that she had not written it correctly.

Now, that is not right. My example, my "such as," should describe the project that I'm going to give. Because I say, I'm saying that, "I'm going to give you three written projects, such as," so I'm going to give them an example. What kind of project am I going to give them? Say I'm going to give them 10 pictures: 10 pictures, 5 URLs, and I need you to put it into rows and maybe have a 2-cell span across each row. So that would be more appropriate than this "such as" part. So they will know, "What's the format? What kind of things am I going to give them? Pictures? URLs? What's in it? What's in the project?" Instead of saying, giving them a scenario. That wouldn't be helpful. (I3, 178-190)

She crossed out the "such as" in her unit terminal objective and decided to write it later at home because it would be simple now that she knew how she needed to write it, and "there are more important concepts in here." (I3, 194)

Moving on to the behavior section, she read the heading in the Form, then looked for page 119 in the course pack. This page, part of the practice test, contained an explanation on how to write the behavior for a unit terminal objective. Beth wrote the behavior, then read the Checklist to see what it had to say about criteria: "'According to,' that's what I want to look at, 'according to the checklist.'" (I3, 202-203) She knew she would need to write a checklist specifying what the table should look like, but decided to write that at home also because she had more resources available to her there.

Beth then turned her attention to the lower limits section, reading the heading and subheadings in the Form ("lower limit," "number of repetitions" and "quality"). She then turned to the practice test explanation on lower limits on page 129. Beth did not feel comfortable deciding how many repetitions of a skill would convince her that a student could perform the skill reliably and well. She decided if they could create two tables with two errors allowed but no uncorrected errors, that that would be sufficient.

Beth became confused about the meaning of the component "number of repetitions" in the lower limits and the relationship between that and the component "number of situations or cases" in the condition. She thought that if she gave her students three tables to create and the lower limits called for two repetitions, then they would be creating six tables, multiplying the number of situations by the number of repetitions. She thought repetitions meant repeating the same tables, when what it actually meant was repeating the same skill, but with different tables. Beth resolved the problem by deriving the correct rule from the example on page 125.

[READS PAGE 125]: "Given 10 situations," 10 case studies. They have to be correct 8 out of 10, that means they have to do it ten times, there is no repetition there. Where are those others? [LOOKS THROUGH COURSE PACK] If I say, "Given three written web page projects." If I say do it three times, does it mean, this is three times [POINTS TO NUMBER IN CONDITIONS] or one time? If I just say, okay, number of repetitions is three, three times, so they're doing the projects. [READS HER PROJECT] Yeah. Okay. So is that, how many times I want them to repeat, I say it right here [IN CONDITIONS], how many I will give them? (I3, 269-274)

She triumphantly wrote "two" for both the number of situations in the condition and the number of repetitions in the lower limits. She started leafing through the course pack, looking for examples of how to write about number of allowable errors and uncorrected errors and found it on page 97: "No more than two errors on checklist and no uncorrected errors." She liked the example on that page because it was "concise, it's just a few words, not like long sentences or paragraphs." (I3, 328-239) She liked the course pack in general because it had many examples.

I like this course packet, it's got a lot of examples. I mean, I don't know to native Americans if it helps at all, but to non-native English speakers, examples are very important. ... We might not copy exactly the way, the same way, but it sure helps us to think. (I3, 301-305)

CHRONOLOGY OF BETH'S ACTIONS

The actions Beth took while writing her assignment during session #3 are shown below in chronological order, followed by a model of the chronology and a summary of the model.

ORIENTATION

- States she will write unit terminal objective and justification in session #3.

READS FEEDBACK

- States that feedback accepts "create" as behavioral verb when used with phrase "using something."
- States feedback was all "OKs."
- Wonders if meaning of feedback: "purpose OK" is "adequate but could be improved."
- Researcher explains how instructor writes feedback.

PREPARATION

- Wonders if purpose required in unit goal.
- Decides to work on project unit terminal objective rather than practice.
- Leafs through course pack.
- Looks at Form.
- Writes page #109 on part 7 of Form to look at when doing part 7, and same for page 118 in part 6.
- Reads her project unit goal.
- Takes out Form.

UTO CONDITION

- Turns to practice test and explanation of condition on page 123.
- Reads and notes Checklist items for condition (number, description, "such as" and medium).
- Looks through course pack for example of UTO condition.
- Looks at Example to see how "such as" is written.
- Writes UTO condition, including "such as."
- ERROR: Writes "such as" for knowledge test rather than skill test.

- Wonders if "such as" should be specific in telling students number of rows and columns required in their HTML tables.
- Reads "such as" on page 123, then page 125 but rejects that example as not clear because "jammed together into a paragraph."
- Wonders how to write "such as" because on p. 121 it describes final exam but on p. 122 it does not ("pending return of an expense").
- ERROR: thinks "such as" is example of final exam questions, when it is supposed to be example of "givens."
- Reads her UTO condition and realizes "such as" should describe project students will be given.
- Decides not to give students a scenario but description of a table to create.
- Decides to work on "such as" at home where she has more resources.

UTO TERMINAL BEHAVIOR

- Reads Form: "Terminal Behavior."
- Looks through course pack and stops at page 119 (practice test explanation of how to write behavior).
- Writes terminal behavior.
- Reads Checklist: "According to."
- States she needs to create a checklist of criteria for the HTML table to be created.
- Decides to write criteria at home where she has more resources.

UTO LOWER LIMITS

- Reads Form: "Lower limits."
- Reads page 129 (explanation in practice test of how to write lower limits).
- States there are two parts to lower limits: number of repetitions and quality.
- States it is difficult for her to decide on appropriate number of repetitions of skill to assess learning.
- Decides on having students create two tables.
- Decides to allow no more than two errors but no uncorrected errors.
- Reads condition and sees she is giving them three projects to do.
- ERROR: Misunderstands meaning of "repetition." Thinks if she gives students three projects and has them do it twice, they will create six tables.
- Reads example on page 125 then derives rule that there is no repetition.
- Looks for additional examples of lower limits.
- Rereads her condition and resolves problem.
- Talks to researcher and repeats resolution.
- Writes "two" for number of errors allowed.
- States she likes course pack because many examples and that examples are important to non-native English speakers.
- Reads example on page 97 and sees it is similar to what she has written: "No more than two errors on checklist and no uncorrected errors."
- Decides to look at example of checklist on page 97 again when she writes criteria because example is concise.

Summary of Tool Use

Beth wrote only three times during session #3: the unit terminal objective condition, behavior and lower limits. She referred to the tools 12 times to help her write. Her use of the tools was in clusters. Before she wrote the condition she looked at the Form, Checklist and Example. Before she wrote the behavior she looked at the Form and the examples on pages 123, 125 and 122. Before she wrote the lower limits she looked at the Form again, the Checklist, the explanation on page 129, and two examples on pages 125 and 97.

Model of Tool Use

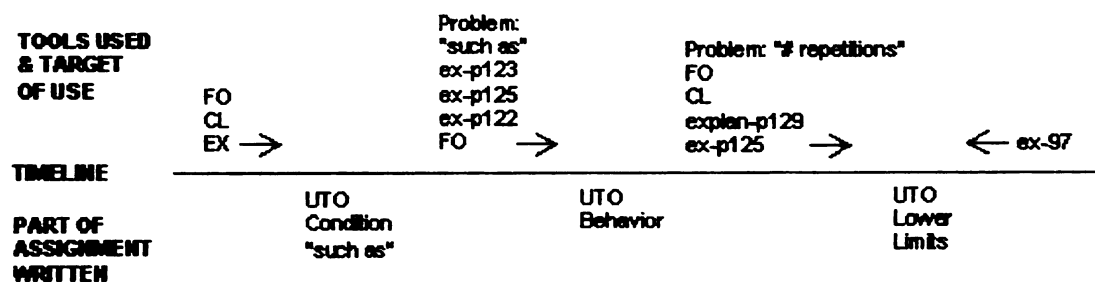


Figure 60: Model of Beth's Tool Use during Session #3

HOW BETH USED THE TOOLS

In this section I will describe which tools Beth used, how frequently she used them, for what purpose she used them and what tasks she did with them, what cued her to use them, and what characterized her practice of the assignment and her use of the tools.

Beth used all the tools except the Annotations: the Example one time, the Checklist two times, the Form three times and the other tools six times. These other tools were an explanation on page 129 and five additional examples on pages 97 and 122-125. Figure 60 below shows the frequency of Beth's tool use.

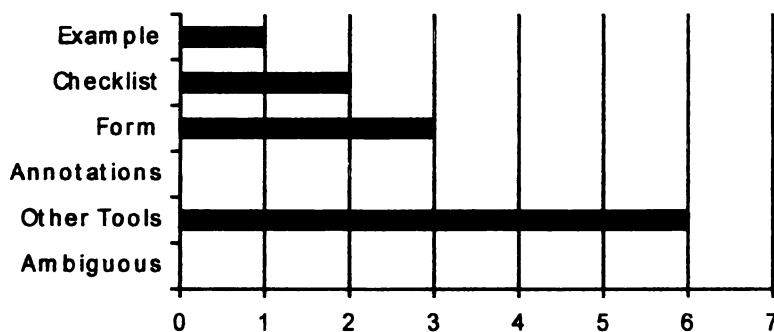


Figure 61: Beth's Frequency of Tool Use during Session #3

She used the tools for guidance before beginning to write a specific component and at the end of the session to gauge the correctness of her writing. She consciously responded to three cues to use the tools:

- 1) when she was uncertain what to write, such as when she started a new part or when she did not understand the tools or instructions,
- 2) when she had questions about or disagreements with the tools or instructions, and
- 3) when she wanted to check what she had written to see if it was correct.

Beth used the tools for two purposes during session #3: to prevent errors by resolving problems she encountered while writing, and to detect and correct errors. The

frequency of her tool use to prevent, detect and correct errors is shown in Figure 61 below.

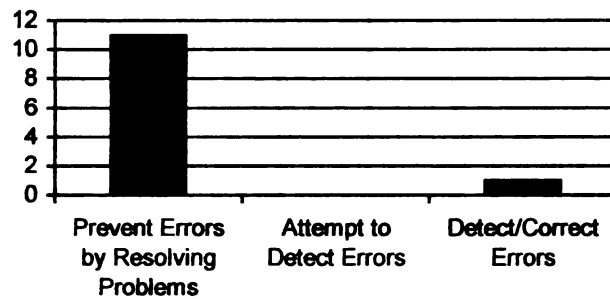


Figure 62: Beth's Frequency of Tool Use for Preventing, Attempting to Detect and Detecting/Correcting Errors during Session #3

Beth used the tools in various ways to help her prevent, detect and correct errors. Table 25 below lists the tasks she did to accomplish these purposes.

Prevent Errors By Resolving Problems	Attempt To Detect Errors	Detect/Correct Errors
Announce Part – 2 Derive Rules - 1 Guide Writing – 7 Learn Extent – 1		Gauge Writing - 1

Table 25: Beth's Tool Use Tasks during Session #3

Beth's main task for preventing errors was to use the tools to guide her writing. Her task to detect errors was to use the tools to gauge her writing. Beth's tasks are compared in Figure 62 below.

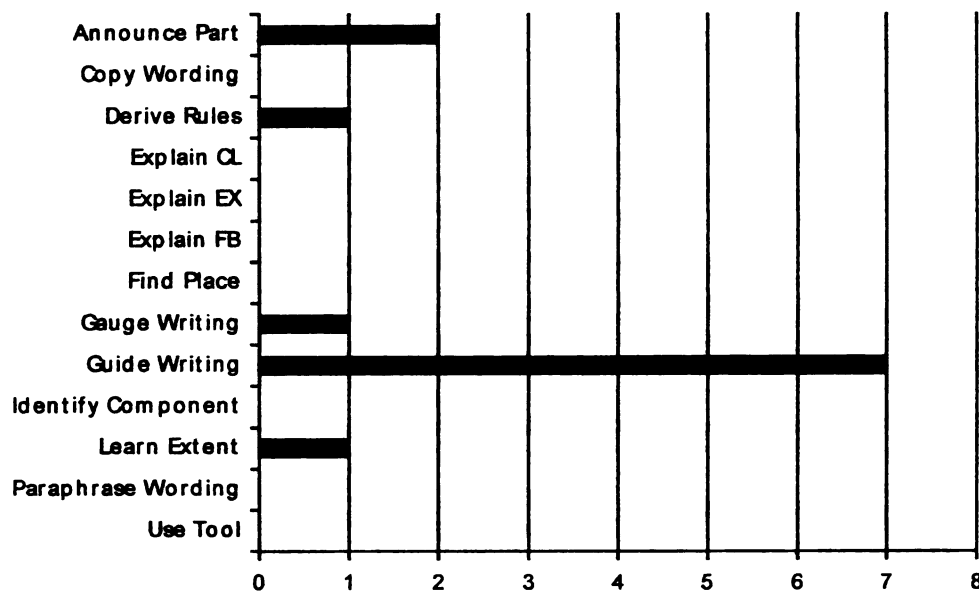


Figure 63: Beth's Frequency of Tasks during Session #3

The immediate results of Beth using the tools was that she was able to prevent an error and detect and correct an error:

- 1) She thought the "such as" in the unit terminal objective condition was an example of the final exam, when it was actually an example of what the student is given to do the test. She compared the examples of the "such as" on pages 121 and 122 and was able to determine what the "such as" was. (I3, 178-190)
- 2) She also did not understand the relationship between the number of situations or cases she was supposed to state in the condition and the number of repetitions she stated in the lower limits of the objective. These two numbers were supposed to be the same, but Beth thought they were to be multiplied. She studied the example on page 125 and was able to resolve her misconception. (I3, 269-274)

Beth's use of the tools was characterized by her reliance on the additional examples in the course pack to guide her writing and to help her resolve problems. She referred to six examples during session #3, five to guide her writing and prevent errors, and one to detect errors. Her practice of the assignment was characterized by the ease and rapidity with which she wrote the unit terminal objective, in spite of the two large misconceptions she had to resolve before she could go on.

BETH'S VIDEO TRANSCRIPT

Observation Session #1

3 R: Okay. This is observation #1 with of Beth. So today what are you working on?
4 B: The "Preliminary Choice of course and Unit Goals" for Assignment #1.
5 R: Okay, and what papers have you brought out to look at?
6 B: It's a sample form that Dr. — gave us. He gave us a few.
7 R: That's the blank form?
8 B: That's the blank form [FOR PRELIM], and it's due on Monday.
9 R: Okay. What are you supposed to do?
10 B: I'm supposed to draw a diagram of a course structure. Yes. Yes, a course structure. This is
11 difficult. I know what I'm doing, but it's kind of hard to describe it.
12
13 R: It is, um hm.
14 B: But, like, Dr. — has an example on page 74 and I know I'm supposed to do something
15 like this, the diagram like that, and pick one unit to do for the project and pick one to do for
16 practice. And he mentioned something that, the little notes on the side [CHECKLIST] will help
17 us to accomplish the test.
18 R: How do you think that [CHECKLIST] will help you?
19 B: I think the notes here are, to me they're more like, satisfy a requirement. So far. I haven't
20 done it yet, so I'm not sure if they will actually help me. But it seems like if you, I did all these
21 things, I'll be okay, or I'll get a good grade. But I hope it'll help me along the way when I do the
22 [m].
23
24 *COURSE DIAGRAM: Okay. So what's your next step here?
25 B: Okay, my next step: Start drawing. I have thought of my whole course is about constructing
26 and publishing a web page. so that is my course goal, and I am thinking of writing it down first
27 in words [AT TOP OF PAGE 66], and then draw it down here [BOTTOM OF PAGE 66]. I know
28 what I'm only doing one course, so I only make one diagram. So I'm just going to write it out
29 here and draw it here.
30 R: And why do you want to write it out AND draw it?
31 B: Because I want to make sure that I'm following the guidelines before I draw anything.
32 R: Oh, so writing it out in text will help you check?
33 B: Um hm. Shall I start?
34 R: Go ahead. Sure.
35
36 B: [WRITES]
37 R: When you began you looked over to the list at the side [CHECKLIST].
38 B: Um hm.
39 R: And what did you do? Did you read out [PAUSES]
40 B: Yeah, I read: "Course goals = whole skill after the course," so I think what kind of skill the
41 learner will learn after taking this course. Which is [WRITES]: "They will construct and publish
42 a web page." That is the whole course. Then [READS CHECKLIST ON PAGE 66]: "Units equal
43 parts of the whole skill." so the unit's different units. The first unit is [WRITES]: "How to
44 construct a web page. And the second unit will be: "How to publish a web page." [READS
45 CHECKLIST ON PAGE 66 AGAIN]: "Each unit is a skill after the course. 'How to...' Each entry."
46 Hm. "Each entry has a verb and object."
47
48 B: So first I'll do "Construct a web page." [m] [WRITES]: "They will learn how to use, how to
49 create an HTML page using [m]"
50 R: What's Netscape Composer?
51 B: That's an application that came with Netscape. It allows you to create a page much faster
52 than Notepad, but I believe my course should teach people the hard way and the easy way.
53 That's how I learned HTML. I first learned how to, I actually typed everything in, and then I found
54 out there's an easy way. But I'm glad I learned the hard way first. So that's why I put Notepad. I
55 hope the course will go: People will learn Notepad, learn all the HTML that they need to know,
56 then they can do it.
57
58 R: When I learned HTML there WAS no other way.
59 B: Really! [LAUGHS]

60 R: [Besides typing. [LAUGHS]
61 B: Just typing. A few years ago, six years ago, but I'm glad I learned it, though. "[m] [WRITES]:
62 "Unit 2: How to publish a web page." Well, they need to know how to upload and download
63 HTML files to Pilot," which is [m] with FTP [m]."
64 R: Speak a little louder. I'm going to make sure that things are perking along over here [AT
65 THE VIDEO CAMERA].
66 B: Okay. Should I keep going?
67 R: Yep.
68 B: Okay. Unit two. Second subunit under two. [WRITES] [m]
69
70 R: Are you thinking of what units you need for publishing?
71 B: Um hm. Yeah. I think I'm done with the unit one, "How to construct a web page," is by
72 teaching them the two main methods that they can construct a web page. And, of course,
73 there is some more little subset units. I don't know if I have to write it out in this assignment.
74 You know, that precise. I'm not sure, but there are definitely more than 20 or 30 steps in using
75 Netscape Composer and Dr. — said we shouldn't be using that.
76 R: Too many steps?
77 B: Too many steps, so I probably will break it down into, like, how to create a table using
78 Netscape Composer, has more than seven, eight steps but less than 20. So I'll probably
79 break it down like that. But I am not sure if I need to break it down at this preliminary
80 assignment.
81
82 R: How can you tell? Is there any way to tell?
83 B: [LOOKS IN COURSE PACK] I don't think there's any example for preliminary. Here's a
84 model format for Assignment #1. [LOOKS IN COURSE PACK TABLE OF CONTENTS] Oh,
85 there is. [TURNS TO PAGE 65]
86 R: Is that page 65? [PRELIMINARY INSTRUCTIONS]
87 B: Page 65. [READS PAGE 65] Well, it looks to me that I don't need to break it down like that,
88 because he gives this as an example. I'm sure there are much more steps to analyze a menu
89 for fat. So maybe that person will break it down some more to do for project, or [m] Well, no,
90 actually, I SHOULD break it down because I need to pick which one is for practice and which
91 for project.
92 R: So if you're going to take it down a level [PAUSES]
93 B: Then I can choose. So I need to do that. There's not enough space [ON THE BLANK
94 PRELIMINARY ASSIGNMENT FORM].
95
96 B: Oh, let's finish subunit two. When teaching publishing a web page, they need to know
97 upload/download. They also need to learn how to submit URLs to search engines so the web
98 page will become publicized.
99 R: Is this [GESTURES TO BLANK PRELIMINARY FORM SHE IS USING] a copy of [PAUSES]
100 B: This is a copy.
101 R: And why did you make a copy?
102 B: Oh, we got it from the class.
103 R: Oh, they provided it in class?
104 B: Um hm. I can't really use this one [IN COURSE PACK] because there's stuff [PAUSES]
105 R: Oh, because there's stuff on the back.
106
107
108 B: Well, so I have to break it down some more. In Netscape Composer, sub-subunit one.
109 R: So could you read for me the two units you have?
110 B: For "Publish a web page"?
111 R: Major unit two. Publish. Yeah.
112 B: Subunit two is "How to upload and download HTML files to a Pilot account." The subunit for
113 unit two is "How to submit your URL to a search engine." And I'm thinking of teaching people
114 how to use Netscape Composer instead of writing HTML, so I will break down Netscape
115 Composer into subskills [INTO SUBUNITS]. And so, [m]. Okay. [WRITES SUBUNITS] Number
116 one, they need to learn to open and save HTML documents. And they need to know how to
117 create tables. They also have to learn how to change colors, backgrounds and fonts. They
118 also need to learn how to link images [ERASES], to link hyperlinks [ERASES], insert
119 hyperlinks and images.
120
121 R: No why did you change to "insert"?

122 B: Because this course is not about teaching people how to create images. And I'm trying to
 123 glue things together. When I think of making a home page, you usually insert links and
 124 images, or some files are video files; it's mostly a link or an image. So I'm trying to put these
 125 two together, and if I use "create," that's not right, because I'm not trying to show people how to
 126 create an image. That's a whole other course. So that's why I choose "insert." They just need
 127 to know how to [PAUSES]
 128 R: to take already existing [PAUSES]
 129 B: materials to their web page.
 130
 131 B: [WRITES SUBUNITS ON SEPARATE PAPER] I think that's good enough for [m]. And so now
 132 I need to select one practice and one project. [READS PRELIMINARY ASSIGNMENT BLANK
 133 FORM]
 134 R: How will you choose?
 135 B: That's a good question. I'll probably choose one that is easier for practice, and one that is
 136 difficult for project.
 137 R: Because?
 138 B: I like challenge. [LAUGHS] Dr. — mentioned he will give plenty of feedback in the
 139 practice, but will only [m] the project [NO FEEDBACK]. And then will not say anything until the
 140 end. If I do a difficult one, then I won't know, but [PAUSES]
 141
 142 R: If you do a difficult one for [PAUSES]
 143 B: The project.
 144 R: For the project. You won't know what?
 145 B: I won't know along the way if I'm doing it right. But I will get some feedback on the easy part,
 146 that I can kind of know if I'm on the right track, and if Dr. — sees that I'm on the wrong track,
 147 then he'll let me know. That's how I choose. I usually like to do the easier one [m], the difficult
 148 one for project. I hope I made the right choice! [LAUGHS]
 149
 150 B: But [READS HER PRELIM. ASSIGNMENT] and another consideration is, the one that looks
 151 more interesting to me, I'll save it for last, usually.
 152 R: Why?
 153 B: Because I can work on it [PAUSES] I don't know.
 154 R: You have something you can look forward to, kind of?
 155 B: Yeah, that's kind of like how I feel.
 156 R: Would that keep you motivated?
 157 B: Um hm. Yeah. And growing up in the Chinese environment, my mo always tells me, "Do the
 158 bitter things first; save the sweet things for last." I'll save what I'm interested in for my project.
 159
 160 B: Hm. I should draw the diagram first before I [m] because I still can make the choices.
 161 R: Is it easier to make it if it's visual, or why do you want to wait until you draw it?
 162 B: I still can't decide right now. [PAUSES]
 163 R: Is this a stalling?
 164 B: And I hope, yeah, it's kind of like making a lifetime commitment. [LAUGHS]
 165 R: [LAUGHS] Sixteen weeks, anyway.
 166 B: You need to make the right choice. But you bring up a good point. sometimes when you do
 167 things visually, it will help you to make decisions. [WRITES]
 168
 169 B: [LOOKS AT CHECKLIST] Okay. Course goal. [DRAWS] Course goal, which is to construct
 170 and publish a web page. [m]
 171 R: So what do you have written so far, in your circles?
 172 B: I have a course goal, which is "Construct and publish a web page." And two units, which is,
 173 "Construct a web page" and "Publish a web page." And how do you make each unit? [READS
 174 CHECKLIST - guide???) There is
 175 the skill, which it tells you. For constructing a web page, there are two skills I'm teaching. The
 176 first is to "write HTML using Notepad," and the second is "Using Netscape Composer."
 177
 177 B: And here are two units also. One is to "upload and download files," and the other one is to
 178 "submit URLs," Oh! [MECHANICAL PENCIL KEEPS BREAKING]
 179 R: Stressed out? [LAUGHS]
 180 B: [LAUGHS] to search engines. "And under subunit one there are sub-subunits. These are
 181 ovals, not circles. [LAUGHS]
 182 R: I think he won't say anything bad if you use ovals. [LAUGHS]

183 B: [LAUGHS]t. Okay, [DRAWS] the first one [SUB-SUB-UNIT] is "open and save HTML
184 documents." The second one is "How to create tables," [THIRD] "how to change colors, fonts
185 and background," [FOURTH] "how to insert hyperlinks and images."
186
187 B: And [PAUSES]
188 R: Are there any subunits to this one? [WRITE HTML USING NOTEPAD]
189 B: There are, but I don't want to go that route.
190 R: Oh, okay. Well, you don't have to.
191 B: Yeah. Because I'm hoping to do either practice or project on Netscape Composer.
192 R: Either, or both, or what?
193 B: Either, I don't know.
194 R: Not both? Why?
195
196 B: [m]
197 R: Why?
198 B: Probably not, because the course is about constructing and publishing web pages, and I
199 wanted to do either one in one of the areas, and not [m] at one time. And I'm interested in the
200 FTP process. I'm also very interested in creating tables, because I spend a huge amount of
201 time on how to create tables. A nice table, not just, you know, simple ones. So these two will
202 probably be my choice, either one will become the practice one, the other one will be project.
203 Do I have to decide tonight? [LAUGHS]
204 R: Actually, you don't, because you don't have to turn this in till Monday, right?
205 B: Um hm.
206 R: You don't have to. You explained your thinking.
207
208 B: I mean, the problem is I'm interested in both of them, and [PAUSES] it seems to me that
209 FTP is more, it's easier in a way because the direction, the instructions will be very
210 straightforward, and when creating tables, even though when I teach someone to create a
211 table, they can still do it in a different way. To me it's more complex that way. So, it's very likely
212 that I'll choose the uploading/downloading process as my practice, and creating tables as my
213 project.
214
215 R: Okay. Are you satisfied with what you've got there? Do you feel like it's done, except for
216 choosing? [LAUGHS]
217 B: [LAUGHS] It, I think it's done for preliminary, because what Dr. — is really looking for is
218 the diagram. I don't think he needs to see these [WRITTEN OUTLINE OF COURSE UNITS]. So
219 probably when I hand it in it'll just be the diagram. And this [OUTLINE] is just a part of helping
220 me to learn, how to conceptualize [m].
221 R: Hm. How does that help you do that? You mean the written part [OUTLINE]?
222 B: The written part, yeah.
223 R: Why does that help you conceptualize?
224 B: Mm, very often when I draw things in diagrams, I end up messing up the whole diagram.
225 And I don't know what I'm drawing. And if I write it in words, if, I'm not afraid of making
226 mistakes that way. It's weird, actually. But I like to jot down, like, little notes before I start
227 drawing anything. Yeah, like when I compose my own web page. There are different designs,
228 of course: linear, hyper, media, bridge. There are different styles. And when I first sat down on
229 how to [m] a web page, I write it out first, like, what do I want in my web page? And then I start
230 drawing, to see [PAUSES]
231
232 R: Is it like a site map, or an outline or something?
233 B: And then I will draw it, to see what kind of web page am I creating, by looking at what I want
234 in my web page. And if it looks like [m], that's what I create. So, that's usually how I do
235 business. Write it out and then, hopefully, the graph will clear any ideas I'm confused about
236 [m].
237 R: Looks to me like having something to refer to when you draw helps you to see the
238 relationships better. Is that possible?
239 B: That is possible. That is possible.
240 R: Do you think you erase more if you go right to a graphic?
241 B: Definitely. Like when I draw this one, I don't need to erase anything, because I already know
242 what I'm going to draw.
243
244 R: I think this one [OUTLINE], although you do show the relationships here, it isn't as

245 [PAUSES]
 246 B: Clear.
 247 R: Clear, so maybe you're not as afraid of just putting something down.
 248 B: Exactly. Exactly.
 249 R: This is my little psychological lingo. [LAUGHS]
 250 B: [LAUGHS] That's exactly how I feel. When you write it you can, you know, write a lot of little
 251 notes, you know, to remind yourself, but after you organize your thoughts, at THIS stage
 252 [DIAGRAM], you don't need to erase a lot. You know what you want there.
 253
 254 R: What did you find useful, that helped you do this assignment?
 255 B: The sample [PAGE 65] and the notes.
 256 R: The sample on page 65?
 257 B: Um hm.
 258 R: And what notes?
 259 B: And also the little guidelines.
 260 R: Oh, here along the side of the blank form? [FOR PRELIM]
 261 B: Along the side. Yep, that helped me what Dr. —'s looking for, or what he's trying to teach
 262 us, how, what is the course structure.
 263
 264 B: There's a course goal, and unit underneath it, and subunits, and [PAUSES]
 265 R: Did you have any trouble understanding these [CHECKLIST]?
 266 B: No, I think it's very clear?
 267 R: Did he explain them in class?
 268 B: Yes, yes. I think if I just look at it, if I give this sheet to another person, they'll probably go,
 269 "Huh?" You know. But I know, like [READS CHECKLIST], "Each entry has a verb and object."
 270 R: Is this what the, oh, it's this one [4TH GUIDELINE DOWN ON PRELIM].
 271
 272 B: Right. This one. This actually goes with this part right here ["EACH UNIT IS A SKILL AFTER
 273 THE COURSE. 'HOW TO...'"], but they're separate, so if you give it to another person, they
 274 might not know, after doing this part ["EACH UNIT IS A SKILL AFTER THE COURSE. 'HOW
 275 TO...'"], they need to do another part ["EACH ENTRY HAS A VERB AND OBJECT"], that needs
 276 an entry with verb and object. But actually saying that each unit, when you really have to do
 277 something, you need to include a verb and an object. So it's a little bit unclear, but since I've
 278 been to classes and he has explains it, it doesn't confuse me.
 279 R: Um hm. Okay. Are you done?
 280 B: Um hm. I think, I think that [m].
 281 R: I'll turn off the camera?
 282 B: Did you get all the things you needed?
 283 R: Yes, I did.
 284 B: Good.

Observation Session #2

3 R: Okay, this is session #2 with Beth. So, so what are you going to do today?
 4 B: I'm doing Assignment #1, Part 1 of Parts 1 through 5, to 5. Yep. And I have the
 5 Preliminary Assignment. I printed it out at home, the diagram. Just to let me know what we're
 6 doing. Hope you don't mind.
 7 R: Oh, not at all, not at all. So this is, uh, you printed the, your diagram onto the blank format
 8 from the disk.
 9 B: Uh huh. Yep. Because I found out a great software from [CEP] 807 to, for diagramming.
 10 R: Really, what is it?
 11 B: It's called ABC Snap. It's the best diagramming software I've ever seen. And it's free!
 12 R: Where did you get it?
 13
 14 B: They have a big, a package that costs \$200 and some dollars, but that's for business, you
 15 know. That's for more advanced users. But for basic, it's free. It's on the U drive here [IN
 16 TEC]. You just copy it and get it.
 17 R: Huh. I'll have to look at it.
 18 B: Look under CEP 807. It's supposed to be [UNINTELLIGIBLE].
 19 R: CEP 807?
 20 B: Uh huh. Program's called [UNINTELLIGIBLE]. It's great and the diagram's so pretty!

21 R: They're beauteous. I'd give you a passing grade just because it looks pretty. [LAUGHS]
 22
 23 B: [LAUGHS] Okay, should I start?
 24 R: Sure.
 25 B: [READS PRELIM] I will do practice.
 26 R: Okay. So you were looking at the diagram to decide which one to do first?
 27 *TITLEB: Yeah, and [READS BLANK FORM, PART 1] course subject is web page design. When I
 28 was thinking of the name I [PAUSES]
 29 R: The name of the course?
 30 B: Yeah. I'm still not sure of what I'm calling it, Web Page Design or Web Page Development.
 31 This course is geared to beginners web, you know web, beginning designers who want to
 32 make it their profession. And since the course is not just web page design, it's also about
 33 teaching how you publish it, or maybe there is something along the line of I would teach how
 34 to make images and stuff like that. So maybe I'll call it Web Page Development instead of just
 35 Design. Sounds more complex that way. [LAUGHS]
 36 R: So development would include design?
 37 B: Uh huh.
 38 R: But design would not include development?
 39 B: Right, right. Does that make sense to you?
 40 R: Um hm. Yeah, it sounds more encompassing, I guess.
 41
 42 B: [WRITES] So, number 1 and 2 is done. [REFERS TO CHECKLIST] And I already starred the unit to
 develop, which is
 43 "Uploading and downloading HTML files to the internet." [UNINTELLIGIBLE]
 44 R: Did you, uh, get any feedback?
 45 B: Yeah, yeah, do you want to see? Oh, there isn't any feedback. Just a bunch of Okays.
 46 R: Nothing written, just okays?
 47
 48 B: Just okays.
 49 R: Good for you! [LAUGHS] See, I was right.
 50 B: Yeah, yeah, so you seem happy with my decision to [PAUSES]
 51 R: So there you go.
 52 B: Bunch of okays, which is good.
 53 R: Really, that's what you wanted to see.
 54 B: Oh, there's so many students in the class are like already finished Assignment #1, they've
 55 done Assignment #1, including, like 6, 7 and 8 [PARTS OF ASSIGNMENT #1].
 56 R: Well, you know what, though [PAUSES]
 57 B: What?
 58 R: 6, uh, 6 and 7. Does it go up to 8? Well, anyway, the part for next week, it's difficult, and if
 59 they think they already know it, they'll be redoing it, I'm sure.
 60
 61 B: Yeah, I know that one girl is completely off track. So, [PAUSES]
 62 R: Really? That's too bad. That's a lot to do.
 63 B: Yeah. I know, and it has its good and bad side. And you know you want to get the feel of
 64 what you're getting into now instead of like me. I'm just doing the stuff that is required. And I
 65 don't know what is next week. Sometimes I know that whole logic, what, what's ahead.
 66 R: Some people just can't even forge ahead.
 67 B: Yeah, I know.
 68 R: I think you're doing fine, especially if you got all okays.
 69 B: I'm glad. [LAUGHS] Okay. [READS BLANK FORM]: "Course goal. Goal has real role,
 70 setting." Now I'm going back to the notes [COURSE PACK] to try and find some examples of
 71 the course goal, the condition and behavior.
 72
 73 R: That's on page [PAUSES]
 74 B: Uh, I'm still looking for it. It's probably on. Um, wait a minute. 97 is actually for unit goal.
 75 Page, starting page 88, it's about course goal. And those are, page 74 there's a full model
 76 assignment format that we can look at. So what I'm going to do is just look up the model
 77 assignment and see what is required and look at the other examples [88-91] before I do my
 78 own.
 79
 80 B: [REMOVES MODEL FROM COURSE PACK THEN WRITES]
 81 R: Are you starting in part 3, Course Goal?

82 B: Course goal, Condition.
83 R: Right at Condition, okay.
84 B: [READS CL] These are things that is composed, the course goal is composed of these things. I've
85 been checking to see if [PAUSES]
86 R: Um hm, so what have you checked off?
87 B: Uh, role and setting.
88 R: Okay, and that's in that left column [CHECKLIST].
89 B: Um hm. Setting. And now I'm working on the purpose, why I need to take this course.
90 [WRITES AND CHECKS OFF ROLE AND SETTING]
91
92 R: So that was the purpose you just marked off? What's your condition say now?
93 B: [READS PRACTICE]: "more businesses, interacting with customers and
94 [UNINTELLIGIBLE] company, graduates will construct and publish the company's web page
95 on the internet [UNINTELLIGIBLE]. [WRITES] and now I'm trying to check and see if I've got
96 [UNINTELLIGIBLE] [READS PAGE 88 EXAMPLES] It's kind of weird to do it this way. In
97 these examples the, uh, the steps are do the role. You state the role, you state the setting
98 and then behavior and then purpose [IN PARENTHESES WITHIN THE OBJECTIVE]. And
99 here [COURSE TERMINAL OBJECTIVE CHECKLIST ON BLANK FORM] it's role, setting,
100 purpose and then behavior. To me it's kind of backward to put the thing that way.
101
102 B: I think it would sound better if I say: "As web designers in a corporate setting, graduates
103 will be able to construct and publish the company's web page on the internet to attract more
104 businesses, interact with customers [UNINTELLIGIBLE].
105 R: Yeah, I think you just putting them together to try to isolate parts for teaching purposes.
106 B: Because that's the main, that's the skill that I want to teach. That makes sense. [READS
107 PRACTICE] Oh, what is that. Is that supposed to be real world performance? [READS
108 MODEL ON PAGE 75]: "Test."
109 R: What's that?
110 B: That should be your work. Yeah. That's weird. It should be the word "test." Is this the Mac
111 one?
112 R: This is in part 4. With the blank. Is this the one?
113 B: It's, I think it's the Word version.
114
115 R: Word for Mac or just Word.
116 B: Just Word. I don't know.
117 R: PC.
118 B: I don't know but I can open it in my PC.
119 R: Well, yeah, I think you can open the Mac in PC too.
120 B: So maybe there's a Mac version, but I opened it in my PC
121 R: Yeah. Huh.
122 B: Strange.
123 R: Yeah.
124 *COURSE TERMINAL OBJECTIVE: [READS BLANK FORM]: "Course terminal objective. Course
125 final exam." That is difficult
126 because there may be a lot of givens in my example. [READS NOTES] So conditions
127 [PAUSES]
128 R: So what are you reading here, when you're looking at this [EXAMPLE]?
129 B: I'm looking at the things on the side.
130 R: The handwritten [PAUSES]
131 B: The handwritten [NOTES].
132
133 R: Notes? Okay.
134 B: Uh huh. I just noticed that it says "All skills from all units on course final exam." So the final
135 exam should be about creating those HTML documents and publishing a web page. So
136 when I write my terminal objective I should mention that given these, given all these
137 equipment that I need, students would be able to [PAUSES]
138 But I also need to have something else, because he said in class that the word "create" is not
139 a behavioral term. And a web page, we usually say "create a web page" or "make a web
140 page" or "construct a web page." I mean, all of these words are not quite behavioral. You can
141 construct a web page in your mind. So I need to talk to him more. I need to find another word
142 to substitute for the word "create" somehow. Because it's not about writing out HTML code

143 because I'm teaching them how to use [UNINTELLIGIBLE]. So I need help.
 144 R: [UNINTELLIGIBLE] You know I'm dying to!
 145 B: [LAUGHS] Come on, [researcher's name deleted] come on.
 146
 147 R: You know what? I had some Korean food yesterday and there was a fortune cookie. It
 148 said a great temptation will come your way. [LAUGHS] There is it! [LAUGHS]
 149 B: [LAUGHS] Come on. [READS MODEL] So I'm working on the conditions now. [LOOKS
 150 THROUGH COURSE PACK]
 151 R: So what are you looking for now?
 152 B: I am trying to find more examples on how to write course terminal objectives. Terminal
 153 objectives. This course stuff is not easy for my information. [LOOKS THROUGH COURSE
 154 PACK] Did you have a feeling like that too, when you were doing homework for this class?
 155 Have you ever felt like you were lost? Or [PAUSES]
 156 R: Yes, who hasn't? [LAUGHS]
 157
 158 B: Now my mind is just stuck.
 159 R: Is that the definitions or examples you were looking at?
 160 B: No, this is not what I was looking for, but my mind is just now stuck with the word "create." I
 161 need to find words that can create them, and you're not telling me! [researcher's name
 162 deleted]
 163 R: [LAUGHS]
 164 B: Okay.
 165 R: He will help you out, — will. He'll give you feedback on [UNINTELLIGIBLE].
 166 B: Um hm, yeah. That's the practice [UNINTELLIGIBLE] [READS MODEL ON PAGE 75]
 167
 168 R: So what were you looking at?
 169 B: Uh, I was looking at the condition, the example, the course, the course goal and purpose.
 170 The particular model is, is solving division problems with whole numbers.
 171 R: You were looking at the course goal or the course [PAUSES]
 172 B: I'm looking for the course, I'm looking for the terminal objective now.
 173 R: Oh, the conditions of the terminal objective [IN THE MODEL]?
 174 B: Um hm, which describes the course final exam. And I'm just trying to think of a way to, I'm
 175 just trying to think if I need to say, "Given a written description of the assignment, of the web
 176 design, designs." Because I know that it's hard for me to pick the right words.
 177 [UNINTELLIGIBLE] [WRITES THEN ERASES]
 178
 179 R: What are you trying to think?
 180 B: I'm trying to think [PAUSES]
 181 R: What comes after "written"?
 182 B: Yeah.
 183 R: "Given a written."
 184 B: I know what I want to do. "Given a written, the, involving web page design, involving
 185 constructing and publishing a web page on the internet."
 186 B: No, actually it's, "Given a written description of a computer project involving creating HTML
 187 documents and publishing a web page [PAUSES] What did I just say? [LAUGHS] That
 188 sounds okay.
 189 R: "Given a written description of a computer project involving creating and publishing a web
 190 document."
 191
 192 B: You don't mind if we change the content? [PAUSES]
 193 R: Well, no because I can't watch you every minute.
 194 B: And you just want our first [PAUSE]
 195 R: Sure. That's fine.
 196 B: Draft.
 197 R: Make it be perfect the first time.
 198 B: It's hard to be perfect the first time.
 199 R: It's hard to be perfect, even at the end!
 200 B: Yeah, especially in this class. I had heard that Dr. — was very demanding on having
 201 things perfect, in details, in the right word. That's why it's hard for me to pick, to be extra
 202 careful of choosing words. Because, you know, before taking this class, I thought "create" is a
 203 behavioral term.
 204 R: How do you know someone's creating something? Now, see, you've got me into my TA

205 mode. I'm creating like mad right now, but you can't tell.
 206 B: See, that, I didn't think about that before this class. I thought when you say "create a web
 207 page" you will, I expect people to actually do it. After taking this class I know now that the
 208 word "Create" is not behavioral.
 209
 210 B: Is "make" a behavioral term?
 211 R: I'm making it right now. You just can't see it.
 212 B: But a web page, you can't write it out. You can write out the HTML code, but you can't
 213 write out [PAUSES]. Hm. [WRITES] Have you ever been a TA for this class?
 214 R: Um hm. Two and a half years.
 215 B: Really?
 216 R: That's why there's the temptation.
 217 B: I know I'm doing wrong things, not, you know, not writing [UNINTELLIGIBLE]
 218 R: Now, that's something similar to what I'm looking for in my research. [WHISPERS]: "Oh, I
 219 know this is wrong."
 220 B: Oh, I just know it. I just know it. [WRITES]
 221
 222 B: Okay. [READS CHECKLIST]: "Close representation of real conditions."
 223 R: Where are you reading?
 224 B: Right here. [INDICATES TOP OF CHECKLIST IN MODEL ON PAGE 75]
 225 R: Oh, the checklist?
 226 B: Um hm. [READS FORM]: "Behavioral." [READS NOTE]: "Description," so I need a description of the
 227 course final exam, which I already have. [GLANCES AT PRELIMINARY ASSIGNMENT]
 228 R: Is that this? Would you read that out loud?
 229 B: Um hm. [READS PRACTICE]: "Given a written description of a computer project involving
 230 creating HTML code and publishing a web page, students will." [READS MODEL] And now I
 231 need to [PAUSES] And now I need to write out behaviors. [READS NOTES ON MODEL ON
 232 PAGE 75]: "Specific and observable, test behaviors." So now I'm supposed to go back to the
 233 word "create." [WRITES]
 234 R: Now, how do you know you're supposed to do that?
 235 B: It's written in the model example. ["SPECIFIC OBSERVABLE TEST BEHAVIORS"]
 236 R: Oh, okay. One of the notes. Okay.
 237 B: [READS MODEL THEN WRITES] [UNINTELLIGIBLE]
 238
 239 R: Are you reading it over to yourself?
 240 B: Um hm.
 241 R: And what are you looking at now?
 242 B: I'm still trying to, I'm making sure that the things that I've written are observable. I think the
 243 word "use" is observable. Yeah. Can I ask you if "construct" is observable?
 244 R: Yes, it is.
 245 B: It is, it's [PAUSES]
 246 R: Because you can see somebody using it.
 247 B: Construct.
 248 R: I don't know that they could use a physical object if they didn't touch it, unless they were,
 249 uh, what do you call it, tele, uh.
 250 B: Yeah.
 251 R: Well, whatever. Move things with your mind.
 252 B: Okay, so "construct." Are there any other words?
 253 R: "Use" is a behavioral term; "construct" isn't.
 254 B: I need a thesaurus.
 255 R: If you told me to use this pen [puts pen down] , am I using it?
 256
 257 B: No.
 258 R: I might be thinking about using it.
 259 B: [UNINTELLIGIBLE]
 260 R: I was picturing walls, and [PAUSES]
 261 B: Yeah. Okay. Now my, I need to find some examples in this course pack, to find a word that
 262 I can use. [READS COURSE PACK]
 263 R: Are those examples?
 264 B: Uh, example of the Unit Goals Related to the Course Goals. [PAGE 72]
 265 R: Uh, okay. Page 72?
 266 B: Two. I remember when I browsed through the course pack, there are some examples of

267 behavioral terms. [LEAFS THROUGH COURSE PACK] And then I forgot to create
 268 [UNINTELLIGIBLE]. [LEAFS THROUGH COURSE PACK] See, in all these examples the
 269 behaviors are either speak or write or state aloud.
 270 R: Well, how could you observe somebody doing what you want them to do?
 271 B: They're actually doing it, so [PAUSES]
 272 R: [GESTURES "THERE YOU GO"] I tried to sneak around and not [PAUSES] It's just too
 273 much.
 274 B: [LAUGHS]
 275 R: [UNINTELLIGIBLE]
 276
 277 B: You can't say, "Students will do it" [UNINTELLIGIBLE]. Oh, my word. I haven't gotten much
 278 sleep last night, so my mind isn't functioning very well right now. This is not the best session
 279 you'll get. [LAUGHS]
 280 R: [LAUGHS] Well, it might be interesting, though.
 281 B: I went to bed at 6:00 a.m.
 282 R: Why?
 283 B: Because I had other work to do.
 284 R: Ah, youth. Able to bounce back. Although maybe you're not bouncing that well. I don't
 285 know. [LAUGHS]
 286 B: [LAUGHS] Ten years from now, [UNINTELLIGIBLE].
 287 R: Yep, and I think of myself with a six-month baby!
 288 B: Um hm. Be prepared.
 289
 290 B: [LOOKS AT COURSE PACK] Is that word, ["airy"?] straightforward that I should know?
 291 R: No, actually [PAUSES]
 292 B: Tell me, [researcher's name deleted], Tell me! I'm dying here! [LOOKS AT COURSE PACK]
 293 R: What do you think that [UNINTELLIGIBLE] involves? Where is it, 78?
 294 B: 74.
 295 R: 4?
 296 B: [TURNS TO PAGE 74, THEN 75]
 297 R: [POINTS TO TOP OF 75] Is this where you are?
 298 B: Um hm.
 299 R: [READS MODEL ON PAGES 75-76] Basically you have to think how could you observe
 300 them doing those skills.
 301 B: How do I observe them, how they do the web page?
 302
 303 B: I would, I would like them to sit in front of a computer and actually [PAUSES THEN
 304 LAUGHS] Can I say, "Students will sit in front of a computer and" [PAUSES] Still I need the
 305 word to, is "sitting in front of a computer" [PAUSES]
 306 R: It's behavioral. Give me a word or a phrase. Not that you see a word [UNINTELLIGIBLE].
 307 B: "Student will sit, will, students will know, no, students will use." Yeah, "Students will use
 308 [ERASES] Netscape Composer and Notepad to [UNINTELLIGIBLE]." I still want to know that
 309 word that you have in mind.
 310 R: It isn't a word that I have in mind.
 311 B: It's a phrase?
 312 R: I think you just got it. Yeah.
 313 B: Oh no, I just forgot what I just said!
 314 R: [LAUGHS]
 315 B: [UNINTELLIGIBLE] See, I need sleep. [UNINTELLIGIBLE]
 316
 317 [Digression on educational psychology, volcanoes, and movies]
 318
 319 B: Okay. I still [UNINTELLIGIBLE] think of something, after Dr. — marks it.
 320 R: Um hm. He's still not going to tell you what to do, though. He's not going to say, "Use this
 321 word instead." [LAUGHS]
 322 B: [LAUGHS] "Find another word. This is not behavioral." [READS PRACTICE] Yeah, I'm
 323 thinking that I need criteria.
 324 R: So read me what you ended up with, though, for your behavior.
 325 B: [READS PRACTICE COURSE TERMINAL OBJECTIVE]: "Students will use Notepad or
 326 Netscape Composer to make a web page, and use FTP to publish the web page on the
 327 internet."
 328 R: What are you looking at?

329 B: I'm looking at this. [PRELIMINARY ASSIGNMENT]
 330 R: That's your diagram?
 331 B: Yes. If I say "Use FTP," it makes it look like I'm teaching people FTP. And it's related to
 332 FTP. Maybe I should say "Students will upload and download HTML files to the internet."
 333
 334 B: [WRITES SEVERAL VERSIONS OF BEHAVIOR THEN ERASES] [UNINTELLIGIBLE]
 335 different, I have to change here [PRACTICE UNIT GOAL ON PRELIMINARY ASSIGNMENT].
 336 R: Here it says [PAUSES]
 337 B: Here it says, "Upload and download HTML files to Pilot." [ERASES] So, they need to know
 338 how to upload and download documents to their Pilot account. "Students will also
 339 [UNINTELLIGIBLE] submit URLs to search engines." [READS EXAMPLE] I'm not
 340 sure if I'm on the right track. It seems like I'm describing the units in the behavior.
 341 R: You're describing the units?
 342 B: Yeah, what they're like, what they [PAUSES]
 343 R: Oh, in the Behavior section.
 344 B: Yeah. [READS CHECKLIST] And the behavior should describe the test that they
 345 get at the end of the course.
 346
 347 B: [READS MODEL ON PAGE 74]
 348 R: What are you looking at now?
 349 B: Uh, I'm looking at, because this person has written something different in the behavior [OF
 350 COURSE TERMINAL OBJECTIVE IN MODEL] that has nothing to do with his diagram or his
 351 units.
 352 R: Oh, really? What's the diagram say, and then what's the behavior say?
 353 B: The diagram [IN EXAMPLE] says, "solving problems using short division and
 354 long division," and the behavior is "write out all steps and write out solution."
 355
 356 B: [READS PRACTICE COURSE TERMINAL OBJECTIVE] So actually I should say, "Students
 357 will use, will be able to use Netscape Composer and Notepad to make a web page." So they
 358 need to know how to use either one of the two to make a web page. And students will also
 359 need to know. [PAUSES] I'm confused right now.
 360 R: About?
 361 B: About the difference between, I'm writing the unit goal in their behavior [OF THE COURSE
 362 TERMINAL OBJECTIVE].
 363 R: But, oh, you mean the behavior in the course terminal objective?
 364 B: Uh huh. And it makes sense partly because it is the test at the end, that they need to
 365 know how to make web pages using Composer, and uploading and downloading web images
 366 and submit URLs. [LOOKS FROM PRACTICE TO MODEL AND BACK]
 367
 368 B: I'm going to leave this work and go back to it later. [PUTS PRACTICE AWAY]
 369 [UNINTELLIGIBLE]
 370 R: What's the, what all have you got? You added a third part [TO BEHAVIOR OF PRACTICE
 371 COURSE TERMINAL OBJECTIVE]?
 372 B: [READS PRACTICE COURSE TERMINAL OBJECTIVE]: "Submit the URLs to search
 373 engines."
 374 R: Oh, that's right.
 375 B: And the unit goal, the real world performance. I'm going to work on "Upload and download
 376 HTML files to Pilot, to their Pilot account." *UNIT GOAL[READS HEADING]: "Unit goal, real world
 377 performance." [WRITES]: "As web designers in a corporate setting, for" [PAUSES] Now I'm
 378 looking for something interactive.
 379 R: What are you looking at, this [INDICATES PRACTICE PAGE 1]?
 380 B: The, the course goal, because the behaviors that they will use, FTP to upload the files,
 381 because they want more people to, they want people to access [PAUSES] [WRITES]: "As
 382 web designers in a corporate setting, for giving easily [ERASES] for giving customers easy
 383 access to company's [UNINTELLIGIBLE] and services [LOOKS AT MODEL] major
 384 [UNINTELLIGIBLE] [PAUSES]
 385
 386 B: [SIGHS] Now, there's a problem. I'm assuming that this course is for business, where
 387 business leaders, but I used "Pilot account," which is a password account, so I should
 388 change it to internet account. Yeah. [WRITES] So now I'll try it. [UNINTELLIGIBLE] "Upload
 389 the web page from local computer to the internet account by using the FTP software and
 390 download the HTML files to local computer for editing." [READS MODEL ON PAGE 75] I know

391 that this is going to look silly when I look at it tomorrow. Right now I just can't think!
 392 R: Okay, you were looking over here [UNINTELLIGIBLE] [INDICATES MODEL ON PAGE 75].
 393 B: I was looking at what this person [IN THE MODEL] wrote as a unit goal.
 394 R: The annotations or the actual example?
 395 B: The actual example and the notes next to it.
 396 R: So what did you learn from that?
 397 B: Uh. [READS CHECKLIST ON PAGE 75] I need a real graduate behavior, and I need.
 398 [READS NOTE] Ooh, this is good. And it says that, "A whole skill, which makes up one portion of the
 course
 399 goal," so I think I'm on the right track because "upload" FTP is part of, is a portion of the
 400 whole course goal.
 401
 402 B: And the real behaviors that, they will actually upload the files to the internet and download
 403 the file back to their local computer. So. [READS MODEL ON PAGE 74] Or I could give them
 404 a criteria, "so well that there will be an increase in the customers visiting the web site."
 405 [LAUGHS]
 406 R: Well, that would be a quantitative way to test it.
 407 B: Yeah, but I don't necessarily need criteria, right?
 408 R: It's optional at this point.
 409 B: [READS PRACTICE] I guess I'm done for now. I just, I need to look at it tomorrow to see. I,
 410 I just can't think.
 411 R: Oh, I can imagine. That's fine. That's fine. All righty.
 412 B: I hope you get what you need.
 413 R: Oh, I'm, it's fine.

Observation Session #3

3 R: This is Beth's third observation session. Okay, so what are you going to work on today?
 4 B: Oh, hopefully part 6 through 8, 7, 6 and 7, which is unit terminal objective and justification.
 5 And I just took out my assignment that I got back from last time [PRACTICE]. Actually, I have
 6 a question. If he says something like "Please check this against practice," does he say this to
 7 everyone, or does he imply there's something wrong with my project?
 8 R: [READS PROJECT]: "Please check the project against the practice"?
 9 B: Um hm.
 10 R: Oh, yes, he says that for everyone.
 11 B: Okay, okay.
 12 R: Just because that's the purpose of having practice and project.
 13
 14 B: Hey, it worked! The word "create." He said it's okay as long as you're using something.
 15 Create something using something.
 16 R: Yeah. Right.
 17 B: So it is fine.
 18 R: What kind of feedback did you get?
 19 B: A lot of okays.
 20 R: Good for you!
 21 B: The condition he said is good.
 22 R: That's the condition of the course objective?
 23
 24 B: Yep, and the behavior is fine, the purpose okay. I'm not sure why he writes "purpose
 25 okay." Maybe he wants a better purpose. I'm not sure.
 26 R: What do you mean? Oh, he wrote the words "purpose okay"?
 27 B: Yeah. "Purpose okay." Because in other areas he just write the word "okay," and in here
 28 [PRACTICE] he writes "purpose okay." And that makes me think maybe it's not good enough,
 29 it's just okay, there's room for improvement.
 30 R: I think that probably he just, I think what he does is if, um, I'll bet the reason he did it is in
 31 the checklist there's no word "purpose." So he wrote, this is the purpose and it's okay. So he
 32 was identifying that way, I think.
 33
 34 B: Do we need purpose? I thought we didn't need purpose. Do we need purpose in the unit
 35 goal? Because in course goal we do need, but we don't need, have to have it, but it's an
 36 option.

37 R: So if you put it in, then it's all right.
38 B: Then it's okay.
39 R: If you put it in and it's okay, that's fine. [PAUSES]
40 B: Okay. So other than that I didn't get any long comments or anything.
41 R: Good for you! Are you going to make any changes?
42 B: Probably not. It was all "okays." I'll probably keep it.
43
44 B: [LEAFS THROUGH PRACTICE] So now I just have to work on the project. It's, my unit goal
45 is basically, it's pretty similar to the practice. So it's probably okay.
46 R: Okay.
47 B: So I'm doing number 6.
48 R: And this is in practice, right?
49 B: Uh, I was hoping to do the project.
50 R: That's fine.
51 B: Is that okay?
52 R: Sure.
53 B: [LOOKS THROUGH COURSE PACK] We just talked about the parts in an objective
54 [LOOKS AT BLANK FORM], and justification, no, we talked about justification two weeks ago,
55 last week. Last week or Monday?
56
57 R: Time flies. [LAUGHS]
58 B: Yeah! Well, we just talked about the parts in an objective. Yesterday. But I just found that
59 on page 109 [IN COURSE PACK] it talks about the justification, so I'm going to write down
60 the page number so I won't lose it. So when I do number 7, I'll go back to that same page.
61 [WRITES "109" ON PART 7 OF BLANK FORM] [LOOKS THROUGH COURSE PACK] Here,
62 number 6, it's, I'm looking at page 118, which is about how the parts of an objective are
63 written. [WRITES "118" ON PART 6 OF BLANK FORM THEN READS PROJECT]
64 R: Now what are you looking at here?
65 B: I'm looking at my unit goal for project, which is: "As web designers in a corporate setting,
66 for making sure that the file of the company's web page displays the same across different
67 browsers, graduates will create a table using Netscape Composer on an IBM computer."
68
69 B: And now I have to write out the conditions for it, [LOOKS THROUGH COURSE PACK]
70 which is on page 123. [PUTS BLANK FORM ON TOP OF COURSE PACK AND PUTS IT IN
71 FRONT OF HER, THEN TURNS TO PAGE 123] We've done a lot of extra practice in class.
72 [READS CHECKLIST ON PART 6 OF BLANK FORM] Conditions consist of number,
73 description, "such as" and medium. [NOTES THESE CHECKLIST ITEMS ON BLANK FORM]
74 R: Now, what were you reading from that page [IN BLANK FORM]?
75 B: I wasn't actually reading it. I was actually looking at the four requirements that are needed
76 in the condition.
77 R: And what are those?
78 B: Which is number of cases, description, medium and an example. And now I'm looking for
79 an example of the objective, the condition. [LEAFS THROUGH COURSE PACK] And now I'm
80 looking at the model assignment [PAGE 74].
81 R: As an example?
82 B: Uh huh. [READS MODEL]
83
84 B: [WRITES]
85 R: When you looked at the annotated model as an example, what were you looking for?
86 Because when you turned back to here you started writing right away.
87 B: I was looking for the example, what kind of example that that person put in "such as," that
88 section. Are they asking questions or is he describing the final or the test, or what is in the
89 "such as" example?
90 R: Oh, so "what would an example look like?"
91 B: Um hm. Um hm.
92 R: So what have you got written so far?
93
94 B: [READS PROJECT UNIT TERMINAL OBJECTIVE]: "Given three written web page design
95 projects involving using tables, such as, "You just got back from Europe and want to share
96 pictures with friends around the world. They all have different monitor sizes and web
97 browsers. How will you ensure that your web page will display the same for all of them?" I'm
98 not sure about the example, though. Should I be more specific, saying that, telling them that

99 they need to have three rows, two columns, or let them decide? [READS PAGE 123 IN
100 COURSE PACK]
101 R: So, does page 123 tell you what you need to know?
102 B: Um, not really. I'm still looking. [LOOKS THROUGH COURSE PACK]
103
104 B: This page [125] has an example, but it's not a good example, so I'm not going to
105 [PAUSES]
106 R: That's 125?
107 B: Yeah.
108 R: Why isn't that a good example?
109 B: Because the example, the "such as" part, is too complicated. It's not listed and it's not
110 indented in a paragraph so it'll be clear. The whole thing is crammed altogether in one
111 paragraph. Actually, up to here [INDICATES PART OF PARAGRAPH ON 125], this is the
112 "such as" part. So it's not clear enough, and I don't think that's a good example to look at.
113 R: Are you looking for format or wording or? [PAUSES]
114 B: I want to look at examples of examples, how they write it.
115
116 R: How they write it.
117 B: How they write it. [LOOKS THROUGH COURSE PACK] See, in this example [PAGE 121],
118 in a problem solving course, the example is very similar to the final exam that the students will
119 see. But in this example [PAGE 122], about the bookkeepers, the example, the "such as"
120 part, does not really describe the final test. It just says "a pending return of an expense."
121 R: So it's less detailed.
122 B: Um hm.
123 R: On 122 than on 121?
124 B: Right.
125
126
127 R: What does 121 say?
128 B: Page 121 says: "Such as, suppose you had 14" [PAUSES] How to pronounce that: K-U-M-
129 Q-U-A-T-S?
130 R: Kumquats.
131 B: Kum, what is it?
132 R: It's a sort of a weird fruit that doesn't grow here. It might grow in California. I don't know.
133 B: [READS PAGE 121]: "Suppose you had 14 kumquats and you gave your sister 6 of them.
134 How many did you have left?" [LAUGHS]
135 R: [LAUGHS] It couldn't be apples.
136 B: [LAUGHS] Yeah! So it's, it's more detailed, the example. To me it describes the test. The
137 students can actually see this test on the final. But on this page [PAGE 122] [PAUSES]
138 R: What's the goal?
139 B: The goal is to organize the files for bookkeeping according to credits and debits.
140
141 R: Okay, and then what was the "such as"?
142 B: "Such as a pending return of an expense."
143 R: Impending?
144 B: Pending. "Such as a pending."
145 R: "A pending return of an expense."
146 B: So if I were to write it, I would assume to write something as, "Given a pile of debits and
147 credits, such as" [PAUSES] I would write it out more like the test. It would describe the test, in
148 the example.
149 R: Um hm. So what's the example in the conditions an example of?
150
151 B: [LAUGHS] Rephrase that. Rephrase that.
152 R: [LAUGHS] In the objective's conditions you've got a "such as." What is that supposed to
153 be?
154 B: It is supposed to be an example, so that [PAUSES]
155 R: Of what?
156 B: Of what they're going to do, the learner [PAUSES] of what they're like in this example
157 [PAGE 121]. This is an example of what they're going to solve, uh, a format, the example of
158 one of the problem solving questions.
159 R: That's an example of what they will be given?
160 B: Um hm.

161 R: So it's an example of part of the conditions.
 162 B: Right. It's "givens."
 163 R: Okay.
 164 B: See, right now my condition is, the answer that they can have is "create a table." And I'm
 165 not sure this is what I want them to answer, or do I want to describe a test so that they can
 166 actually do it?
 167
 168 B: Something like, um, "You want to make sure that everything displays the same way across
 169 different monitors or web browsers." Um.
 170 R: That's the objective or the goal or what?
 171 B: The objective.
 172 R: Read that again. Read your conditions again.
 173 B: [READS PROJECT UNIT TERMINAL OBJECTIVE]: "Given three written web page design
 174 projects involving using tables, such as, 'You just got back from Europe and want to share
 175 pictures with friends around the world who all have different monitor sizes and web browsers.
 176 How will you ensure that the web page will display the same for all of them?'"
 177
 178 B: Now, that is not right. My example, my "such as," should describe the project that I'm going
 179 to give.
 180 R: Now, is that you as the teacher?
 181 B: Yeah.
 182 R: Are going to give the students?
 183 B: Because I say, I'm saying that, "I'm going to give you three written projects, such as," so
 184 I'm going to give them an example. What kind of project am I going to give them? Say I'm
 185 going to give them 10 pictures: 10 pictures, 5 URLs, and I need you to put it into rows and
 186 maybe have a 2-cell span across each row. So that would be more appropriate than this
 187 "such as" part. So they will know, "What's the format? What kind of things am I going to give
 188 them? Pictures? URLs? What's in it? What's in the project?"
 189
 190 B: Instead of saying, giving them a scenario. That wouldn't be helpful. [CROSSES OUT
 191 ORIGINAL EXAMPLE IN PROJECT UNIT TERMINAL OBJECTIVE] That part I'm going to
 192 have to work on my own. Do you mind if I do it later?
 193 R: Oh, I don't mind. Why are you going to have to work on that on your own, or later?
 194 B: I don't want to do it, examples. [LAUGHS] There are more important concepts in here.
 195 R: [LAUGHS] Okay. that's fine.
 196
 197 B: [READS PART 6 OF BLANK FORM]: "Terminal Behavior." [LOOKS THROUGH COURSE
 198 PACK]
 199 R: That's what, 119?
 200 B: 119. I will say [WRITES]: "The learner will create a table using Netscape Composer and the
 201 learner will insert images, URLs, inside the cells, insert images, URLs and a description of the
 202 image inside the cells, " um, [READS CHECKLIST]: "according to," that's what I want to look at,
 203 "according to the
 204 checklist."
 205 R: So that part you put down in the criteria?
 206 B: Um hm. Because I was thinking that I need some kind of, um, criterion I need to give them,
 207 how many rows I want to get, how I want them to span their cells, and alignment, cell
 208 padding, cell spacing, that kind of stuff. And I would like to do this later, too. [LAUGHS]
 209 R: Make a checklist?
 210 B: Yeah, because I need to actually get into Netscape or, I have a book at home that talks
 211 about all the table elements and I could just plunk it in. Is that okay?
 212 R: Sure. So what have you got, though, for your behavior?
 213 B: [READS PROJECT UNIT TERMINAL OBJECTIVE]: "The learner will, 1. create a table using
 214 Netscape Composer, 2. insert images, URLs and a description of the images inside the cells."
 215 And there is some more criterion, which is going to be down here [IN CRITERION SECTION
 216 OF PROJECT UNIT TERMINAL OBJECTIVE]. So basically all they need to do is create a
 217 table.
 218 R: Okay. Are you going to put the checklist right in there, then?
 219 B: Um hm. They don't need to make it fancy or have a background in the back. This unit is all
 220 about creating a table. So basically that's what they're going to do, create a table.
 221

222 B: [READS BLANK FORM]: "Lower limits." [TURNS TO PAGE 129 IN COURSE PACK] 129.
 223 R: That's on lower limits?
 224 B: Um hm. [READS PAGE 129] And there are two types of lower limits. The first part I have to
 225 include a repetition, a number of repetitions, and then the quality. See, this is the part that,
 226 when I was listening to Dr. — talk about it in the classroom, it makes me wonder, because
 227 he says it's your own judgment, that how many repetitions you want to make that learner do.
 228 And for me it's difficult to determine the number of repetitions.
 229 R: Um hm. You and most everybody else.
 230 B: Yeah. He says it's our own judgment, but how do we make that judgment, how [PAUSES]
 231
 232 R: So what he probably said was, "What would, how many times would convince you that the
 233 person really knows how to do it and it's not just a fluke that they did it right?"
 234 B: Right. Right. [PAUSES THEN LAUGHS]
 235 R: Still don't know. Yeah, see, that's why it's a judgment call, because there's probably not
 236 any...
 237 B: Right answer.
 238 R: ...thing that says "This is how you determine the number of repetitions."
 239 B: I wish there's a book. "If you're learning this, you should do this at least how many times."
 240 R: Yeah, wouldn't that be great.
 241 B: I'll probably have them do it two times. If they can do two tables without any errors, I would
 242 say that they pass. Does that sound reasonable?
 243
 244 R: How many, uh, are you going to give them to do? Two?
 245 B: Two projects, and one other thing.
 246 R: Do they have to do them both without error?
 247 B: "Given," yeah.
 248 R: And if they make one error?
 249 B: With. No. With, maybe with two errors, but no uncorrected errors. So they're allowed to
 250 make mistakes, but they have to correct them. I was saying [READS PROJECT UNIT
 251 TERMINAL OBJECTIVE]: "Given three written web page design projects," so, hm. I don't
 252 know. I'm already giving them three projects. If they have to do it twice, that's six projects. Am
 253 I, am I confused?
 254
 255 B: Yeah! If I give them three projects and they repeat two times, that means they have to do
 256 six projects. I was thinking about that in class, too, because the examples [PAUSES]
 257 R: So is that what you mean, though, that you would give them three projects and they'd
 258 have to do them twice?
 259 B: Um hm. Is that [PAUSES]
 260 R: The same projects twice?
 261 B: Yeah. [LOOKS THROUGH COURSE PACK]
 262 R: I mean, that's okay, but [PAUSES]
 263
 264 B: Or see, that's what I'm confused, too, when I was listening to his lecture. If I say, "Given
 265 one written projects" and have them do it twice, is it the same as saying, "Given two projects"
 266 and you only do it once?
 267 R: I think you'd have to specify.
 268 B: Um hm. See, I don't even understand what he's, what these example [ON PAGE 129],
 269 what, what are they doing? [READS PAGE 125]: "Given 10 situations," 10 case studies. They
 270 have to be correct 8 out of 10, that means they have to do it ten times, there is no repetition
 271 there. Where are those others? [LOOKS THROUGH COURSE PACK]
 272 R: Is that [PAUSES]
 273 B: I, I'm just, if I say, "Given three written web page projects." If I say do it three times, does it
 274 mean, this is three times [POINTS TO NUMBER IN CONDITIONS] or one time?
 275
 276 B: [PAUSES] If I just say, okay, number of repetitions is three, three times, so they're doing
 277 the projects. [READS PROJECT] Yeah. Okay. So is that, how many times I want them to
 278 repeat, I say it right here [IN CONDITIONS], how many I will give them?
 279 R: Right.
 280 B: Are they correlated? Instead of saying, "I'll give you, each time I'll give you three projects,
 281 and you have to repeat two times, that means you have to do six projects." Total.
 282 R: I think that you, uh, are unclear on the meaning of the word "repetition" that's used here.
 283 B: Um hm.

284
 285 R: It doesn't mean repeat. It means, I think it means how many times do they have to do that
 286 kind of problem.
 287 B: So if I only want them to do three times or two times, each project, so I would say, "Given
 288 two written projects, and you have to repeat them two times, and I want you to do them two
 289 times." Does that make sense?
 290 R: Does that make four?
 291 B: No, two.
 292 R: Okay.
 293 B: Two. Now I'm checking off this side. Now, my understanding is, how many times I want
 294 them to repeat is the amount of projects that I'm going to give them. [LAUGHS] Okay.
 295 [WRITES]: "Two."
 296 R: Got past that one! [LAUGHS]
 297 B: All right! Yay! So I'll say, um, [WRITES] I'll allow them two errors, with no uncorrected
 298 errors.
 299
 300 B: [WRITES] does that sound right? I remember I saw something [UNINTELLIGIBLE] [LEAFS
 301 THROUGH COURSE PACK] I like this course packet, it's got a lot of examples. I mean, I don't
 302 know to native Americans if it helps at all, but to non-native English speakers, examples are
 303 very important.
 304 R: They are to native English speakers, too.
 305 B: Really? We might not copy exactly the way, the same way, but it sure help us to think.
 306 R: Well, in one of the previous classes that I was in, one of the students made a template of
 307 phrases, you know, "given da-da-da-DA, student will da-da-da-DA," and it would just be a
 308 template, and then you'd sort of fill in things. And a lot of the international students used
 309 that.
 310
 311 B: [STILL LEAFING THROUGH COURSE PACK] Really?
 312 R: Yeah. It makes it a lot easier and makes it quick.
 313 B: Right.
 314 R: The trick is, though, to make it, to use it when it's appropriate. That's difficult.
 315 B: We have to learn to decide. Okay, I found it. I highlighted it when I was [PAUSES]
 316 R: What did you highlight?
 317 B: This example say "no more than two errors on checklist and no uncorrected errors."
 318 R: Oh, no uncorrected errors.
 319 B: It's the same things that I've written.
 320
 321 B: Because when I was reading this example, I thought that that's exactly what I [PAUSES]
 322 R: What you would do.
 323 B: Yeah.
 324 R: And that's page?
 325 B: 97.
 326 R: 97. And that's in the lower limits of the unit objective?
 327 B: Um hm. And I'll probably go back to this page (97), too, when I go home and do the
 328 criteria, according to the checklist and see how they construct the checklist. It's concise, it's
 329 just a few words, not like long sentences or paragraphs. So it's got to be precise. [FINISHED
 330 UNIT TERMINAL OBJECTIVE AND TURNS PAGE OF BLANK FORM TO JUSTIFICATION
 331 SECTION] One page down!

BETH'S FINISHED ASSIGNMENT WITH FEEDBACK

Joel Usam
Thanks
ASSIGNMENT FORMAT #1

Joel Usam
Thanks

NAME Name of classmate checking assign
☐ PROJECT ☒ I have read the assignment ☒ I have read the model
☒ PRACTICE ☒ I have read the annotations on the model
☒ I have a physical or mental skill whose steps and decisions
☒ I know well enough to describe step by step in assignment 2

School or training
 Subject

1 Course Subject Name

Web page development

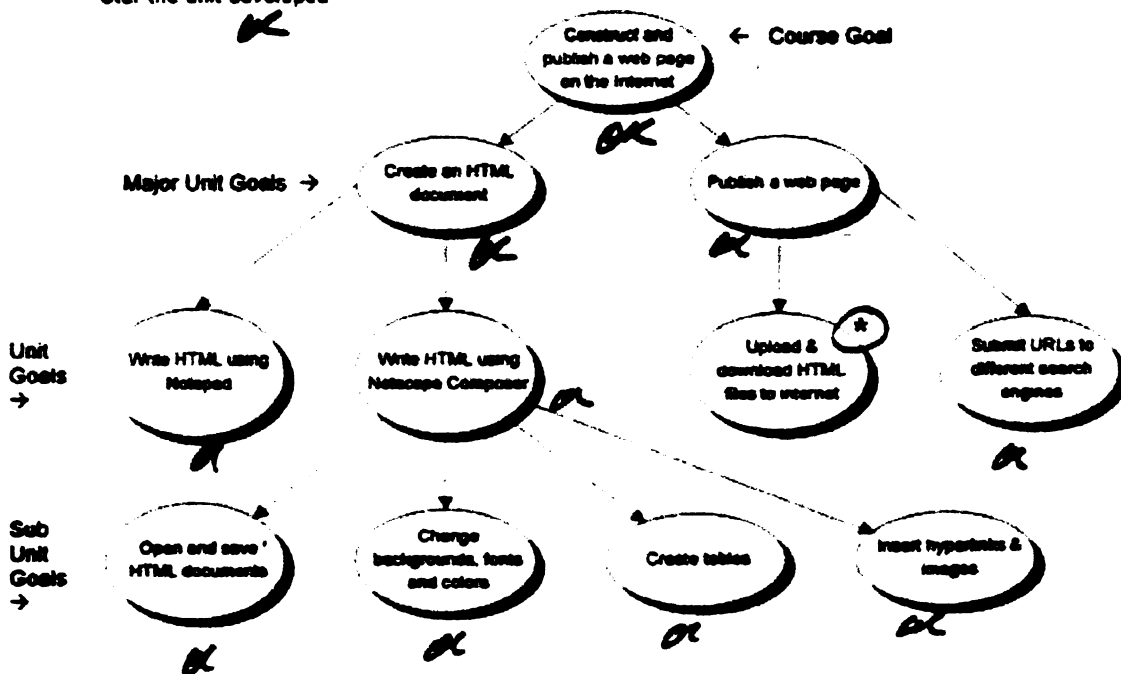
Course = whole

Unit = Parts

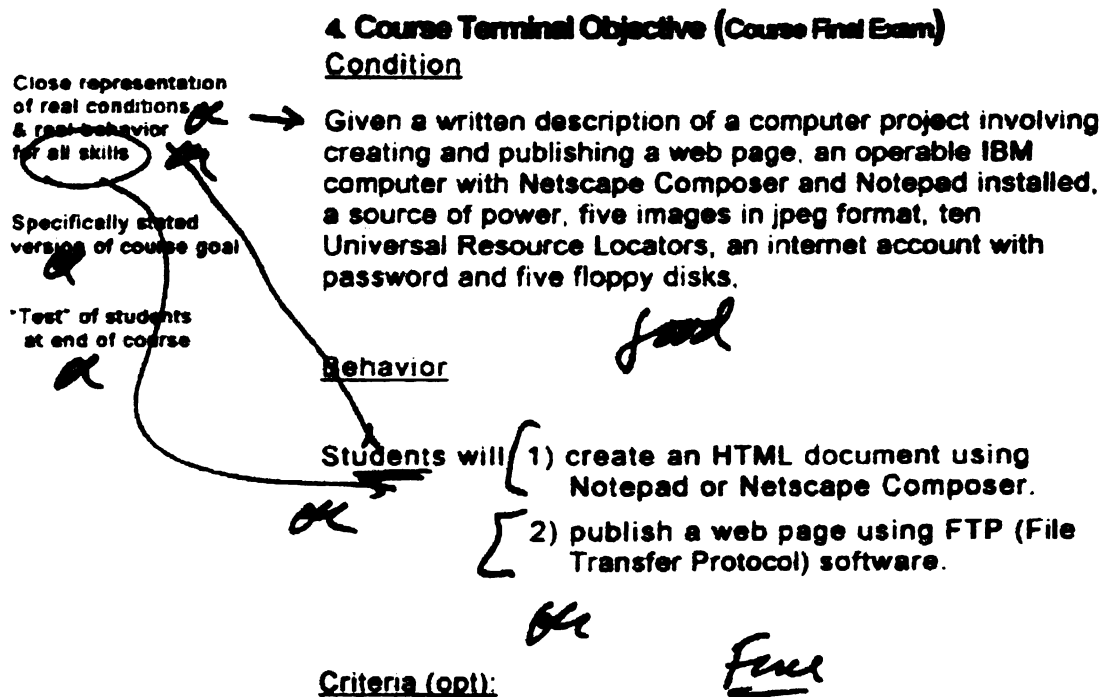
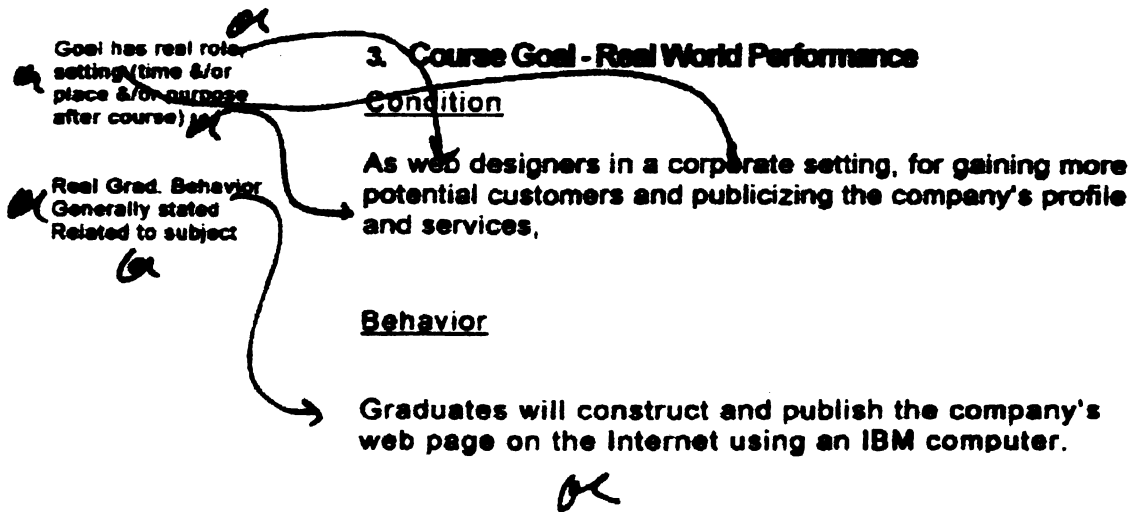
Each unit is a skill

Star the unit developed

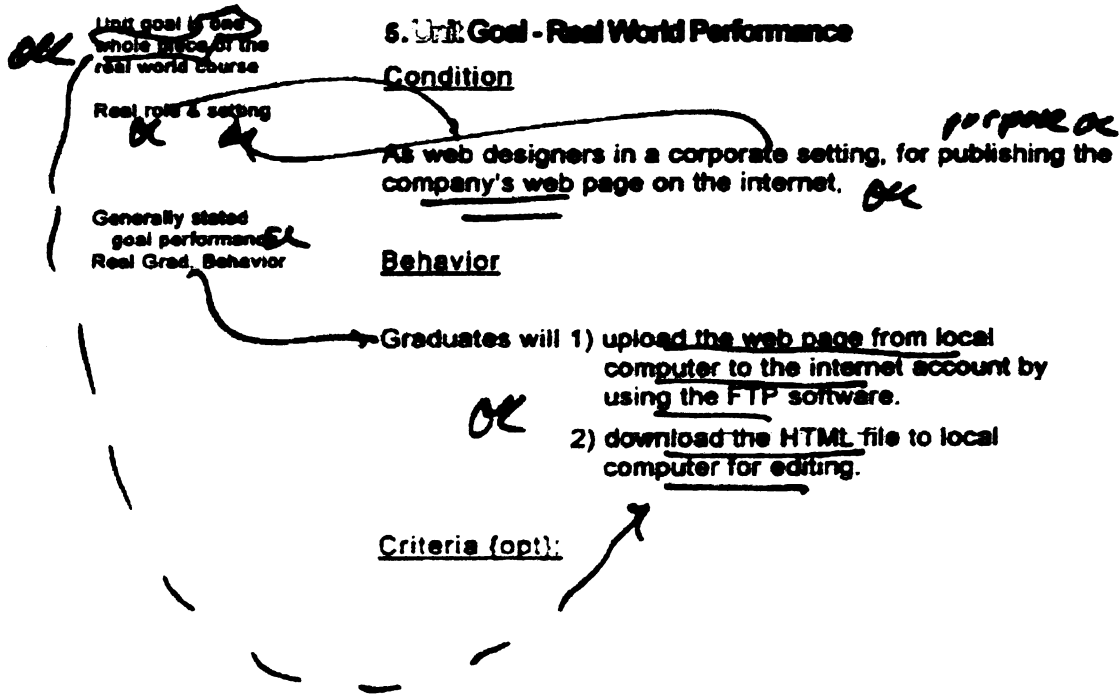
**2 Diagram or Outline Showing
 Course Goal & Unit Goals**



BETH'S FINISHED ASSIGNMENT WITH FEEDBACK – Page 2



BETH'S FINISHED ASSIGNMENT WITH FEEDBACK – PAGE 3



BETH'S FINISHED ASSIGNMENT WITH FEEDBACK – PAGE 4

6.1.2.1 Terminal Objective (Unit Final Exam)

Conditions:

of cases/ situations

Complete descriptions of "givens"

The way situation is presented on the "Task" "Medium"

"Such as"

describes "test" situation

Close representation of real conditions: time and place in unit goal

Behavioral terms

Object of the action very clear

If more than one behavior then listed and numbered

Close representation of real performance in unit goal

According to or so well that time

Built in checklist

Criterion for each behavior

If more than one criterion then listed and numbered

of times done on the test

Quality control: # of errors within a situation/item

Given an operable IBM computer with File Transfer Protocol software installed, a source of power, three HTML files saved on disks, five images in jpeg format, an internet account with password, and two written file transfer projects that involve uploading and downloading HTML files to the internet such as:

You have just finished and saved a web page project for your clients. Next, you need to publish the entire project on the web. Using the FTP software and the Internet account information listed below,

- 1) upload all three of the HTML files and five images to the internet account.
- 2) download the existing HTML files from the internet account to your floppy disks to make changes.

Host name: ftp.microsoft.com

User ID: anonymous

Password: guest@unknown

Terminal Behaviors:

Students will be able to:

- 1) operate the File Transfer Protocol software.
- 2) upload the HTML files to the internet.
- 3) download the HTML files from the internet.

Criterion:

According to this checklist:

- 1) host name, user ID and password are entered in the right place.
- 2) all files are transferred completely.
- 3) the HTML files will be available to view on the Internet.

Lower Limits & Quality:

of repetitions: Two times with no errors on the checklist.

APPENDIX C

CAROL'S STORY

OBSERVATION SESSION #1

Assignment: Write a diagram of the course structure in terms of a course goal and unit goals and select units to develop for practice and project.

During session #1 the students were supposed to draw a diagram of the structure of the course they were going to develop. Carol decided not only to draw the diagram, but also to rough out the rest of the assignment that was due later. She wanted to do this to see if the course units she chose to develop would fit all parts of the assignment. Rather than first drawing the course diagram when she began writing the assignment, she began with part 3, the course goal, which she was supposed to work on in session #2.

As she was writing the assignment she became confused by the difference in where the headings were located on the blank Form as compared with the headings on the Example, where they are pushed farther down to make room for the Example.

Order in Which Carol Did the Assignment

Carol must have had the course structure in mind before she drew the diagram because she was able to write part 4, the course terminal objective, before she drew the diagram. The course terminal objective contains a list of all the unit goals in the course. After writing part 4, the course terminal objective, she finally drew part 2, the diagram. Then she wrote part 1, the course title. After that she went back and worked again on parts 3 and 4, the course goal and course terminal objective. When she was satisfied with her efforts, she continued with part 5, the unit goal. Her path through the assignment is shown in Figure 64 below. A path straight through the assignment would be a diagonal from part 1 at the top left to part 5 at the bottom right.

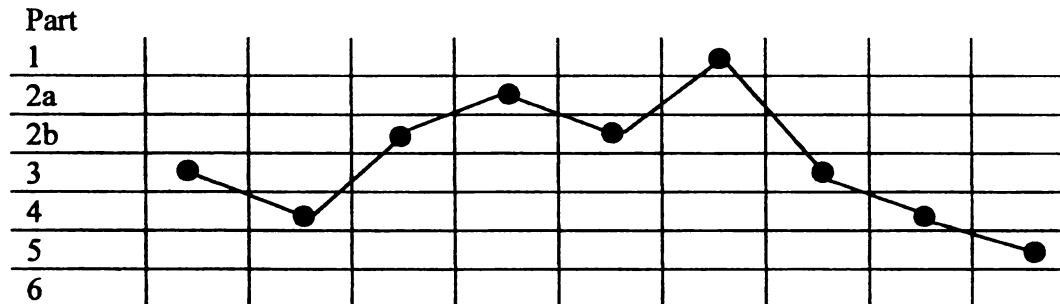


Figure 64: Carol's Path through the Assignment during Session #1

Dividing Course Goal into Units

Carol had trouble dividing her course goal into units because each unit was a prerequisite for the one following. She finally divided the course goal by following the

Example diagram closely. Like Carol's course, the Example course is also about math, how to do long and short division. Later Carol revised her diagram because she felt she had followed the Example diagram too closely, resulting in an "artificial" division.

Problems

The problems Carol encountered during session #1 included how specific to make her goals and objectives, how to divide the course goal into units, how big the units should be, what does real world performance mean in a math class, and should she include an example in the unit goal.

CHRONOLOGY OF TOOL USE

The actions Carol took while writing her assignment during session #1 are listed below. This list is followed by a summary and a model of the chronology.

- Places course pack, Example and blank notebook on table.
- Checks Example to see what assignment is.
- Decides to rough out Parts 1-5 as well as create course diagram in first session.
- Asks self questions to clarify thinking.
- Considers what real world performance in high school math is.
- Selects topic for course development.
- Makes concrete examples to clarify selected topic.

PART 3 - COURSE GOAL

"As a manager of a business or of a family's finances, compare two situations represented by straight line graphs to make a decision based on the results."

- Reads Form to learn purpose of course goal in Part 3.
- Reads course goal heading of "real world performance" as "real world objective."
- Reads Checklist for list of components in course goal.
- Reads Example to paraphrase.
- Writes role and setting of course goal.
- Considers how specific course goal should be.
- Decides to get something down on paper and correct it later.
- Wonders how to word behavior.
- Writes behavior of course goal.
- Reads her course goal aloud.
- Decides to move on and make course goal more specific later by providing examples.
- Distinguishes between behavior and its purpose.
- Finishes writing behavior of course goal.
- Decides to do course diagram next.
- Reads Form and discovers she is writing Part 3 instead of Part 1.
- Reads Form to distinguish between course goal and course terminal objective.
- Finishes writing course goal.
- Considers if course goal is too broad.
- Decides she can revise later if necessary.
- Considers if her course goal is specific enough.

PART 4 - COURSE TERMINAL OBJECTIVE

"Given two sets of information, for example, starting salary plus commission for job A and job B, the student will: 1) graph the line that represents job A, 2) graph the line that represents job B, 3) find the point of intersection, and 4) interpret which is better, based on the point of intersection."

- Writes first draft of condition and behavior of course terminal objective.
- Compares her “givens” with Example to see if her course terminal objective is specific enough.
- Decides to write a rough draft and revise later if necessary.
- Reads Example and derives rules on how specific the behavior should be.
- Decides to make the behavior more specific.
- Wonders if her course goal (not CTO) is going to be too large.
- Thinks about what skills are prerequisite to the course goal.
- Considers which units to select for practice and project.
- Finishes writing course terminal objective behavior.

SELECT UNITS

- Decides to wait for instructor’s feedback on course diagram before making a final selection of practice and project units.
- Considers that other examples are too simple for her topic.
- Considers selecting a unit that has more application to real world performance.
- Thinks that units of Example diagram are too small, are more like lessons.
- Researcher mentions that instructor may use different definition of unit than participant.
- Considers problem of what size math unit would have a real world performance.
- Considers problem of real world performance in math.
- Reads Form heading for Part 5, Unit Goal.
- Reads Note: “What the graduate will be able to do in real world...”
- After reading note, considers she may have a problem with unit goal. [because of RWP?]
- Reads another Note: “General description of unit final exam.”
- Selects unit goal to write (*graph linear systems of form $Y=MX+B$*)

PART 2 - COURSE DIAGRAM

CG: *Graph linear systems of the form $y=mx+b$ involving two lines and interpret.*

UG: *1) Graphing lines in the form $y=ks$; 2) Graphing $y=mx+b$; 3) Linear systems.”*

- Reads Note: “whole course goal.”
- Decides to rough out diagram.
- Reads Note: “major unit goal.”
- Subdivides course goal into units.
- Considers problem in subdividing course goal into unit goals in a linear subject like math.
- Considers problem of having to teach her students everything.
- Researcher reminds Linda of being able to specify prerequisites.
- Reads Example and derives knowledge about how to create a diagram for a linear topic and how to use prerequisites.
- Writes another unit goal (correctly).
- Reads her notes.
- Decides to look ahead to rest of assignment #1 to see if units will fit it.
- Reads Example to see if units will fit all parts of assignment #1.
- Decides to rough out Assignment #1, Parts 1-5 on blank form.
- Looks through course pack for blank form.
- Considers how confusing it is that course pack contains same information in several places and doesn’t know which is best place.
- Reads “Relation of course and unit objectives and content.”
- Decides it is explanatory rather than a form to be completed and turned in.
- Decides to look for an overview of Project #1.
- Looks in course pack table of contents.
- Reads Form on page 710 - assignment #2.
- Reads Form on page 721 - assignment #3.
- Finds and reads Assignment Overview on p. 63.
- Considers problem of describing how a competent performer would do the chosen skill because there is more than one way.

"CG: Graph linear systems of the form $y=mx+b$ and find point of intersection.

UG: 1) Labeling a point on a graph; 2) Graphing $y=kx$; 3) Graph $y=mx+b$; 4) graph system $y=mx+b$ and find intersection; 5) interpret graphs to make decisions.

NOTES: Course goal is same as UG 4 and is lower skill than UG 5. She is told this by her classmates and revises diagram in observation session #2."

- Decides to look at Example before writing course diagram on Preliminary Assignment blank form.
- Thinks Preliminary blank form is for all of Assignment #1.
- Confused by blank forms for Preliminary Assignment and Assignment #1.
- She asks researcher what she does first, who answers "Preliminary; check your calendar."
- Looks in course pack, which she dislikes because too much information and not in chronological order.
- Reads calendar and notes due date for Preliminary Assignment.
- Confused because of terminology: Thinks Preliminary Assignment and bubble diagram are two different things.
- Reads *something* and discovers bubble diagram is the Preliminary Assignment.
- Realizes Checklist is how instructor judges the assignment.
- Reads Preliminary Checklist.
- Wonders how detailed to make bubble diagram.
- Studies Example Diagram and notices it is not detailed.
- Reads Preliminary Checklist again.
- Considers how to word course goal on diagram so instructor knows "real world objective."
- Reads Example.
- Wonders how detailed to make diagram.
- Reads Example and decides she only needs to specify skill, not rationale or how skill will be used.
- Decides to justify skill use later because the Example, Checklist or Notes to not ask for it in course diagram.
- Reads Checklist for guidance in what units are.
- Writes three unit goals.
- Reads Checklist again to gauge if unit goals she has written are correct according to checklist.
- Reads Checklist again for guidance as to what else is required for the course diagram.

SELECT UNITS

- Realizes she needs to choose units for practice and project and indicate them on diagram.
- Wonders how different practice and project have to be from each other.
- Reads Prelim. Example and determines how alike or unlike units may be.
- Selects units and decides to wait for instructor's feedback to change them.
- Reads Checklist to gauge if she has written diagram correctly according to checklist.
- Reads Form and realizes she will have to find a fellow student to check her assignment.
- Wonders if her note "6 to 20 steps" applies to course goal or unit goals.
- Researcher resolves question by indicating unit goals.
- After finishing Preliminary Assignment, decides to work ahead in assignment.

REVISES ASSIGNMENT #1

- Reads Form and realizes she will need to use a separate form for project and for practice.
- Realizes she will not have to write a new course goal or course terminal objective for practice and project.
- Reads Form for heading of Part 1.
- Writes course subject.
- Reads Form for heading for Part 2.
- Skips Part 2 because she has already created the course diagram for the Preliminary Assignment.

REVISES PART 3 - COURSE GOAL

"As managers of financial resources in a business or a family, the graduate will be able to graph two linear functions involving rates, find the point of intersection and interpret the results to make decisions."

- Reads Form for heading for course goal.
- Reads Checklist as guide to components of course goal.
- Decides to read Example.
- Reads Note to course diagram.

- Thinks note is for course goal because note is near where course goal is in Example. (Headings on blank Form are closer together than headings in Example.)
- Reads Form and realizes she is reading at area on Example where course goal is on blank Form.
- Reads Example to see how specific she needs to be in course goal behavior.
- Realizes she does not need to be specific because Example is not.
- Revises conditions of course goal.
- Reads Checklist to gauge her writing.
- Reads Example course goal conditions and cannot identify a purpose in it.
- Rereads Example course goal conditions out loud and identifies purpose.
- Reads Example course goal behavior.
- Wonders how to word behavior because still confused about real world performance for math.
- Gives a concrete example to clarify behavior for herself.
- Revises behavior of course goal.
- Reads Checklist to gauge writing of behavior.
- Decides she is trying to be too specific.
- Revises behavior of course goal.
- Compares behavior to Example and models it after Example.
- Still confused about real world performance in math.
- Compares behavior to Example in terms of real world performance and decides her course goal is real world performance.
- Revises behavior of course goal.
- Looks for blank Forms in course pack.
- Decides she needs Post-It notes to mark important pages.
- Thinks unit means a topic taught over a long period.
- Researcher explains “unit” does not include a time period.
- Finishes revising behavior.
- Wonders if behavior has enough detail.
- Decides to wait for feedback.
- Decides to rough out entire assignment before due so can determine from class instruction what to change.
- Reads Checklist to gauge her course goal behavior.

WRITES PART 4 - COURSE TERMINAL OBJECTIVE

“Given two different job offers involving starting salary plus commission, the student will: 1) write the terms of the offers in the form $y=mx+b$, 2) graph the two lines, 3) find the point of intersection, and 4) interpret the results.”

- Reads Checklist to guide her writing of the course terminal objective.
- Wonders how specific to be.
- Reads Example and sees it is specific.
- Decides to state in the conditions the problem she will use.
- Writes conditions of course terminal objective.
- Reads Example to see how it is worded.
- Reads Checklist to see how specific to be.
- Writes behavior of course terminal objective.
- Wonders if behavior is specific enough.
- Reads Example to see if behavior is specific enough.
- Decides to change it later, if necessary.
- Adds detail to behavior.

WRITES PART 5 - UNIT GOAL - Practice

“As managers of financial resources in a business or a family, the graduate will graph a set of data involving a constant rate of change, such as cost of electricity per kilowatt hours in order to predict the cost for any amount of usage.”

- Reads Form for heading of unit goal section.
- Reads her course diagram.
- Reads Checklist.
- Reads Form for subheading “condition.”

- Decides unit goal has same condition as course goal.
- Decides not to write condition on form at present, but to work on writing unit goal behavior.
- Thinks that course terminal objective is one of the units (interpret). *Later her classmates will help her understand that the subunits help her students achieve the course goal, that the course goal is the culmination of all the skills, not the final unit.*
- Reads course diagram and realizes unit goal is graphing one line, while course goal requires graphing two lines.
- Considers that Example may not be useful at this point because it gets “tricky.”
- Reads first word in condition of Example course terminal objective.
- Reads first word in condition of Example unit goal.
- Reads condition of her course goal.
- Starts writing behavior of unit goal.
- Reads Example unit goal behavior.
- Notices that Example says “the graduate will” and hers says “the graduate will be able to.”
- Changes to Example wording.
- Mentions that course goal is two graphs and unit goal is one graph.
- Considers that there is little justification in graphing one line.
- Wonders if she has to give a purpose in unit goal.
- Finishes writing unit goal.

WRITES PART 5 - UNIT GOAL - Project

- States that in her project unit goal, everything would be same as practice unit goal except graduate behavior.
- Reads course diagram to remember her project unit goal.
- Gives concrete examples to clarify her thinking about project unit goal.
- Still has a problem with how she divided course into units.
- Confused because if makes unit (graph $y=mx+b$ and find intersection) her practice, then is same as course goal.
- Still thinks course goal is final unit, rather than all units together.
- Realizes she had modeled her diagram too closely on Example diagram, but doesn’t fit.
- Thinks instructor’s examples are of discrete units, which does not help her divide course into units.
- Considers that her problem is math is a linear topic, where each topic is a prerequisite to a later topic.
- Reads Example diagram and notes that its units are linear.
- Wonders if she could show this linearity of prerequisites by showing units vertically or by numbering them.
- Researcher says instructor doesn’t care what is prerequisite to what, but wants equal size project and practice units.

REWRITES PART 5 - UNIT GOAL - Practice

“As managers of financial resources in a business or a family, the graduate will look at a point on a graph and give coordinates in order to use and interpret the information presented.”

- Decides to make practice unit “labeling a graph.”
- Asks self questions to clarify what real world performance of skill would be.
- Considers herself too wordy.
- Rewrite practice unit goal “labeling a point on a graph.”
- Wonders if needs example because “too mathematical” to say “give coordinates.”
- Researcher says it is all right.
- She writes “and give the coordinates.”
- Wonders if she has to justify skill.
- Reads Checklist for unit goal condition and does not see purpose.
- Reads Checklist for unit goal behavior, rather than for condition, where purpose would be.
- Recalls instructor saying each goal must have role, setting, purpose and behavior.
- Reads her practice unit goal, “labeling a point on a graph.”
- Writes purpose for practice unit goal and puts it after behavior.

WRITES PART 5 - UNIT GOAL - Project

“As managers of financial resources in a business or a family, the graduate will graph information which can be represented by a linear function of the form $y=mx+b$ in order to analyze and make projections.”

- States that project unit goal would have same condition as practice unit goal but different behavior.
- Decides to make project unit goal “graph a system of lines in form $y=mx+b$.”
- Still considering if unit has a real world performance and decides it does.
- Compares something to Example and decides her work is all right.
- States that course goal and course terminal objective will be same for both practice and project, but that unit goal and terminal objective will be different.
- Writes project unit goal behavior.
- Writes purpose after behavior.
- Confused by Form and Checklist because of all they contain.
- She likes to have them short and simple: do this, do this.
- States that she over-explains everything when she teaches.

Summary of Tool Use

When Carol began her assignment, she first oriented herself by looking through the Example to see the extent of the assignment and by using the Form to help her identify parts of the assignment. She then referred to several tools to help her write her assignment without errors, following which she then wrote part of the assignment. After she had written, she referred to a few tools to help her detect errors by gauging if she had written correctly. She was then ready to use the tools again to prevent errors in the next part she wrote. During session #1 she used the tools more often to prevent errors than to detect them.

Model of Tool Use

A model of Carol’s tool use is shown below in Figure 65. The horizontal line represents time. The area above the line indicates the tools Carol used; the arrows indicate the purpose for which she used the tools. The area below the line indicates which part of the assignment Carol wrote at that time. The abbreviations used in the model are:

FO = Form; EX = Example; CL = Checklist; AN = Annotations;
 explan = explanation; ex = additional example; CG = course goal;
 CTO = course terminal objective; UG = unit goal; → = prevent error;
 ← = detect/correct error; | = division between parts

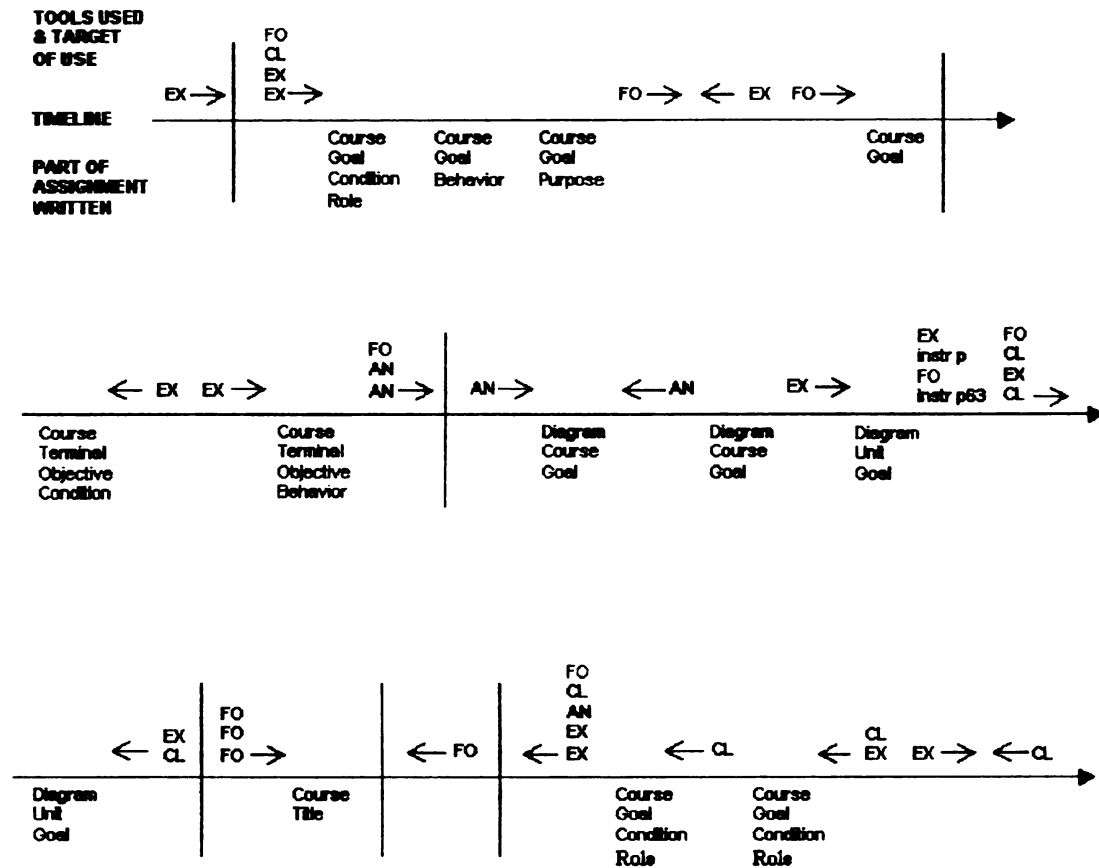


Figure 65: Model of Carol's Tool Use during Session #1

Carol made use of all four tools during observation session #1. She used the tools 59 times: the Example 20 times, the Checklist 15 times, the Form 13 times, the Annotations five times and the other tools in the course pack two times. In addition, there were four times when the tool use could not be identified as to tool, task done or purpose. Figure 66 below shows how often she used the tools.

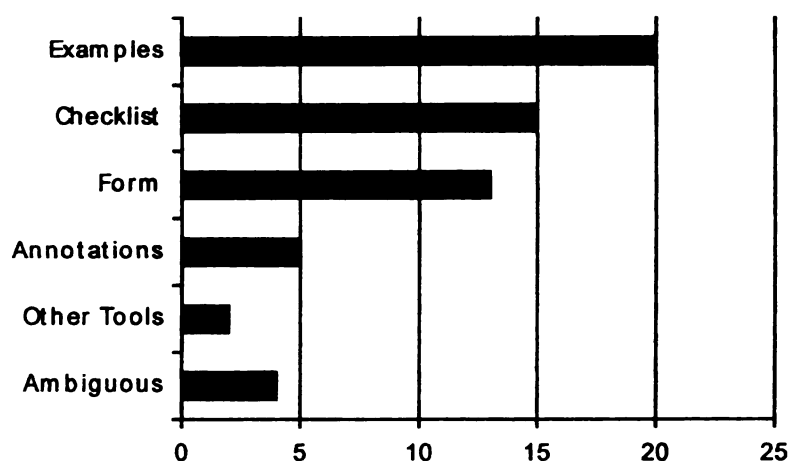


Figure 66: Carol's Frequency of Tool Use during Session #1

Carol used the Example the most often and the other tools in the course pack the least often. She used the Form almost as often as she did the Checklist.

During session #1 Carol wrote the course terminal objective without looking at any tools, then read the Example to see how specific she should be. She considered which units she should develop for practice and project, reading the Example and other examples to help her decide if her units were too large or small, or too alike or different to develop for the assignment. Before selecting a unit goal she read the heading and annotation which describe the purpose of the unit goal. She then decided to develop the unit on "graphing linear systems of the form $Y=MX+B$."

Carol used the tools at the beginning of the assignment to learn what was expected of her and how extensive the assignment was. She used the tools while she was writing to determine what components to include and how to write them. After she finished writing she used the tools to help her gauge the correctness of what she had written.

Carol consciously responded to four cues to use the tools:

- 1) when she was uncertain what to write, such as when she started a new part or when she did not understand the tools or instructions,
- 2) when she had questions about or disagreements with the tools or instructions,
- 3) when she wanted to check what she had written to see if it was correct, and
- 4) when she had found an error and wanted to know how to correct it.

Most of Carol's tool use during observation session #1 was for the purpose of preventing and detecting errors. She used the tools 35 times to prevent errors by resolving problems, 20 times to attempt to detect errors, and 2 times to detect/correct errors.

Carol used the tools almost twice as often to prevent as to attempt to detect errors, as shown in Figure 67 below.

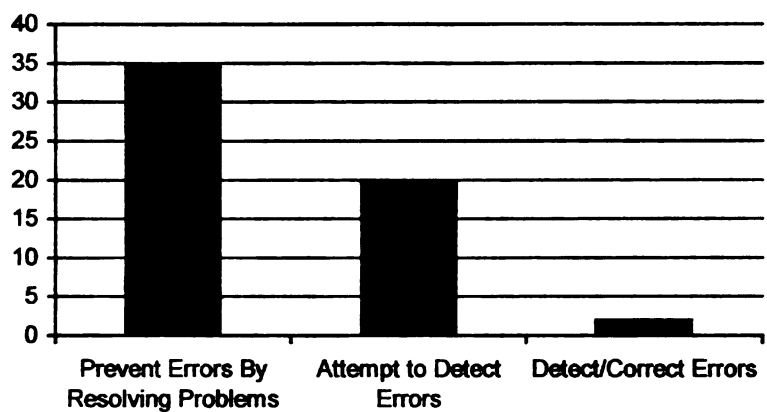


Figure 67: Carol's Frequency of Tool Use for Preventing, Attempting to Detect, and Detecting/Correcting Errors during Session #1

Carol used the tools in various ways to help her prevent, detect and correct errors. Table 26 below lists the tasks she used to accomplish these purposes.

Prevent Errors By Resolving Problems	Attempt To Detect Errors	Detect/Correct Errors
Announce Part – 4 Copy Wording - 2 Derive Rules – 4 Explain Example – 2 Guide Writing – 13 Identify Components - 2 Learn Extent – 2 Paraphrase Wording – 1 Use Tool - 2	Announce Part – 1 Derive Rules – 5 Explain Example – 1 Gauge Writing – 13 Identify Components - 1	Find Place - 1 Gauge Writing – 1

Table 26: Carol's Tool Use Tasks during Session #1

Carol's main task for preventing errors was to use the tools as a guide to what components to include in her writing and how to write them. Her main task for detecting and correcting errors was to use the tools to gauge her writing by seeing if she had included the required components and if she had written them correctly. She did the task of deriving knowledge almost the same number of times to prevent and to detect errors. The number of times she did the different tasks is shown in Figure 68 below.

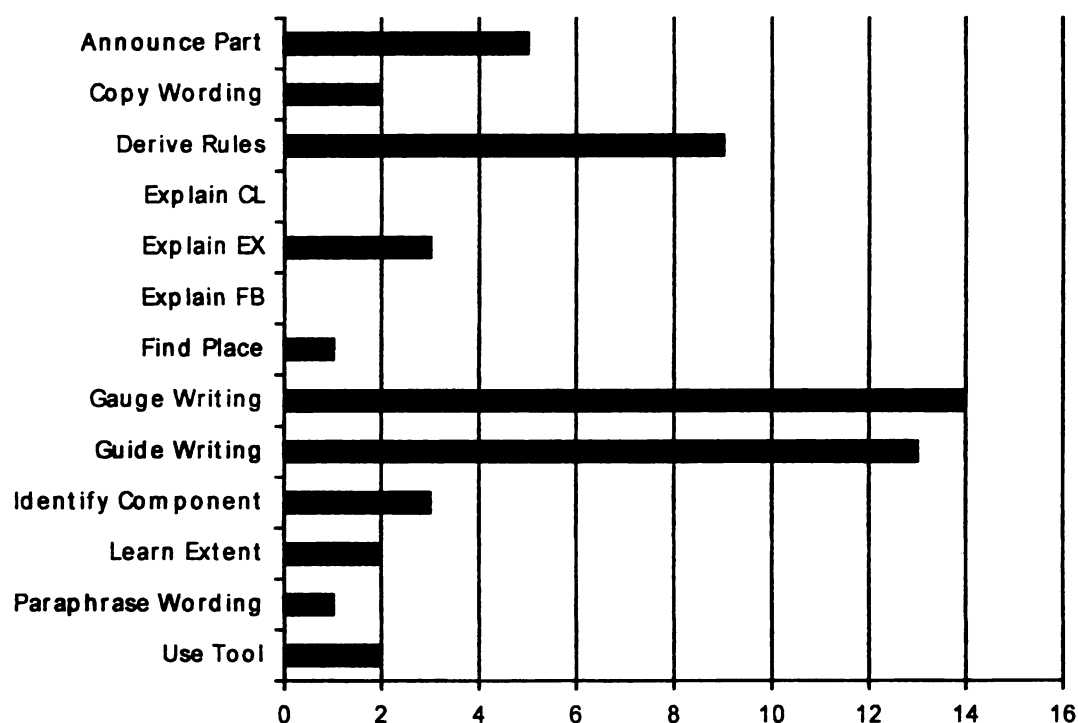


Figure 68: Carol's Frequency of Tasks during Session #1

Immediate Results of Tool Use

The immediate result of Carol's use of the tools was that she was able to prevent nine errors by resolving problems through use of the tools (the tool she used is indicated at the beginning of the list of problems below):

- Example: How unlike must practice and project be? (L1, 298-305)
- Example: How to divide course into units if they are prerequisites for other units? (problem is linearity of math) (L1, 168-187; 580-591)
- Example: How specific or general to write? (L1, 62-73)
- Example: How specific or general to write? (L1, 258-270)
- Example: How specific or general to write? (L1, 395-405)
- Example: How specific or general to write? (L1, 492-494)
- Example: How specific or general to write? (L1, 501-506)
- Confused about relationship between Preliminary and Assignment #1 Forms. (L1, 239-251)
- Example: Trouble identifying purpose in Example course goal. (L1, 409-415)

She also used the tools to detect and correct two of the three errors she made:

- Form (to detect) and Example (to correct): Started with part 3-course goal rather than drawing diagram. (L1, 45-46)
- Form (to detect) and Example (to correct): Thought Annotation on Example diagram was for course goal. (L1, 388-392)

The fourth error was detected and corrected later in class by other students when she showed them her diagram:

- Course goal and course terminal objective were final unit of her course. (L1, 511-539)

Characterization of Carol's Tool Use and Practice of Assignment

Although Carol used the tools extensively, she had nothing positive to say about them. The Example and the other examples in the course pack and in the lecture were too simple and therefore, she felt, not helpful to her. She also thought the tools were confusing because they had so much information in them: the Example with its Annotations and arrows, the Checklist with its numerous items, the Form with its headings and subheadings.

Carol's practice during session #1 was characterized by a balance between the certainty with which she wrote the course terminal objective, whose behavior statement requires a list of the skills from all her unit goals, and her uncertainty about how to divide her course goal into those units. She wrote her course terminal objective before she drew the diagram, meaning she had an idea of what the units would be before she drew the diagram. When it came time to actually divide the course into units, however, the division she had thought would work, did not.

OBSERVATION SESSION #2

Assignment: Write the course title, revise the course diagram, write the course goal, course terminal objective and unit goal.

Carol began session #2 by revising her diagram based on feedback from the instructor and from other students in the class. During the previous session she had had a problem with the final unit in her course being identical to the course goal. The other students told her to change the course goal to a higher skill, from "Graph linear systems of the form $Y=MX+B$ and find the point of intersection" to "Interpret graphs to make decisions." She also added "and interpret" to each unit goal in the diagram at the suggestion of the instructor so there would be at least six steps to each of the unit skills.

In session #1 Carol roughed out the first five parts of the assignment so she could take notes on what she needed to change when the instructor discussed them in class. She then revised them in session #2, thus all her tool use in session #2 was for the purpose of detection of errors.

Carol's major problem during session #2 was the same as in session #1: how specific to make the goals and objectives, i.e., how much detail to include. As in session #1 she used the Example extensively to show her how specific she needed to be. Another problem that concerned her was when she should include examples and what they should contain.

CHRONOLOGY OF TOOL USE

The actions Carol took while writing her assignment during session #2 are listed below. This list is followed by a summary and a model of the chronology.

REVISED PART 2 - COURSE DIAGRAM

“CG: Interpret graphs to make decisions.

UG: 1) Label a point on a graph and interpret; 2) Find rate of change (or slope; $Y=MX$) and interpret; 3) Graph lines of the form $Y=MX+B$ and interpret; 4) find point of intersection of two lines and interpret.”

- Received feedback from classmates that interpret was real world performance and higher skill than graph and find intersection.
- Changed course goal from “Graph linear systems and find point of intersection” to “interpret graphs to make decisions.”
- Changes practice unit from “Label a point on a graph” to former project unit, “Graph $y=mx+b$,” because it has more steps.
- Changes project unit to “Find point of intersection of two lines.”
- Adds “and interpret” to each unit because of instructor’s feedback, to add more steps.
- Decides to revise Assignment #1 Parts 1-5 according to instructor’s feedback.
- Looks for and finds Example.
- Looks for blank Form she started filling in during the previous observation session.
- Digresses on busy schedules, matriculation fees, coffee and picking up Emily Sleight.
- Gets out two blank Forms, one for practice and one for project.
- Reads Form for heading to Part 1 - title.

WRITES PART 1 - TITLE

“Algebra I”

- Writes Part 1 - Title.
- Decides to work on practice first.
- Reads Form for heading to Part 2 - course diagram.
- Decides to copy it later from Preliminary assignment.

REVISES PART 3 - COURSE GOAL

“As managers of financial resources in a business or family, the graduate will interpret graphs of linear systems to make decisions.”

- Reads Form for heading and subheadings to Part 3 - course goal.
- Reads roughed out former Part 3 course goal.
- Decides condition is all right, but behavior must be changed to reflect change in diagram course goal.
- Writes condition of course goal.
- Reads Checklist about behavior.
- Derives knowledge of how specific she needs to be (not very).
- Reads her course goal.
- Still wondering about real world performance, if students need to graph.
- States concrete example to clarify goal.
- Decides to keep graphing as goal.
- Decides to revise if feedback requires.
- Reads her course goal.
- Writes behavior.
- Wonders how specific she needs to be about kinds of graphs.
- Reads Checklist: “purpose and behavior.”
- Identifies purpose and behavior in her course goal.
- Tries to word behavior so a lay person will understand.
- States that she doesn’t have to give example in course goal, but later.
- Realizes later example will help her make a lay person understand.

- Reads Example behavior.
- Decides she does not have to give example or details.
- Writes purpose in behavior when purpose should go in condition.
- Reads her course goal and identifies behavior and purpose.
- States that course goal will be same for project.

REVISES PART 4 - COURSE TERMINAL OBJECTIVE

"Given two different but related situations involving rates, such as two job offers involving salary plus commission, the student will: 1) write the terms of the offers in the form $Y=MX+B$, 2) graph the two lines, 3) find and name the point of intersection, and 4) interpret the results by stating under what conditions the first scenario is the best and under what conditions the second is best."

- Reads Form to identify purpose of course terminal objective.
- Reads her roughed out course terminal objective.
- Reads Example course terminal objective.
- Reads Note: "All skills from all units."
- Decides her course terminal objective is specific enough.
- Reads her course terminal objective.
- Reads Example.
- Wonders if condition is too specific because she gave an example. (ERROR?)
- Considers that on real course final exam she would have more than one problem and they wouldn't all be job offers, so decides to generalize condition and give example.
- Reads Example.
- Recalls instructor giving students a format for writing objectives.
- Wonders if course terminal objective is where "such as" goes.
- Considers that Example course terminal objective is not following format. (Format is probably for unit terminal objectives.)
- Wonders if format is for course or unit terminal objective.
- Reads Example unit terminal objective.
- Realizes that unit terminal objective is more specific than course terminal objective because criteria is required.
- Wonders if course terminal objective requires criteria.
- Reads Form for subheadings in Part 4 - course terminal objective.
- Sees that criteria are optional.
- Reads Example.
- Thought from class that criteria were not optional, but thinks only unit terminal objective may require it.
- Decides what she has is all right and that she will expand on it.
- Compares her objective to Example.
- Reads Form for heading of Part 3 - course terminal objective.
- States that course terminal objective will be same for both practice and project.
- Reads Form subheading "Condition."
- Writes condition.
- Reads Example.
- Wonders how to word "givens."
- Writes condition and behavior.
- Wonders if she should explain what $Y=MX+B$ means.
- Decides to wait and add explanation if feedback requires.
- Writes behavior.
- Wonders how to word behavior so it is behavioral.
- Decides to add "by stating" to behavior.
- Reads Example.
- Wonders if she should keep example because Example does not have one.
- Wonders if she should mention a specific problem in objective if not all problems on final exam will be of that type.
- Decides to write more generally.
- Writes behavior.
- Digresses on computers.
- States that course terminal objective will be same for practice and project. (Reassurance?)

- Reads Example.
- Decides not to write criteria because it's optional and she's running out of space on the form.

REVISES PART 5 - UNIT GOAL - Practice

"As managers of financial resources in a business or a family, for situations involving a starting point and a rate of change (e.g., phone charges involving flat monthly fee and per minute rate), the graduate will express the situation as a linear equation in the form $Y=MX+B$, graph the equation, and interpret the graph to make decisions."

- States that Part 5 will be different for project and practice.
- Reads practice unit from her Preliminary Assignment.
- Considers what real world performance of unit goal is.
- Decides condition is same as course terminal objective.
- Writes condition and behavior.
- Reads Example.
- Wonders how realistic graphing the situation is.
- Realizes she will be stating realism later in assignment.
- Reads Note in behavior: "what grads will be able to do..."
- Confused about note that says behavior is "general description of unit final exam."
- See "final exam" and thinks course terminal objective. (Ignores "general" and "unit.")
- Wonders how specific she needs to be.
- Reads Example.
- Decides she needs to be more specific by stating what kinds of problems, as Example does.
- Reads Example.
- Reads Notes.
- Reads her unit goal.
- Reads Example.
- Writes condition.
- Compares her unit goal with Example.
- Wonders how specific she needs to be in terms of $Y=MX+B$.
- Writes condition.
- Decides to stop and wait for feedback.
- Gets out blank Form for project.
- Compares her unit goal with Example.
- Decides her unit goal is similar to Example.
- Notices that Example unit goal gives example in condition.
- Writes condition.

REVISES PART 5 - UNIT GOAL - Project

"As managers of financial resources in a business or family, who are comparing two different situations involving a starting point and a rate of change, for example, phone charges involving a flat monthly fee and a permanent rate, the graduate will express each situation in the form $Y=MX+B$, graph each of the equations, find the point of intersection and interpret the information to decide between the two alternatives."

- Reads her course diagram.
- Reads her Assignment #1 Parts 1-5.
- States that Parts 1-4 will be same for project as for practice.
- Decides to copy course goal and terminal behavior later.
- States that condition of project unit goal will be same as practice unit goal except will have two situations instead of one.
- Writes condition.
- Digresses on handwriting, plastic binders and *Calvin & Hobbes*.
- Reads her practice unit goal.
- Writes condition.
- Writes condition.
- Reads her project unit goal.
- Considers how best to word purpose.
- Writes condition.

- Decides to change wording in condition to be more mathematical and precise.
- Writes condition.
- Changes same wording in practice unit goal condition.
- Reads her unit goal condition.
- Writes behavior.
- Reads her unit goal.
- Wonders if behavior is observable enough.
- Writes observable behavior.
- Decides to change practice unit goal behavior to observable behavior.
- Realizes goals are more general and do not require observable behavior.
- Writes behavior.
- Wonders if she is too specific.
- Uses word “interpret” because feedback suggested it.
- Wonders if she needs to be more specific about “making decisions” in behavior.
- Reads Example.
- Decides to let instructor ask for more detail if he wants it.
- Writes condition.
- Reads her project unit goal.
- Again considers problem of real world performance in math.
- Uses concrete example to clarify her thinking.
- Checks practice unit goal to see if wording is same as in project unit goal.
- Decides she wants to create a unit she can use in classroom.
- Rewrites behavior in practice unit goal.
- Decides to explain what y, m and x are if instructor asks.
- Rewrites behavior in practice unit goal.

Carol spent session #2 revising parts 1 through 5 of the assignment that she had written in the previous session. She used the tools only minimally to prevent errors, and used them mostly to attempt to detect errors in the text she had already written. After orienting herself to the assignment, she used all the tools to look for errors in the entire part she was working on. Then she revised it and did not attempt to detect errors in it.

Model of Tool Use

Figure 69 below shows a model of Carol’s tool use. The abbreviations used in the model are:

FO = Form; EX = Example; CL = Checklist; AN = Annotations;
 explain = explanation; ex = additional example; CG = course goal;
 CTO = course terminal objective; UG = unit goal; → = prevent error;
 ← = detect/correct error; | = division between parts

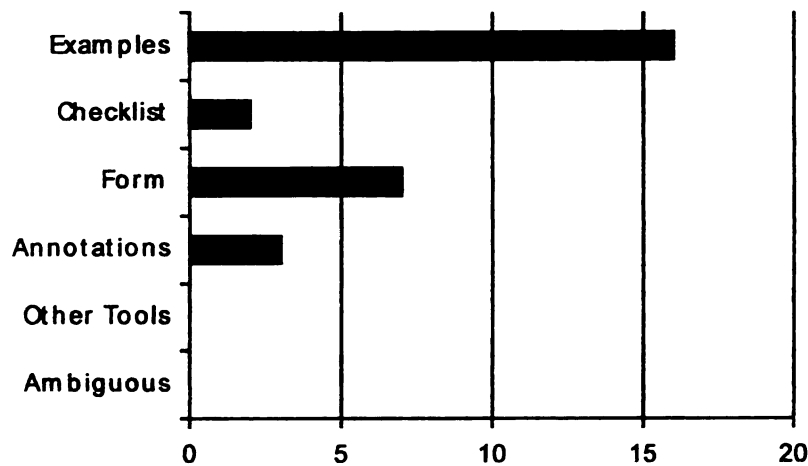


Figure 70: Carol's Frequency of Tool Use during Session #2

More than half of Carol's total tool use involved the Example. The tool she used second most frequently was the Form, which she used one-quarter of the time.

During session #2 Carol used the tools:

- 1) at the beginning of the assignment to find her place and to learn how to use the Form,
- 2) while she was revising to detect errors and to resolve problems and questions, and
- 3) after she finished writing to help her gauge the correctness of what she had written.

Carol consciously responded to the same four cues to use the tools that she had during session #1:

- 1) when she was uncertain what to write, such as when she started a new part or when she did not understand the tools or instructions,
- 2) when she had questions about or disagreements with the tools or instructions,
- 3) when she wanted to check what she had written to see if it was correct, and
- 4) when she had found an error and wanted to know how to correct it.

Most of Carol's tool use was for the purpose of attempting to detect errors. She used the tools 6 times to prevent errors by resolving problems before or while she wrote, 20 times to attempt to detect errors after she wrote, and two times to detect/correct errors. These numbers are shown in Figure 71 below.

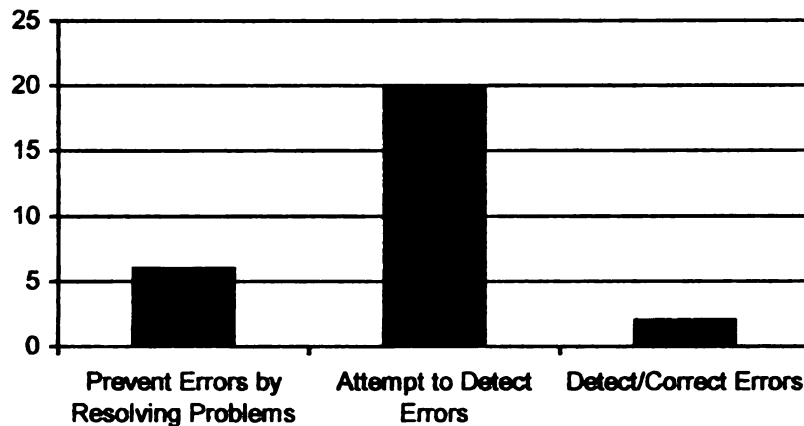


Figure 71: Carol's Frequency of Tool Use for Preventing, Attempting to Detect, and Detecting/Correcting Errors during Session #2

Carol wrote most of the assignment for session #2 during session #1, so she did not need to use the tools as often for prevention in session #2 as she had done in session #1. Carol used the tools in various ways to help her prevent, attempt to detect, and detect/correct errors. Table 27 below lists the tasks she did and how often she did them.

Prevent Errors By Resolving Problems	Attempt To Detect Errors	Detect/Correct Errors
Guide Writing - 6	Announce Part - 5 Explain Example - 3 Gauge Writing - 9 Paraphrase Wording - 1 Use Tool - 2	Derive Rules - 1 Gauge Writing - 1

Table 27: Carol's Tool Use Tasks during Session #2

Carol's only task for preventing errors was to use the tools to guide her writing. Her main task for attempting to detect errors was to use the Example to gauge the correctness of her writing. Figure 72 below shows how often Carol did the different tasks during session #2.

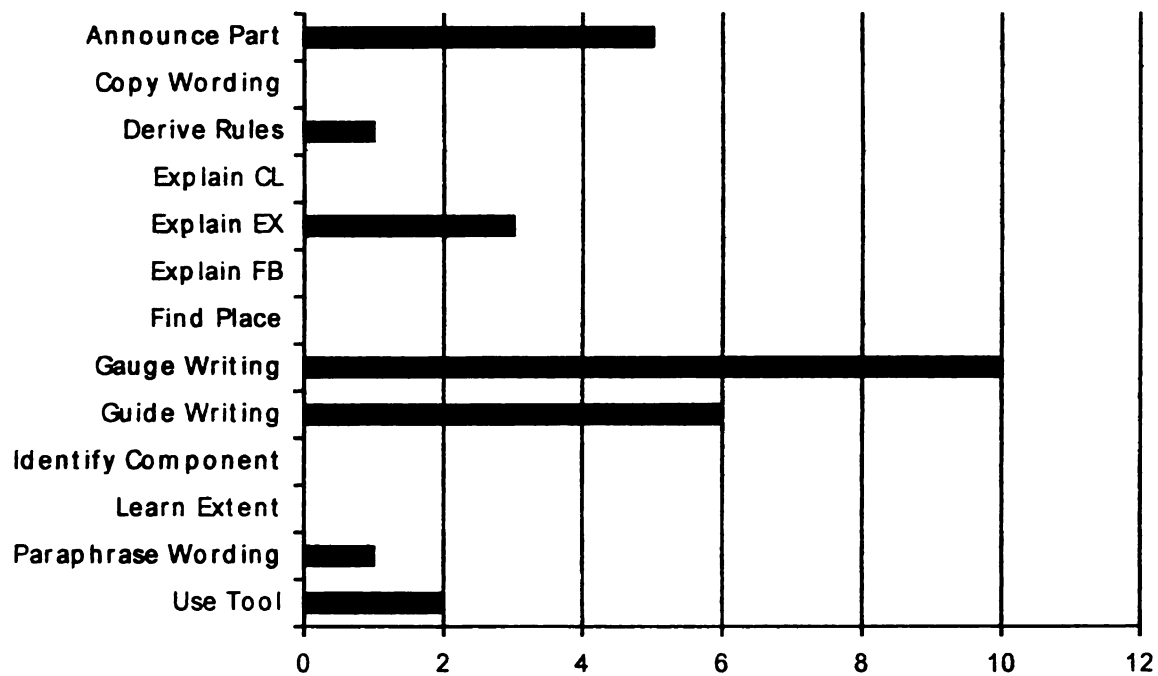


Figure 72: Carol's Frequency of Tasks during Session #2

Immediate Results of Tool Use

One immediate result of Carol's tool use was that she was able to prevent four errors by using the tools to resolve problems as she wrote. The tool she used is indicated at the beginning of each problem listed below.

- Example: Have to give example in course goal? (L2, 134-143)
- Checklist: How specific or general to write? (L2, 121-127)
- Example: How specific or general to write? (L2, 282-293)
- Example: Supposed to put "such as" in CTO? (L2, 165-167)

Another result was that she was able to use the tools to detect and correct two of the four errors she made:

- Example: Put example in course terminal objective. (L2, 161-167)
- Example: Made wording too specific in course goal. (L2, 211-222)

The third error was detected later by the instructor and corrected through his feedback:

- Put purpose after behavior. (Commits error: L2, 140-142; Learns of error: L3, 4-6)

The fourth error Carol detected and corrected by rereading her assignment:

- Made unit goal too specific, like unit terminal objective. (L2, 384-388)

Characterization of Carol's Tool Use and Practice of Assignment

Carol relied heavily on the tools to help her detect errors. Because she had come to rely so much on the tools, the two times she thought the tools were wrong she was annoyed. (One time she read the annotation for the unit goal, which says "general description of unit final exam," and thought it was wrong because she knew that the terminal objective described the final exam. What she missed was the word "general." The goal is a general description of the final exam, and the objective is a specific description.)

Carol's practice during session #2 was characterized by an attitude of efficiency and reliance on the instructor's feedback. Rather than "spinning her wheels" she decided to ask the instructor her questions, to wait for the instructor's feedback before revising, and to word her assignment as the instructor suggested in the feedback.

OBSERVATION SESSION #3

Revisions

Carol started session #3 by reading the instructor's feedback to parts 1 through 5 of her assignment (course title, diagram, course goal, course terminal objective and unit goal). Again in session #2 she had made the mistake of placing the purpose of the course goal after the behavior statement, as she had done in session #1. She misread some of the feedback, such as reading "ok, ok" as "in, or." For the most part, however, she received favorable feedback and did not need to make many revisions.

Part 6 – Unit Terminal Objective

After revising parts 1 through 5, Carol started writing part 6, the unit terminal objective. She started by looking at the Checklist to see what the first required component is. Then she looked at the Example to see how it worded the first component, which was "number of situations." The Example said, "Given 10 problem cases, in written form." This prompted Carol to think about how many problems she would give her students on the test. She decided five would be enough to assess if they had learned the concept she was testing.

She continued looking at the Checklist then the Example, then writing her own version of the component, but when she got to the last Checklist item for the condition statement of the objective, she did not understand it. It said, "Close representation of real conditions: time and place in unit goal." She then read the Example, but there was only an annotation that said, "Like conditions in unit goal." She reread the Checklist item again closely and finally understood that it meant the time and place in the objective should match that in the unit goal. The colon told her that what follows were details of what was stated before the colon.

She still did not understand what the annotation meant, however. She wondered if she had to repeat in the objective the time and place mentioned in the goal. She ignored it and continued with the rest of the objective, but later she understood it because of another

Checklist item/annotation combination written at the end of the behavior statement: “Close representation of real world performance” / “Writing out shows how the student solves the problem.” She realized that not every Checklist item needed a corresponding Example, that some of the items described qualities the writing should have.

While writing the criteria for the unit terminal objective, Carol tried to use the Checklist and Example as if they had a one-to-one correspondence, but she had trouble understanding them. First she read the Checklist: “So well that,” then the Example: “Not applicable here,” then the Checklist again: “Built-in checklist,” then the Example: “Follow the sense of the information given.” The tools were designed to support a complex, adaptive, open-ended cognitive task, that is, writing educational goals and objectives, thus they could not be used in a one-to-one correspondence like that. She reread the Checklist and the Example, then determined that the Checklist items “According to,” “So well that” and “Built-in checklist” were suggestions for types of criteria she could use, not requirements.

Strategies

She followed the strategies of wording her assignment as the instructor’s feedback suggested, of writing something even if she thought it might be wrong because she could always take it out later, of staying consistent with earlier parts of her assignment by referring back to them, and by looking for other examples in the course pack if the Example was not sufficient.

CHRONOLOGY OF TOOL USE

Shown below is a chronological list of the actions Carol took while writing her assignment. This list is followed by a summary and a model of the tool use.

REVISIONS

- Reads feedback to Parts 1-5.
- Thought purpose was supposed to be after behavior.
- Reads feedback asking if course goal contained all skills.
- Reads Checklist about all skills.
- Wonders what instructor means about all skills.
- Reads her course terminal objective.
- Reads feedback again.
- Interprets little diagram sign in feedback to mean does her course terminal objective have all the unit skills in her course diagram.
- Decides her objective does have all the unit skills.
- Reads feedback for practice unit goal (“OK” next to “real role” in Checklist with arrow to instance of role in goal).
- Reads unit goal.
- Decides instructor wants a real role.
- Reads unit goal again.
- Reads more feedback for unit goal: “Yes” next to Checklist item “Unit goal is one whole piece”.
- Decides “Yes” means instructor thinks her unit goal is one whole piece.
- Misreads feedback “ok, ok” next to Checklist item “real role & setting” as “or, in”.
- Misreads feedback in condition, “to make decisions about”, as “decisions about, to make”.
- Realizes her error and reads feedback correctly.
- Decides to revise assignment according to feedback.

- Thinks she will decipher feedback “in, or” when she revises unit goal.
- Reads unit goal again.
- Wonders if instructor wants her to move “in” in her condition “in a business” to earlier in condition.
- Researcher wonders if feedback says “ok.”
- Reads unit goal again and decides researcher is correct.
- Reads unit goal with revision “to make decisions about”.
- Reads additional feedback in behavior: “put above in conditions.”
- Decides it means instructor wants her to put purpose “to make decisions” into conditions instead of behavior.
- Gets out two copies of blank Form.
- Decides to revise and type practice during observation session and project later.
- Types revisions of Parts 1-4.

REVISES PART 5 - UNIT GOAL - Practice

“As managers of financial resources in a business or a family, in order to make decisions about situations involving a starting point and a rate of change (e.g., phone charges involving flat monthly fee and per minute rate), the graduate will express the situation as a linear equation in the form $Y=MX+B$, graph the equation, and interpret the graph.”

- Types revision of Part 5 - unit goal.
- Reads feedback for behavior: “yes” next to Checklist item “unit goal is one whole piece of real world course” and “one whole piece is circled”.
- Decides feedback means behavior is all right.
- Wonders how realistic unit goal behavior is.
- Researcher explains what “one whole piece” means.
- States that feedback didn’t concern realism.
- Finishes revising unit goal behavior.

WRITES PART 6 - UNIT TERMINAL OBJECTIVE

“Given five problem cases in written form that involve an initial cost or starting point and a constant rate of change such as:

‘The rental car costs \$30.00 per day plus \$0.10 a mile. Express this as a linear equation of the form $Y=MX+B$. Graph the equation that shows the possible costs for one day. Find and label the point on the graph that shows how much it would cost to rent the car for one day if you drive 500 miles.’

Without calculators, but using graph paper, the student will:

- 1) *write the terms of the situation in the form $Y=MX+B$*
- 2) *graph the line*
- 3) *find and label a point on the graph which corresponds to a given value of x (such as 500 miles) by darkening the point and writing the coordinates next to it*
- 4) *explain in writing what the coordinates mean.*

The work shown must fit the following criteria:

1. *In the equation $Y=MX+B$, Y is the total cost or amount, m is the rate of change, B is the initial cost or amount and X is the variable that determines the total (such as miles, minutes, sales)*
2. *The graph will show the correct Y -intercept (B) and the correct slope (M).*
3. *The point that is darkened will be the correct point and will be correctly labeled.*
4. *The explanation of what the coordinates mean is correct. (e.g., “The cost to rent a car for one day when you drive 500 miles is \$80.00”)*

Three of the five problems completely correct, with no errors will be passing.”

UNIT TERMINAL OBJECTIVE CONDITION

- Reads Form
- Decides to do practice first and project if there is time during observation session.
- Reads Checklist: “# situations or cases”.
- Reads Example condition.
- Copies “Given” from Example.
- Decides not to copy number of situations from Example (10) but to give 5 because 10 too many for students.

- Types condition.
- Thinks Example is not specific about what is given.
- Reads Checklist and realizes unit terminal objective is specific because it contains “such as.”
- Reads Checklist : “complete description of givens.”
- Types condition.
- Thinks unit terminal objective is not where she tells students they cannot use calculators.
- Reads Example.
- Reads Checklist: “complete description of givens”.
- Reads Note: “problems of what kind”.
- Wonders how specific givens should be, such as giving them graph paper and calculators.
- Decides they would not need calculators.
- Reads her condition.
- Reads farther in Example.
- Reads Form: “criteria”.
- Decides to put specific givens and not givens in condition because she doesn’t know where else it would go.
- Decides she can cross it out later if she is wrong.
- Thinks Example doesn’t mention calculators because unit is for elementary students.
- States her condition so far.
- Adds “graph paper but without calculators” to conditions.
- Thinks wording is awkward because “that involve” that comes after “calculators” relates to condition.
- ERROR - Thinks she is not writing condition, but she is.
- Reads Checklist: “close representation of real conditions: time and place in unit goal.”
- Wonders what “place in unit goal” means.
- Decides to leave “graph paper but without calculators” in condition.
- Reads her condition.
- Reads Example and sees condition contains example,
- Confused because thinks Checklist on Form and Example do not match.
- Discovers they do match, but Note obscures part of Checklist.
- Again compares Checklist on Form and Example.
- Checks condition against Checklist and sees she has completed that part.
- Reads Checklist: “such as”.
- Reads Example.
- Types example of givens.
- Reads Example.
- Types example of givens.
- ERROR - Thinks that “such as” in condition of unit terminal objective requires observable behavior, but behavior does, not example of givens.
- Revises example of givens to contain observable behavior.
- Reads Example and realizes her error.
- Revises example of givens.
- Wonders how to word behavior so it is consistent with course diagram.
- Refers back to diagram to stay consistent.
- Types example of givens.
- Worries about using example that contains two kinds of rates.
- Restrains example of givens so one rate.
- Reads Checklist: “close representation of real conditions.”
- Wonders what conditions and where.
- Reads Note: “Like conditions in unit goal; as real as possible; similar to times, places, purposes, roles intended.”
- Thinks Note is not helpful, so looks for another example.
- Knows what to write, but not how.
- Says she gets hung upon grammar.
- Reads Checklist on blank Form: “such as; describes test situations.”
- Reads Checklist on blank Form: “close representation of real conditions: time and place in unit goal.”
- Doesn’t understand meaning of checklist item.
- Reads Checklist on Form again.
- Suddenly understands because of the word “close” and the colon before “time and place in unit goal.” *(Also perhaps because no note to confuse and annoy her, as in CL on Example.)*

- Wonders if instructor wants her to write out conditions from unit goal in terminal objective.
- Reads Example unit goal and terminal objective.
- Notices that Example unit terminal objective does not have unit goal conditions stated after example of givens, where checklist item is.
- Decides to put just “without calculators but using graph paper.”
- Finishes typing condition.

UNIT TERMINAL OBJECTIVE BEHAVIOR

- Reads subheading “terminal behaviors” on Form.
- Interprets subheading to mean that is where she will put what students will do.
- Reads Example: “The student will.” (Although it says “learner”)
- Reads Checklist and realizes she must use action verbs with objects.
- Reads Checklist to check her work to see if she has used action verbs with objects and says all right.
- Starts typing behavior.
- Reads Example.
- Wonders how specific to be about behavior #1: writing the formula, because Example behavior is not specific.
- Decides to be general.
- Types behavior #1.
- Wonders how specific to be about behavior #2: how to write graph.
- Reads previous parts of her assignment.
- Decides to be general.
- Types behavior #2.
- Reads previous parts of her assignment.
- Wonders how to word behavior #3: find and label a point.
- Decides to say “label.”
- Types behavior #3.
- Decides to make it more observable by saying how to label point.
- Finishes typing behavior #3.
- Wonders how to word behavior #4: interpret.
- Reads behavior #3.
- Decides to make interpret more observable by saying “explain in writing”.
- Types behavior #4.
- Reads Checklist and checks each behavior to see if each has an action verb and object.
- Reads Checklist: “close representation of real world performance.”
- Reads Note: “Writing out shows how student solves problem”
- Suddenly understands that she doesn’t need to provide writing for each checklist item because example has just notes next to some items. (L3, 40:31)
- Thinks she is done with practice unit terminal objective because Example Part 6 - unit terminal objective looks like it ends there .
- Researcher tells her she is not done.
- Looks at her objective and says she has the behaviors. (She thinks the objective ends with behavior because the other parts have ended with that.)
- Looks at page 77 of Example and is dismayed.

UNIT TERMINAL OBJECTIVE CRITERIA

- Reads subheading “Criteria” on Form and groans.
- Digresses on work schedule.
- Reads Example criteria.
- Identifies part as criteria.
- Reads Checklist: “So well that.”
- Reads Note: “Not applicable here. Built-in checklist. Follow sense of information given.”
- Doesn’t understand what “Follow sense of information given” means.
- Reads Checklist.
- Thinks items are suggestions, that she does not have to use all of them, but only the ones that are applicable.
- Decides to use “built-in checklist.”
- Reads her unit terminal objective.
- Types criterion #1: equation.

- Wonders how much detail to give.
- Says her topic is a lot more detailed than division.
- Reads Example criteria #2.
- Wonders what a T.D. is. [task description, which she has not learned yet]
- Researcher tells her what T.D. means.
- Reads her criteria so far.
- Decides to put all criteria about writing equation as criterion #1.
- Types criterion #2: graph.
- Types criterion #3: label point.
- Reads her criterion #4.
- Types criterion #4: interpret.
- Says it would be easier to show example of criteria than have to write it.
- Types criterion #4: interpret.
- Decides to correct grammar later.
- Reads Example.
- Checks her criteria against Example and decides there is no alternative to checklist for her topic.

UNIT TERMINAL OBJECTIVE LOWER LIMITS

- Reads subheading for lower limits in Form and announces part.
- Reads Example lower limits.
- ERROR - Decides what lower limits are for her unit, including quality.
- Paraphrases Example.
- Types lower limits.
- Reads subheading for quality in Form and announces part.
- Realizes number of repetitions and quality (the 2 parts of lower limits) are to be separated.
- Reads Example.
- States number of repetitions goes in one place and quality goes in another.
- Reads Form.
- Decides to use "are" instead of "must be".
- Finishes typing lower limits.

Summary of Tool Use

Carol was methodical about using the Checklist. She would read a Checklist item, then read the corresponding part of the Example, and finally write that part of the assignment. This worked as long as the Checklist item was telling her what component was required, but when it told her how rather than what to write, she got confused. Carol used the tools more often in combinations, such as Form, Checklist, Example and Annotation: The Form to learn the purpose of what she was going to write, the Checklist to learn specifically what components she had to write, the Example to see how it worded the component, and the Annotations to learn more about the Example of the component. She used the tools extensively for preventing errors by resolving problems before and while writing, and minimally for attempting to detect errors after writing.

Model of Tool Use

A model of Carol's tool use for session #3 is shown in Figure 73 below.

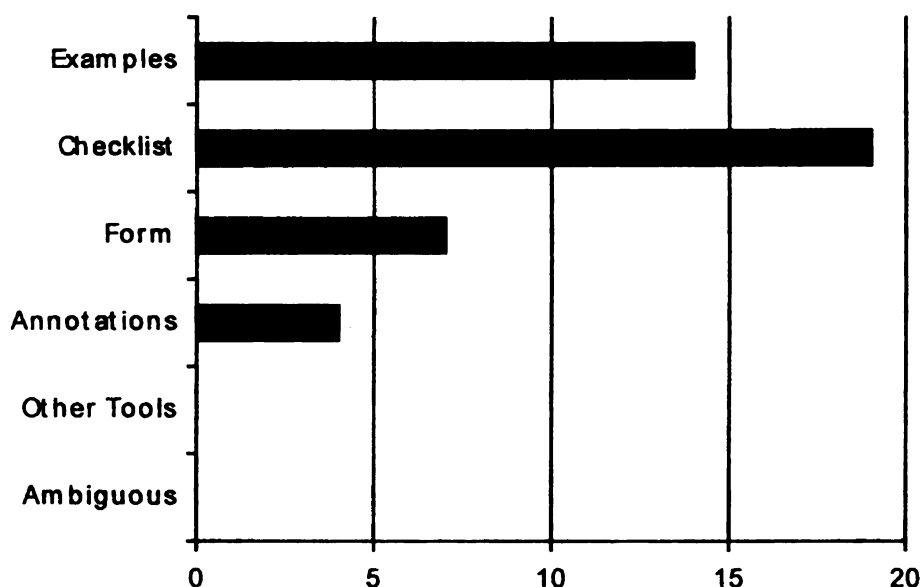


Figure 74: Carol's Frequency of Tool Use during Session #3

Almost half of Carol's total tool use during session #3 involved the Checklist. She used the Example a third of the time. When she started a new part she would first read the heading in the Form to take note of its name and purpose, such as "Course Goal, real world performance." Then she would often read the Example to learn what components were required and how they should be written, or to see how the components might be worded. Throughout the use of these tools she would read the Checklist to see what she was to write. Finally she would write a component.

She used the tools at the beginning of the session to help her understand the instructor's feedback. Before writing each new component she used the tools to determine what components to include and how to write them. As questions and problems arose she used the tools to answer them. After she was writing she used the tools to help her gauge if what she had written was correct.

Carol consciously perceived cues to use the tools when:

- 1) she was uncertain what to write, such as when she started a new part or when she did not understand the tools or instructions;
- 2) when she had questions about or disagreements with the tools or instructions;
- 3) when she wanted to check what she had written to see if it was correct;
- 4) when she had found an error and wanted to know how to correct it; and
- 5) when she wanted to understand the instructor's feedback.

Carol used the tools mostly to help her prevent errors when she wrote by resolving problems, as shown in Figure 75 below. She also used the tools to help her attempt to detect errors.

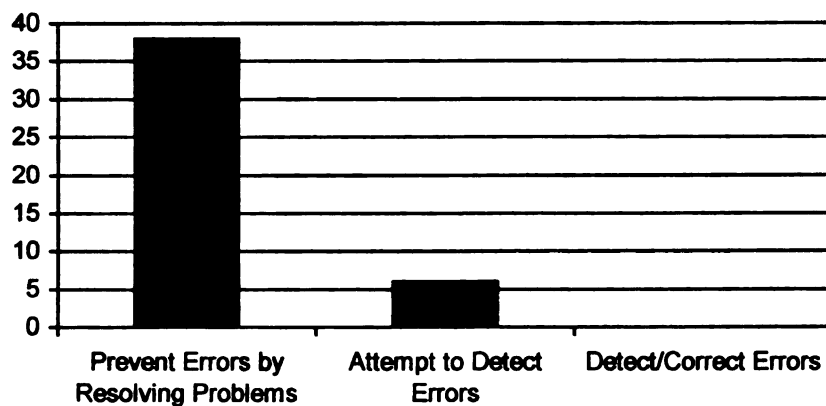


Figure 75: Carol's Frequency of Tool Use for Preventing, Attempting to Detect, and Detecting/Correcting Errors during Session #3

Carol used the tools in various ways to help her prevent and attempt to detect errors. These tasks and the frequency with which she did them are shown in Table 28 below.

PREVENT ERRORS BY RESOLVING PROBLEMS	ATTEMPT TO DETECT ERRORS	DETECT/CORRECT ERRORS
Announce Part – 5 Derive Rules – 1 Explain Checklist – 4 Guide Writing – 22 Identify Components - 1 Learn Extent – 1 Paraphrase Wording – 2 Use Tool - 2	Explain Feedback – 3 Gauge Writing - 3	

Table 28: Carol's Tool Use Tasks during Session #3

Carol used ten tasks to prevent errors. Her main task for preventing errors was to use the tools to guide her writing. She did two tasks equally for attempting to detect errors: explain the feedback and gauge the correctness of her writing. Figure 76 below shows how often she did these tasks.

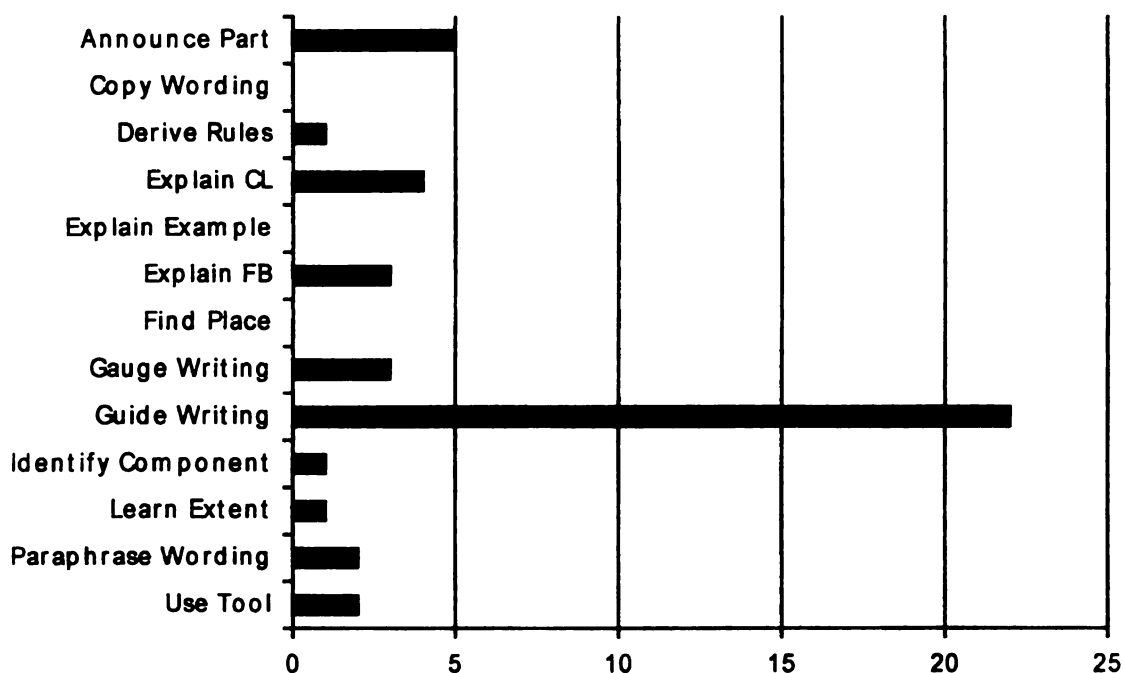


Figure 76: Carol's Frequency of Tasks during Session #3

Immediate Result of Tool Use

One immediate result of Carol's tool use was that she was able to prevent three errors by resolving problems while writing. The tool used is indicated at the beginning of each problem listed below:

- Checklist: Does not understand Checklist: "so well that...info. given." (L3, 361-369)
- Checklist: Does not understand Checklist: "close rep. of real cond." (L3, 234-243)
- Annotation: Need to repeat unit goal conditions in unit terminal objective? (L3, 239-325)

Characterization of Carol's Tool Use and Practice of Assignment

During session #3 Carol's use of the tools was characterized by her proficiency with them. She relied on the tools and used them more frequently than in the previous two sessions, and expected them to help her do the assignment. When the tools failed her she complained, but most of the time she used them with facility to help her write the assignment. She used the tools mostly before writing to prevent errors.

During session #3 Carol's practice was characterized by confidence. By this time she knew what the instructor expected, how the assignment was set up, how to use the tools, and what she wanted to say. Rather than determine what to do and how to do it, all she had to do during session #3 was decide how to word her assignment.

CAROL'S VIDEO TRANSCRIPT

Observation Session #1

3 R: Okay, so this is observation #1 with Carol. Now, what have you gotten out here to look at?
4 C: Okay, first thing I'm doing is checking out the sample format on pages 74 and 75 for
5 Assignment #1. Because what I've decided to do is, I'm not just going to do the bubble
6 diagram. I'm going to do the whole things, or at least rough out the whole first assignment,
7 which is the first five steps [PARTS 1-5]. And so I'm going to rough that out and I'll do the
8 bubble diagram and have it ready to hand in Monday.
9
10 C: So, I've been thinking about [PAUSES] the first thing I did was, I thought about "What do I
11 want to teach?" and I teach algebra, and [PAUSES]
12 R: High school?
13 C: High school algebra, first year. One of the things that's always a problem is teaching them
14 how to graph a straight line. So I thought about that being, that was the first idea, graphing a
15 straight line. And then I thought, what real world performance is related to graphing a straight
16 line? I thought about when would you ever use this? I thought, well, if you were comparing
17 two phone companies, for example, and comparing their rates. If you could graph a straight
18 line you could make a graph and show where they intercepted and it would help you to make
19 a decision about which company to deal with.
20
21 C: Another example would be, if you were trying to decide whether to take a job—salary plus
22 commission or straight salary—you could make a graph and see when one job would be
23 better, when would the other job be better. It still wouldn't tell you what to do, but it would
24 help you to evaluate it. So then, [READS BLANK FORM] what I thought about is how to word
25 the real world objective.
26
27 *COURSE GOAL
28 So we've got to have [READS MODEL CHECKLIST]: "the role, the setting, the behavior and
29 the purpose." Or the purpose and behavior, whatever.
30
31 C: [READS MODEL] So the role would be, possibly, [WRITES]: "As a manager of a business
32 or of a family's finances. The setting would be a business or a family. And the behavior would
33 be [PAUSES] Here's where I'm not real sure how specific this has to be. But right now I'm just
34 going to put it down and just do it, so I'll know what it is. [PAUSES] So the behavior would be
35 [READS NOTEBOOK]: "Evaluate or compare to situations," which could be—let's see, how to
36 word this is a problem—which could be represented by a line, by straight line graphs.
37
38 C: [READS PRACTICE]: "Compare two situations represented by straight line graphs to make
39 a decision." Okay, I'm probably going to have to get more specific and give some examples,
40 but for now I'll know what that means. I'll move on. The purpose, actually the behavior and
41 purpose are kind of related. Hm. Well, probably evaluating and comparing would be the
42 behavior, but making a decision would be the purpose. [WRITES]: "Making a decision based
43 on [PAUSES] the results," I guess.
44 C: So that's the goal. The graduate, "As a manager of business or family finances will"
45 [UNINTELLIGIBLE]. [READS FORM] Now we've got to have the diagram. Wait a minute. [READS
46 EXAMPLE] Oh, okay, I started
47 with number 3 [COURSE GOAL]. [READS BLANK FORM]: "The course goal is the real world
48 performance. The course terminal objective is the course final exam." Student—given—
49 something [UNINTELLIGIBLE].
50 R: So now what are you writing down here, the course terminal objective? And this is
51 [PAUSES]
52 C: Um hm. The real world performance goal.
53 R: The course goal?
54 C: Course goal. Okay, the only thing I'm wondering is, if I've got this too broad. If I do, I can
55 always go back and maybe make it less broad.
56
57 *COURSE TERMINAL OBJECTIVE
58 So the course terminal objective would be [WRITES]: "Given, uh, two sets of information, for
example, starting salary plus commission for job A and job B, uh, graph [UNINTELLIGIBLE]"

59 information and tell under what conditions job A is more than job B, and under what
60 conditions job B pays more."
61
62 C: Okay, so, "Given two sets of information [UNINTELLIGIBLE] the student will." [PAUSES]
63 Okay. Now, [READS EXAMPLE]: "Given a written description." [PAUSES] I'm not sure this is specific
64 enough, but this tells me what I want to do, so I can go back and make it more specific when
65 I finish writing it up.
66 R: Okay. What were you looking at?
67 C: I'm looking at this, um, they're describing the behaviors very specifically. "Students will:
68 one, write out all the steps; two, write out the solutions. So I'm probably going to have to be
69 more specific about what the students will do. Instead of just saying "the students will graph
70 the information," I would probably have to say, "The students will graph the line that
71 represents job A; the students will graph the line that represents job B; they'll find the point of
72 intersection; then they'll interpret what, you know, which one is better, based on the point of
73 intersection."
74
75 C: The only thing that I'm a little leery about is that this is a really ambitious goal, and my only
76 question is, is to whether I should have this be my goal and whether I should have the goal
77 be just graphing one line, as opposed to graphing two lines and comparing. But what I'm
78 thinking is, I'll, because what I'm going to do as my unit goal is just to graph one line, so this
79 is my real world goal, but part of that is, they've got to be able to graph one line, and that's
80 going to be my unit goal. But I was thinking about making this my practice. You know, you've
81 got the practice and the project.
82
83 R: The interpretation, or the [PAUSES]
84 C: Well, because I was thinking when I divide this up into units, okay, the terminal objective,
85 and in math we would call this graphing a system of lines. Okay. So if that's a linear system
86 [WRITES]: "Graph a linear system." So if that's the terminal objective, and then interpreting
87 them. But in order to get to that, you first have to, there're a lot of things you've got to do, like
88 you might have a unit on just graphing $Y=KS$, okay. Then you might have another unit
89 graphed $Y=MX+B$. Then you might have another unit, graph, you know, two lines, like
90 $Y=MX+B$, two different ones, and that's the one that would relate to this.
91
92 R: Would these take different steps? Or just different numbers?
93 C: You'd have to do the same thing you did here, but you'd have to do it for two lines. But
94 then there would be a further step here, and that would be finding the point of intersection
95 and interpreting it. So it would be a little more complicated than this. That's why I'm thinking I
96 could just do this as my course goal. But I'm thinking I might wait to see what his feedback is.
97 R: Well, that's why he's having you do this, because you know more about this topic than he
98 does, and how many steps there might be. And it does matter, then, what level you put your
99 course goal at.
100
101 C: So, I was thinking that what I would do is make this my project, the graphing, just the
102 $Y=MX+B$, and possibly this the practice. Or I might make this the practice, but I don't know.
103 It's just not as simple as the ones they gave in class. The ones they gave in class were like
104 [PAUSES]
105 R: Obvious, right?
106 C: Because I could, you know. [PAUSES] The only thing is, the reason I thought about doing
107 this is because this has more applications in the real world, because there's not too many
108 times in the real world where you're going to just say, "Gee, I'm making \$6.00 an hour. I think
109 I'll make a graph so I can see how much I'll make after ten hours." You're probably not going
110 to graph it. You're just going to multiply it out and see what it is.
111
112 C: And you might not graph it if you had two situations, either, but the graphing helps to see
113 what's really happening here. If this is your first line and this is your second line, at this point,
114 you know, if this is job A and this is job B, this is the point where you make less on job A.
115 Over here you're making more on job A, so it's like, if you think you're going to go past this
116 point here in terms of sales, then you want to get job B, but if you're not going to go past it,
117 then you want to get job A. So that would be something I think is pretty useful. Anyway.
118
119 R: I can see you've given a lot of thought to this.
120 C: I've given a lot of thought to this, and I've thought about the division example, and I

121 thought, "Geez, you don't do a whole unit on division with no remainder, then a whole unit on
 122 division with a remainder." I mean, you do a lesson on division, then you do a lesson on this,
 123 then you do a lesson on that. I mean, unless they're really, really slow, that would be like a
 124 one-day lesson.

125 R: Right, but also, I think his definition of "unit" might not be the same as yours.

126 C: Yeah, that's what I was thinking. That's why, I mean, I could do this, but I just don't know if
 127 I could justify it in the real world in terms of you've got to be able to graph this.

128

129 R: That's the same problem Peggy had.

130 C: And I also kind of have a problem with this "real world" thing. Even though I basically agree
 131 that most of what we teach should have a real world objective, but yet if everything had a real
 132 world objective, there's tons of valuable stuff that we would never teach. And like in math, I
 133 showed my kids a film one time where mathematicians would play with numbers, and a lot of
 134 times they find things that have no practical application, but they just play with the numbers.

135 Years [PAUSES] generations later, they have an application for it. And I'm thinking, if we
 136 always make the real world performance our only criteria [PAUSES]

137 R: Yeah, but what if the real world performance is to play with numbers?

138 C: But in the real world people don't play with numbers unless they're mathematicians.

139 R: Yeah, but those are real people.

140 C: Well, that's true, but you can't justify that to high school kids. "Now in the real world, you're
 141 going to play with numbers because you're going to be a mathematician."

142 R: You probably wouldn't have to justify it to those kinds of people, right?

143

144 *UNIT GOAL

145 C: Okay, so, our [READS BLANK FORM]: "unit goal, real world performance.
 146 [UNINTELLIGIBLE] [READS NOTE]: "What the graduate." Oh, I think I have a problem with this.
 147 [READS NOTE]: "General description of unit final exam." Well, this'll be my unit goal right
 148 here—graphing this. [UNINTELLIGIBLE]

149

150 *COURSE DIAGRAM

151 C: [READS NOTE]: "Whole course goal." Let's see if I can get this thing roughed out. My whole
 152 course goal. We'll see if I can get it all on that little thing [FORM].

153 R: Where are you? Right here?

154 C: [WRITES]: "Graph linear systems of the form $Y=MX+B$ involving two lines and interpret."
 155 [READS NOTE]: "Major unit goal." Okay. Then that's the whole course goal. I just don't know. Now I
 156 need the unit goals. Okay, first of all, I'm not even sure how many units to make because I
 157 could do a unit on just graphing ordered pairs. The kids don't even know that. And then I
 158 could do a unit on, I don't know if I should, I could do one finding the rate of change, which
 159 would be slope. Or I could, I could subdivide these, that might even be better. That would be
 160 better. So I could have another little thing here. [WRITES]: "Graphing lines in the form of
 161 $Y=KS$," and in order to do that you have to be able to graph ordered pairs, and you have to
 162 be able to find the rate of change. And then I could have one, graphing $Y=MX+B$, and then I
 163 could have one: "linear systems."

164

165 So that's really the unit goal, unit to be developed. Somehow, when I was thinking of this in
 166 my mind, it was so much easier!

167 R: It always is.

168 C: Okay. Um. The problem is in math, it's more like a linear progression: one step, one step,
 169 two step, three, rather than spreading out, that you can subdivide. That's why I'm having a
 170 problem with it. Um. [PAUSES]

171 R: Well, if this will help, and this is what I told Peggy, there is such a thing as prerequisites,
 172 that you can keep in mind. You don't have to teach them everything.

173 C: That's true. I could assume they already, but they don't. I've got to be realistic. They
 174 should, most of them [PAUSES]

175 R: You were teaching this lesson, or whatever, at the end of these.

176 C: Well, if I was teaching this lesson, if that was my goal, then I probably wouldn't worry about
 177 this. I just worry about, first you've got to be able to graph this kind of a line, then you've got
 178 to be able to graph this kind of a line, then you've got to be able to graph [PAUSES]

179

180 R: So this would be a linear thing?

181 C: Probably. But, I mean, they've got here [READS EXAMPLE], on the division thing, you would teach
 the

182 short division without remainder first, because that's the easiest. Then you teach the short
183 division with remainder second, so this would really be a linear progression here too, because
184 this is the easiest to the more difficult. So I guess I could [PAUSES] because here, you're not
185 really learning, you've already learned the graphing. What you're really doing here is
186 interpreting it. So that's the real main difference, interpreting [WRITES]: "Interpret graphs to
187 make decisions." Okay, so let's see [PAUSES] I took all these notes [PAUSES] Okay.
188 [READS HER NOTES]
189
190 R: So what did you find from your notes?
191 C: Not really much of anything.
192 R: No? [LAUGHS]
193 C: All right [PAUSES] Okay, what I'm doing now is, first of all, I'm looking ahead to the rest of
194 this [EXAMPLE] to see what else I have to do for Assignment #1 to make sure this all
195 fits in. I think I can give a justification, so I think I'm okay there. I think I can judge the realism
196 of the behaviors. Okay, so this is a assignment one, the format. So I need, I think what I'm
197 going to do is, first of all, I think I'm going to do this in pencil. Let me grab a pencil.
198
199 R: You're going to fill out your Assignment #1 right now?
200 C: I'm going to, maybe, well. [PAUSES] Because this. We have lots of forms, right? He said
201 there are extra forms. This is just going to be a rough draft. So I think I'm just going to use
202 this [BLANK FORM ON 78]. The thing that I find confusing about this is, he's got the same
203 information in two or three different places, and I never know which place to go for the best
204 source of the information, because there's the Overview, and then there's this thing here
205 [PAUSES]
206 R: What's that?
207 C: [READS]: "The Relation of Course and Unit Objectives and Content." I could fill that out. It
208 looks to me like that's just to help me organize my thoughts. That isn't something I'm going to
209 hand in. So... And then here's some examples of course goal, unit goal, unit goal. This is just
210 different examples. And then I was kind of hoping, if I could get the overview of the whole
211 assignment, and I know there's one in here somewhere, the whole of Assignment
212 #1[PAUSES]
213
214 R: You mean an explanation or example, or what?
215 C: Not the whole of Assignment #1, the whole of Project 1, which Assignment #1 is just the
216 first part, so [READS COURSE PACK TABLE OF CONTENTS-20]: "course overview, projects
217 and tests, page 50. Projects. Planning a unit of instruction. Planning and conducting an
218 evaluation of instruction."
219 R: That's that FEI thing. The formative evaluation.
220 C: Oh, okay. I already had something different. Let's see. [PAUSES] Where the whole outline
221 is for that project is, because this is just part 1, this is just Assignment #1, so now I'm going to
222 see if I can find out where Assignment #2 is. I suppose if I look in the back [PAUSES] I'm
223 looking to see what all the assignments are, so I sort of have an idea [PAUSES]
224 R: And this is page what? Seventeen?
225 C: 710 [BLANK FORM FORM ASSIGNMENT #2]. I just don't want to get too far into this and then find
226 out, gee, that's not going to
227 work with the second assignment. Okay, so here's number 1. We basically went over all that.
228 Here's number 2, task description. Okay. That doesn't look like that's going to be a problem.
229
229 C: Then, that's number 2 and that's number 3. Okay. [READS PAGE 721-BLANK FORM FOR
230 ASSIGNMENT #3]: "Skills, decisions,
231 rules, principles, facts, concepts." Number 4. So I think this'll work with all the assignments.
232 Now I've got to go. Oh, here you go. [READS 63]: "Assignment Overview. Consider all four
233 assignments when choosing skills for Assignment #1. Choose two skills." Okay. "For the same
234 two skills, describe each step and decision a competent performer will take when doing the
235 task." That could be another problem because there are different ways of doing this. So I
236 don't know if I need to describe both ways or just one way. I usually teach them two ways.
237 *COURSE DIAGRAM
238 So what I'm going to do now is go back and look at that example one more time and try to do this
239 diagram.
240
241 R: Okay. And this is the blank form, is it?

240 C: That's the blank form. So.

241 R: This is the blank form for all of Assignment #1, right?

242 C: For all of Assignment #1. [READS]: "Preliminary Choice of Course and Unit Goals for Assignment #1."

243

244 R: Is this the blank form for the preliminary [PAUSES]?

245 C: See, this is what's confusing, you know. This is confusing. So I don't do this

246 [ASSIGNMENT #1? First? I do this first?

247 R: I think you do the preliminary first. What does your calendar show? I think it's page 55.

248 C: There's too much information in here and it's not in chronological order.

249 [UNINTELLIGIBLE] Okay. [READS]: "Preliminary Goal Choice Assignment" is due on the

250 14th. Now why was it that, for some reason, I thought only the bubble diagram [PAUSES]

251 Oh, the bubble diagram is the thing. So this is the bubble diagram.

252

253 R: Yeah.

254 C: Okay.

255 R: They're starting you out easy.

455 C: Oh, I see. And this is how he's going to judge it. [READS PRELIMINARY CHECKLIST]: "Parts about skill.

257 Each unit has a skill after the course. Each entry has a verb and object." All right. Let's see.

258 [PAUSES] "Course goal equals a whole skill after the course." I don't know how detailed to

259 make this. They didn't make it very detailed. "Each entry has a verb and object." Okay.

260

261 R: What are you thinking of?

262 C: I'm thinking of how to word this. "Graph a linear system involving two lines of the form

263 $MX+B$."

264 R: And why do you think it should be different?

265 C: Well, what I'm trying to see is, do I have to give him enough information so that he knows

266 the real world objective, or can I just, I don't see anywhere on here where I'm actually giving

267 the real world objective. I'm giving the skill but I'm not giving the rationale for the skill or how

268 it's going to be used. But it doesn't ask for it, though, so maybe I don't have to worry about

269 that. Because here they don't tell why you need to be able to add parts, they just say "Add

270 parts." So I guess I can just say "graph." I'm just going to say [PAUSES] I'm trying to shorten

271 this up as much as possible and yet still have the [PAUSES] I'm just going to say "Graph

272 linear systems of the form $MX+B$ and find the intersection."

273

274 C: And then [PAUSES] because it doesn't ask why you're doing this, so I'll justify it later.

456 Okay. [READS CHECKLIST] The units will be the parts of the whole, so I figured the units were [PAUSES] I think, if

276 I'm going to ask them to find the point of intersection, they have to be able to read a graph.

277 So I'm thinking that's going to have to be one of the skills. Okay. So, one of the skills would

278 be reading, or possibly I could be more specific, labeling a point on a graph. [ERASES THEN

279 WRITES] Because if they can't label the point, they won't know what the point of intersection

280 is. Then [WRITES]: "Graph $Y = a \text{ constant times } X$, graph $Y=MX+B$ and graph system

281 $Y=MX+B$ and find the intersection." Okay. [READS CHECKLIST]: "Each unit is a skill after the

282 course." [UNINTELLIGIBLE] "Parts of the whole. Each unit is a skill after the course." Well,

283 this would be a skill that I want them to know. "Each entry has a verb and object." "Labeling"

284 is a verb. "Everything has a verb and an object. One practice is noted; one project is noted."

285

286 C: This is going to be my project. [GRAPH $Y=MX+B$]

287 R: Why?

288 C: Because it's. Okay, first of all because it's really important. It's one of the most [PAUSES]

289 R: What's that graph? $Y=?$ [PAUSES]

290 C: $MX+B$, which I'll explain later what that means. Anyway, um, they really need to know how

291 to do this when they get out of algebra. We spend a lot of time on this. Now, they may not

292 pick this up until they get to Algebra 3.

293 R: The interpretation?

294 C: Right. We do spend time on it, but a lot of them won't get it. But they really need to get

295 this because if they don't get this, when they go on to this in Algebra 3, they're not going to

296 get it.

297

298 C: So I'm thinking this could be my project, and I could make this my practice [LABEL POINT

299 ON GRAPH] if it's not too much like the project. He's going to say, "That's too much."

300 Although some of these [UNINTELLIGIBLE]. Practice. Seems like there was one [PAUSES]
 301 Okay, like here. [READS PRELIM EXAMPLE]: "Adding like fractions. Adding unlike fractions." Those
 are
 302 almost the same thing.
 303 R: Is that what he? [PAUSES]
 304 C: One's practice, one's project, so I think I'm just going to try making this my practice, unless
 305 he has a problem with it. Then I'll change it. And let's see. [READS PRELIM PROJECT
 306 CHECKLIST] So I got that. [READS PRELIM PRACTICE CHECKLIST] So I got all this on
 307 practice and project. That's one thing.
 308
 309 C: So now I have to do, so now I have to put it on one of these papers [PRELIM BLANK
 310 FORM]. And then, as far as classmate checking, I don't know what to do about that. I guess
 311 I'll have to get to class early, see if I can get somebody to check it for me.
 312 R: You could get Peggy to check it. She could check yours, er, you could check hers.
 313 C: Yeah. I don't know who Peggy is, but [PAUSES]
 314 R: She's a math teacher.
 315 C: So if I get there early I could find Peggy and [PAUSES]
 316 R: Yeah. She has short blond hair. Real short.
 317 C: Okay. I'll try and do that.
 318 R: She's a, she teaches 7th and 8th grade math.
 319 C: Now, there's got to be extras [BLANK FORMS] in the back. I hope, because that's the only
 320 one here. I don't see any. So, I'm wondering if this has to be [PAUSES] It said we had to use
 321 the [PAUSES]
 322 R: But it doesn't have to be beautiful.
 323
 324 C: But he said we had to use the form that he gave us, and I only see one form here.
 325 R: Right. Well, what you could do, if you wanted, you could copy this [CHECKLIST] and then
 326 cut, you know, put this [HER COURSE MODEL] on another page and paste this
 327 [CHECKLIST] on. [PAUSES] He wants this thing. [CHECKLIST] He wants all this stuff
 328 [CHECKLIST AND BLANK FORM HEADERS] on the page, but it doesn't have to be the
 329 original page. You understand? You could create your own. But, to tell you the truth, that's
 330 fine. He doesn't care what it looks like, as long as it's readable.
 331 R: Oh, you think this is the final thing? This would go?
 332 R: I'm telling you, it would. I've seen them As long as it's readable. [LAUGHS]
 333 C: So then, there's that. See, he's my advisor [PAUSES]
 334
 335 R: Yeah, he's my advisor, too.
 336 C: I don't know if he remembered me! I don't know if he remembered me. I met with him this
 337 summer to try to plan a course of study. I've got to meet with him again because we didn't
 338 really get the thing mapped out. But it sound like pretty much anything I can justify, he'll okay
 339 it. I don't know, I mean [PAUSES] Because I thought, you know, it's required. If it's in the
 340 core, you've got to have it. But he was like, "Well, you know, maybe you might want to take
 341 this; maybe you might want to take this." I'm thinking, "I want to take 30 credits, but I can't
 342 afford to take any more." He could have me taking 45 because he's all excited and
 343 [PAUSES]
 344
 345 R: Yep. So, are you done? Feel satisfied with your [PAUSES]
 346 C: Um. I feel like I'm okay with this. But what I'd like to do is [PAUSES]
 347 .There would be at least six to twenty steps on my, this goal. This one at the top.
 348 [UNINTELLIGIBLE] the top one, but I don't think [PAUSES] if there'd be [PAUSES]
 349 R: Six to twenty steps for the course goal?
 350 C: See, I wrote this down: six to twenty steps, but I then don't know what that applied to,
 351 whether it applied to the course goal had to have six to twenty steps, or the one we're
 352 developing has to be six to twenty steps.
 353
 354 R: It applies to one of these.
 355 C: That's what I'm thinking. I think this would have six steps at least. So it'll be all right. It's
 356 important, I think. Okay, so now, it's not 2:00, so what I thought I'd do is just work on the rest
 357 of Assignment #1.
 358 R: Sure.
 359 C: So, I'll go back to what I wrote. I'm going to try to write it in the, or something. And another
 360 thing I need to do is, I need to get the format [BLANK FORMS] on my disks. I mean, I haven't

361 really used that before, but I'm assuming that I can just go in there, type it and, like, move
362 this down if I needed to.

363 R: Um hm. You're using a PC, or what?

364 C: I'm going to use a PC. Well, if I have to use a Mac I could probably figure it out. I mean,
365 once you get into Word, it's pretty much the same. It's, like, so funny because Mac users are
366 like: "How can you use a PC? They're so complicated!" And my co-teacher and I, this summer,
367 we were both PC users, and we got into a Mac lab one day, and we were ready to tear our
368 hair out, because we couldn't find anything.

369

370 C: Because the PC just lists everything. All you've got to do is look at the lists. Everything is
371 right there, whereas the Mac, you've got to know which folder to open. They said, "It's so
372 easy! You just click on this, open it up [PAUSES]"

373 R: It's whatever you're used to, is the easiest.

374 C: Yeah! Okay, let's see. Now it looks to me like I have to have one of these [ASSIGNMENT
375 #1 FORMS] for my practice and one of these for my project? So I'm going to have to do two
376 of these.

377 R: Um hm.

378 C: So, let's do the practice one first. That's the nice thing about the computer, because my
379 practice and my project have the same real world goal. I won't have to rewrite all of that.

380 R: Right. Of course, that's what he's looking for, that they're not too close.

381

382 C: I know, but a lot of the examples he gave us, the big final thing is the same.

383 R: Um hm.

384 C: Okay. So [READS FORM] course subject name is [WRITES]: "Algebra."

457 [READS FORM]: "Outline." I've already got that done, so I'm not going to do it right now. [READS
FORM]: "Course goal. Real
458 world performance. Condition." [READS CHECKLIST]: "Setting, time, place and purpose after the
course." I'm going to
387 go back and look at the guide, the example, again, which, I think is on page 74 [PAUSES]
388 Okay. [READS NOTE]: "What students will do." All right.

389 R: Where does it say "What students will do"?

390 C: Oh, I'm looking at the wrong part. Oh, I see. This [COURSE MODEL DIAGRAM] is
391 stretched out. Okay. So, I'm looking up here and thinking this is number 3 [PART 3]. But
392 number 3 is down here.

393 R: Oh, I see.

394 C: Okay. [Reads Checklist???] The goal has a real world setting, purpose, behavior. Okay.
395 [READS EXAMPLE]: "As managers of resources." All right.

396 R: So when you looked down here [EXAMPLE], why were you
397 looking at that? What did that [UNINTELLIGIBLE]?

398

399 C: I just want to make sure that I get it in the right format.

400 R: Format? Okay.

401 C: Like, what does he mean by conditions? You know. I guess what I'm really looking for is
402 how specific do I need to be? And doesn't look like this is real specific. It just says:
403 "Graduates will solve division problems."

404 R: And this is for the course goal?

405 C: The course goal real world performance. Okay. [WRITES]: "As managers of a business or
455 of a the family's finances. [READS CHECKLIST]: "The setting?" Okay, that's obvious. Business and
family. [READS OWN COURSE GOAL]:
407 "As managers of a business or of a family's finances in a business or a
408 family [UNINTELLIGIBLE]." Maybe I should reword it. [WRITES]: "As managers of financial
456 resources in a business or a family." Okay. So that takes care of the [READS CHECKLIST] It says
"time,
410 place and purpose after the course." They don't give a purpose in this one [EXAMPLE].

411

412

413 R: What's this one say?

414 C: This one says: "As managers of resources for any problems needing division of resources
457 at home or in a business." Well, I guess that's the purpose. Okay. Well, anyway. [READS EXAMPLE]:
"The
416 graduate will. The graduate will." Now how do I want to word that? [PAUSES] Well, what I
417 really want the graduate to be able to do is, not that the graduate would necessarily graph

418 this. That's the thing I'm having trouble with, so I'm not sure graphing is the real world
 419 performance goal.
 420 R: What is it then?
 421 C: But I think graphing is a way to help them get to the real world performance goal.
 422 R: Which is?
 423 C: The real world performance goal is to compare two sets of conditions, and to decide for
 424 your situation which condition is better. So, for example, if Sprint is going to charge me \$5.00
 425 a month to get the 10-cent-a-minute rate, and Ameritech is not going to charge me anything
 426 to get a 15-cent-a-minute rate, when is Ameritech cheaper, when is Sprint cheaper, how
 427 many long distance calls do I make, how much time do I spend on the phone a month? I can
 428 decide which long distance company to go with.
 429
 430 C: So I want them to be able to make decisions based on [PAUSES] See, that's
 431 complicated, and to try to word it a simple way. "The graduate will be able to choose between
 432 two rates or two different [PAUSES] Will be able to choose between two alternatives, for
 433 example, different long distance rates, by finding the point at which both are equal. That's
 458 really what they're doing, finding the point at which both situations are equal. [READS CHECKLIST]:
 "The
 435 real graduate behavior generally stated. Generally stated."
 436
 437 C: I think maybe I'm trying to be too specific. [WRITES]: "The graduate will be able to choose
 438 between two offers. Between two offers." Hmm. This [EXAMPLE] just says the
 439 graduate will solve division problems. "The graduate will graph two lines. Between two offers
 440 involving rates." Now. Choosing is the purpose. That's not the behavior. The behavior has to
 441 be the math. [ERASES] Okay. Well, maybe I should just say that the graduate will be able to
 442 graph it, because even if they don't graph it, the ability to graph it is what's going to help
 443 them to solve it, even if they don't actually use the graph to solve it.
 444
 445 C: Like here [EXAMPLE], they may not actually do a long division problem to
 446 solve it. They might use a calculator, but still, the ability to do it helps them to solve the
 447 problem. Although I'm going to say [WRITES]: "The graduate will be able to graph functions
 448 in order to determine." [ERASES]
 455 R: Thank goodness for erasers!
 456 C: [READS HER COURSE GOAL]: "Two linear functions involving rates to determine which offer is
 best under given
 451 circumstances."
 452 R: I think on one of your previous notebook pages you had put "interpretation" as a separate
 453 skill.
 454 C: Yeah, I did, didn't I? Where is that? Maybe that's the one I was going to hand in.
 455 [SEARCHES THROUGH NOTEBOOK]
 456
 457 R: Is this it? [POINTS TO A SEPARATE PIECE OF PAPER]
 458 C: Well, there I've got it under the same thing. But let's see, I don't have anything under
 459 there. I don't have anything back there, but I had a thing [FORM] I was going to hand in. It
 460 might be in the book [COURSE PACK].
 461 R: Is that [PAGE] sixty something?
 462 C: There's a variety of these things [BLANK FORMS IN COURSE PACK]. I need some Post-it
 463 notes. Actually, I didn't have anything about interpreting at all. That might be. Usually I teach
 464 that all in one unit. I don't teach interpretation as a separate thing.
 465 R: I think the educational definition of "unit" is not what he's using.
 466 C: Oh.
 467 R: You know, in terms of for the calendar, when you teach a unit within [PAUSES]
 468
 469 C: Yeah, I've [PAUSES] Well, it would definitely be a separate lesson. Actually I try to teach it
 470 as concurrent, otherwise the kids don't have any motivation. "Well, what do you use this for?"
 471 [WRITES]: "Interpret results to make decisions. In order to determine" [PAUSES] "Graduate
 472 will be able to graph two linear functions involving rates." Okay. So I could say [READS HER
 473 ASSIGNMENT #1]: "The graduate will be able to graph two linear functions involving rates,
 474 find the point of intersection, and interpret the results to make decisions." [ERASES THEN
 475 WRITES.] Okay, so that's what I want them to be able to do, and the purpose is "interpreting
 476 the results to make decisions."
 477 C: [WRITES] Now, I don't know if that's enough detail, or if I have to say "make decisions"

478 and [UNINTELLIGIBLE].
 479 R: Well, he's going to go through that in class.
 480 C: Okay. Well, I'll just leave it then. See, that'll help me too, if I have this roughed out, and
 481 then when we go over this in class, I can just make notes on what I need to change.
 482
 483 *PART 4 - COURSE TERMINAL OBJECTIVE
 484 C: Okay, now the course terminal objective. [READS CHECKLIST]:
 485 "Real graduate behavior, generally stated, related to the subject." I think it's
 486 related to my subject. I think I've done all that.
 487
 488 C: [READS CHECKLIST]: "Close
 489 representation of real conditions and real behavior for all skills." So, Condition. [WRITES]:
 490 "Given." I guess I could be pretty specific here, even though I need to know [PAUSES]
 491 R: What are you working on, the course terminal objective?
 492 C: I'm working on the course terminal objective, like, what's going to be on the final exam.
 493 Now, how specific were they? [READS ANNOTATED MODEL] They were pretty specific
 494 [UNINTELLIGIBLE], but I think I can be pretty specific. Okay. [WRITES]: "Given." Let's see.
 495 R: That was the example you were looking at?
 496 C: Yeah, I just looked at the example, the division example. Okay, so what I'm going to do in
 497 my Conditions is give, like, the problem I'm going to use. Okay, so [WRITES]: "Given two, um,
 498 different job offers involving starting salary plus commission." Okay, so that's the condition,
 499 and that is a real behavior, I think.
 500
 501 C: Okay. [READS EXAMPLE]: "Student will." Okay, I'm looking back again to see how they did it.
 455 [READS EXAMPLE]: "Students will." Okay now. [READS CHECKLIST]: "specifically stated."
 [WRITES]:
 503 "The student will, 1. write the terms of the offers in the form $Y=MX+B$, 2. graph the two lines,
 504 3. find the point of intersection, and 4. interpret." [READS ANNOTATED MODEL] and I don't
 505 know if that's specific enough, if the word "interpret" is specific enough.
 506 C: So if it isn't, I'll add to it later. [WRITES]: "Interpret the results." Okay.
 507
 508 *PART 5 - UNIT GOAL - PRACTICE
 509 And then my [READS BLANK FORM]: "unit goal, real world performance." Okay. This would
 510 be, oh, I said this was my practice. So my practice is. [LOOKS FOR HER PRELIM FORM IN
 511 COURSE PACK.] Oh, I should take that out of there. [TAKES PRELIM FORM OUT OF
 512 COURSE PACK.] All right. So my practice is graphing direct [UNINTELLIGIBLE]. Okay. So the
 513 [READS CHECKLIST]: "unit goal is one whole piece of the real world course." [READS
 514 BLANK FORM]: "Condition." The same condition, basically. So that, that [UNIT GOAL] would
 515 be the same as this [COURSE GOAL]. So I'm not going to write it right now. Um, the only
 516 thing that would be different is the objective. Because instead of giving them starting salaries
 517 and commission, uh, with this one you just give them a commission, or you give them a rate
 518 that had no starting.
 519
 520 C: So, this would be the same as. Course terminal objective is "interpret" unit. No, it wouldn't
 521 be the same as this one. [ERASES] Because you're not talking about two [GRAPHS], you're
 522 just talking about one. Okay, so, the conditions might be the same though. This is where it
 523 gets tricky. I'm not sure this [ANNOTATED MODEL] will be quite as useful. Um, anyway,
 524 "Given." Okay. "As." I think the conditions is [sic] going to be the same. "As managers, et cetera."
 525
 526
 456 C: [READS THEN WRITES]: "As managers, et cetera, DA da DA da DA, the graduate will know?"
 [READS
 528 HER WORK] I said "The graduate will be able" and he said [READS EXAMPLE]: "the graduate will," so
 I'll
 529 take that out. "Will graph." Hmm. This [COURSE GOAL] is two [GRAPHS], two, and this [UNIT
 530 GOAL] is only one [GRAPH].
 531 R: Two what?
 532 C: This is two, the course goal is they've got to graph two functions and find the intersection.
 533 The unit goal, they're only going to have to graph one. So there's no finding any point of
 534 intersection because they're only graphing one. And in this one [POINTS TO UNIT IN
 535 COURSE DIAGRAM], there's no, this is just a strict rate. So I can't really see a whole lot of uses
 536 for it, really, other than they can use it to predict, to [PAUSES AND SIGHS, THEN WRITES]:

537 "Will graph, such as electrical consumption." Do I have to give a purpose?
538
539 R: What does your behavior say?
540 C: "The graduate will graph a set of data involving a constant rate of change, such as cost of
541 electricity per kilowatt hours in order to determine." I didn't want to do that! I did not know! Uh,
542 you really wouldn't graph it, you'd really multiply it. But if you understand the concept of
543 graphing, then you should be able to figure it out, even if you didn't graph it. "In order to
544 [ERASES] predict the cost for any amount of usage." And that's all we had to do so far, but
545 [PAUSES]
546 R: Is it up to part five [UNIT TERMINAL OBJECTIVE]?
547 C: Unit terminal objective. That's up to part five. So that would be my practice.
548
549 *PART 5 - UNIT GOAL - PROJECT
550 And then for my project, everything would be the same except for the graduate behavior.
551 [READS HER COURSE DIAGRAM]: "The graduate will be able to graph a set of data." See, this
552 one doesn't just involve rates, it involves a starting, an initial cost like they're going to charge
553 sixty cents for the first minute and ten cents for every minute after that.
554
555 R: So this equation here would be the way to figure out which phone company to go with?
556 C: Depends. The phone company is only going to, like, if AT&T is going to charge you, um,
557 fifteen cents a minute but isn't going to charge you a monthly fee, then it would be this
558 $[Y=MX]$. And if Sprint is going to, but see, really, this $[Y=MX+B]$ includes this $[Y=MX]$.
559 Because with this $[Y=MX+B]$, this is the same as this $[Y=MX]$, but in this $[Y=MX+B]$, this [THE
560 'B'] would be zero. But for kids, you've got to go through, I mean, you don't really have to go
561 through it. [PAUSES]
562 R: So you could graph both of these $[Y=MX]$ and $[Y=MX+B]$?
563 C: See, that's the other thing I'm thinking about. It's like, when I really teach this, I don't teach
564 this $[Y=MX]$ separate from this $[Y=MX+B]$. So what I could do is eliminate that altogether. But
565 see [PAUSES] I don't know. I don't teach this $[Y=MX]$ separate. I just teach this $[Y=MX+B]$.
566 So I could make this [GRAPH SYSTEM $Y=MX+B$ AND FIND INTERSECTION] my practice and
567 this [GRAPH $Y=MX+B$] my project. [READS HER COURSE MODEL]
568
569 C: Because if this [GRAPH SYSTEM $Y=MX+B$ AND FIND INTERSECTION] was my practice,
570 then [PAUSES] That's the other thing that's confusing. If this were my practice, then the unit
571 goal would be the same as my course goal, because it's not like there are four separate
572 things [UNITS], it's like they build up to this.
573 R: Are they more like this? [?]
574 C: Yep. It's a lot more complicated than I thought. Because I think when I separated this out
575 [INTO UNITS], I was sort of doing it artificially, just to follow what he's got, kind of. Because I
576 don't think I'd teach it that way.
577 R: Did he say anything in class about how you divide them?
578 C: No, because the examples he gave were obvious. Like, uh, you know, fitness.
579
580 C: Right? "Flexibility, Nutrition," and whatever the other one was.
581 R: They're related but they can stand alone?
582 C: Right. Right. You don't have to know about strength in order to know about nutrition.
583 R: And your thing is?
584 C: But my thing is, you have to know about this other stuff to know about this [GRAPH
585 SYSTEM $Y=MX+B$ AND FIND INTERSECTION]. So it's not like it's three separate things
586 [UNITS]. Well, I would say that this [UNIT ON LABELING POINT ON A GRAPH] is prerequisite
587 to this [GRAPHING $Y=MX$], and these [LABELING POINT ON A GRAPH AND GRAPHING
588 $Y=MX$] are prerequisites to this [GRAPH SYSTEM $Y=MX+B$ AND FIND INTERSECTION].
589
590 C: But then the division example I would say the same thing. I would say that short division is
591 prerequisite to long division. So, each is a major subskill to reach the goal, of course.
592 R: That's a good question to ask him, uh, if that major unit level is, uh, or even the unit level,
593 if it's, can be non-linear, or linear, or does it matter.
594 C: Well, if it can't be linear, I'm in trouble, because in math everything's linear. Unless I went
595 with a whole other thing, if I went with something like probability, I could probably get
596 something that's not linear.
597
598 R: I don't think it has to be linear, er, that it can't be linear.

599 C: See, but the thing is, I don't know if I should show it this way [HORIZONTAL] or if I should
600 show it linear [VERTICAL]. [READS ASSIGNMENT #1] Maybe I could show it like this.
601 [NUMBERS UNITS?]
602 R: I think the only reason he shows it like he does is he wants you to choose practice and
603 project that are fairly equal in size. I don't think he cares if one is prerequisite to the other.
604
605 C: Okay. Well, that's why I wasn't going to choose this, because I didn't think this [SYSTEMS]
606 was equal in size to the other ones, because this is really a big deal. I could maybe choose
607 labeling a point on a graph. That actually, that might have more practical applications than
608 this [SYSTEMS] does. That might be better as a practice, even though it seems so simple, it
609 seems like it's hardly justified to use it, but [ERASES].
610 R: But you know better, right? [LAUGHS]
611 R: But if I did that, then it would be much easier to write this.
612
613 *PART 5 - UNIT GOAL - PRACTICE
614 C: The graduate will be able to look at a graph, at any point, and determine what that means.
615 Now, why is that useful? It's not really useful, but to verbalize why it's useful, but to know how
616 to verbalize why it's useful. I have a problem with being too wordy. But that would actually,
617 because lots of people have to use graphs. Lots of people have to look at graphs and then
618 tell what a point on a graph means. So that would be very useful. [ERASES PRACTICE UNIT
619 GOAL] Unit goal. [UNINTELLIGIBLE] Okay. [WRITES]: "The graduate will look at a point on a
620 graph and, and give the coordinates." I'm afraid if I say "give the coordinates," that's too
621 mathematical. Um, so I'm wondering if I need to give an example.
622
623 R: What would be too mathematical? It's a math course.
624 R: For him to know what I mean. Okay. [WRITES]: "And give the coordinates." But do I have
457 to, let's see. [READS CHECKLIST??] I guess I don't have to justify it. It doesn't say. [READS
CHECKLIST]:
626 "Real role and setting."
627 R: Where are you at now? Unit goal.
628 C: It doesn't say that we have to, it doesn't say. Because I thought we had to do role,
629 setting, purpose, behavior. They have behavior. Purpose. It doesn't say to give purpose, but
630 he said to give the purpose in class, so that's why I'm thinking I have to give the purpose.
631
632 R: It doesn't say that, huh?
633 C: No, it doesn't say purpose.
634 R: Now, is he talking about the Preliminary [Assignment]?
635 R: It [CHECKLIST] says "real graduate behavior."
636 R: Was he talking about the Preliminary Assignment or this part [UNIT GOAL]?
637 C: When he talked about role, setting, purpose and behavior? I think he was talking about
638 the final thing, the final goal, every goal, because he said "Role, setting, purpose, behavior.
639 Put them into the goal" and something about saving them. But he did say put them in the
640 goal, so.
641
642 C: [READS UNIT GOAL OF ASSIGNMENT #1]: "As manager [UNINTELLIGIBLE] look at a
643 point on the graph and give coordinates." Well, that [PAUSES] "Give the coordinates."
644 [LAUGHS] [UNINTELLIGIBLE] "Look at a point on the graph and give the coordinates in
645 order to interpret the information presented?" [SIGHS] [WRITES UNIT GOAL]: "In order to use
646 and interpret the information presented." Okay, so that's my practice. And then my project
647 would be pretty much the same except when you get down to behavior. Behavior would be
648 different.
649 R: Is this $[Y=KX]$ your project, or this one [SYSTEMS]?
650 C: This one [SYSTEMS]. I think this [INTERPRET AND MAKE DECISIONS] is too comp, I
651 don't know.
652
653 C: To me, you know.
654 R: Well, if you think it's too complicated, then it probably would be.
655 C: I think it's too complex to be the whole project, because we spend a lot of time just on this
656 [INTERPRET AND MAKE DECISIONS]. But if you're just looking at this little piece $[Y=MX+B]$,
657 it doesn't really justify the real world as much as this [INTERPRET] does. So, by looking at
658 the whole, to me it's like, "What can you do once you know how to do this?" $[Y=MX+B]$ Well,
659 once you know how to do this $[Y=MX+B]$, then you can do two at a time, compare them. And

660 then you really have some information you can use.
 661
 662 C: Whereas, just to be able to do one, yeah, it provides some useful information, but not as
 663 much. But, um, okay, so on my hope, I hope to use it different, but I'm just going by this
 664 [POINTS TO BLANK FORM] example, and in this example, that's one of the examples. So
 665 that's what I'm going by. So in the project the first three things[PARTS] would be the same,
 666 the first four things would be the same. Course goal, course terminal objective would be the
 667 same, and this [UNIT GOAL AND UNIT TERMINAL OBJECTIVE] would be different.
 668 R: The unit goal would be different?
 669 C: The unit goal would be different because of different units.
 670
 671 C: So, the project goal would be [WRITES]: "Graduate." I'm going to put this on a form later,
 672 after, I think I'm going to take my disks in. I was going to do that last week and I forgot. I'm
 673 going to take in my disks and get these [BLANK FORMS] so I can start doing my own
 674 computing. But anyway, so "The graduate will graph information which will be, um, information
 675 which can be shown in the format of $Y=MX+B$, information which is linear, information which
 676 [PAUSES] which can be represented by a linear function, a linear function of the form
 677 $Y=MX+B$." And I might give an example here. "For example, da-DA-da-DA-da-DA-da-DA."
 678
 679 C: And then the purpose. "In order to" [PAUSES] To make projections? To analyze? I'm just
 680 going to say "to analyze and make projections." Okay.
 681 R: It'll be interesting to see the feedback you get.
 682 C: Yeah. [LAUGHS] Real interesting. I imagine I'm going to get a lot of feedback. I mean, this
 683 stuff [BLANK FORM AND CHECKLIST] confuses me in a way. Because it's got all this stuff on
 684 it. I'm the kind of person that wants to have it short, simple. "Do this, do this." But on the other
 685 hand, I think about my style of teaching and I think, "God, I would probably do the same
 thing." You know, sometimes I just over-explain everything.

Observation Session #2

3 R: This is observation session #2 with Carol. Now, you were telling me about the feedback
 4 you got on the Preliminary Assignment.
 5 C: The Preliminary Assignment. [READS PRELIM] I changed my course goal due to the input
 6 from classmates.
 7 R: How did you change it?
 8 C: The original course goal was to "Graph linear systems and find the point of intersection." I
 9 changed that to "Interpret graphs to make decisions" because interpreting is like a higher
 10 level skill. So they would have to know how to graph it and find the point of intersection in
 11 order to interpret it.
 12
 13 R: So was that actually your fellow students' feedback?
 14 C: Yeah. Because they were looking at all the unit goals, and they saw the one, "Interpret."
 15 They said that should really be the course goal because that's like the ultimate goal,
 16 interpreting the graphs to make decisions. That's what you do in the real world. So that's my
 17 course goal. So my unit goals, um, originally labeling a point on a graph was going to be my
 18 practice, but since I don't think that has six steps [PAUSES]
 19
 20 C: And my project was going to be to graph $Y=MX+B$. I changed that-- "Graphing $Y=MX+B$ "--to
 21 my practice. And the project will be "Find the point of intersection of two lines." And then Dr.
 22 --- added, to each of these unit goals he added "interpret." So do it and interpret. Graph
 23 it and interpret. Okay. So now I have my practice and my project [PAUSES]
 24 R: Why did you switch the one, $Y=MX+B$ was your project?
 25 C: Was my project.
 26 R: And now it's your practice.
 27
 28 C: Because I, these other two units, I didn't think they would have six steps, and he wants
 29 something with at least six steps.
 30 R: So that other, the "find the point of intersection," would have six steps.
 31 C: Yeah, I think so. I mean, I haven't really actually mapped out the steps, but [PAUSES]
 32 R: Now, you turned in your entire, er, parts 1-5?
 33 C: No, I only turned in the Preliminary. But I had roughed out parts 1-5, so now I've got to go
 34 back and [PAUSES]

35 R: I wondered if you'd gotten any feedback from Dr. — on [PAUSES]
 36 C: No.
 37
 38 C: So. I need to [LOOKS FOR ROUGHED OUT PARTS 1-5 IN NOTEBOOK] go back, get
 39 what I did [UNINTELLIGIBLE]
 40 R: So what are you looking for now?
 41 C: [LOOKS IN COURSE PACK] I am looking for Assignment #1, the format for Assignment #1
 42 [BLANK FORM]. [READS EXAMPLE]: "Model format for Assignment #1," page
 43 74. Oh, there's the model format. Now I need the blank form, because I thought I started
 44 filling in one of these forms. Yeah, I did. Here it is [IN FRONT OF COURSE PACK]. So I'm
 45 going to take out the one I started to fill in, and [PAUSES]
 46 R: Have you given any thought to this since Wednesday's class?
 47 C: Not really. [LAUGHS]
 48
 49 [Digression on busy schedules, matriculation fees, coffee and picking up — yesterday, Friday,
 September 18, 1998, at O'Hare International Airport in Chicago at 3:30 pm.]
 50
 51 C: Okay. I think [PAUSES]
 52 R: Okay, so what you have there is [PAUSES]
 53 C: My, I have two Assignment #1 formats [BLANK FORMS]. I'm going to do my project on
 54 one, my practice on one. And so, um, it's going to be the same, the first part's going to be
 55 the same.
 56
 57 *COURSE TITLE
 58 Okay, so [READS FORM] the course subject name is Algebra I.
 59
 60 R: And which one are you working on now, practice or project?
 61 C: Um, I think I'll do the practice one first. Okay.
 62
 63 *COURSE DIAGRAM
 64 [READS BLANK FORM]: "Diagram or outline. Use back of page." Well, that's already done, so
 65 I'm just going to copy that [BUBBLE DIAGRAM] from this [PRELIM] later. Um.
 66
 67 *COURSE GOAL
 68 [READS BLANK FORM]: "Course goal, real world performance. Condition. Behavior." Okay.
 69 Let me look at what I had before. [READS ROUGHED OUT ASSIGNMENT #1]: "As managers
 70 of financial resources in a business or a family, the graduate will"—this is what I had—"graph
 71 two linear functions involving rates, find the point of intersection, and interpret the results to
 72 make decisions."
 73
 74 C: I think I'll have to change that a little bit, but the first part is okay. "As managers of financial
 75 resources in a business or a family." I think that's okay.
 76 R: And why do you think. Oh, you'd have to change it because you changed [PAUSES]
 77 C: Because I changed the course goal, and interpreting was the main part of it now, so, um,
 78 okay. So [WRITES]: "As managers of financial resources in a business or family" [PAUSES]
 79
 80 R: So you're pretty much copying from what you had done earlier but changing it to reflect
 81 the new course goal.
 82 C: Um hm. I'm changing the behavior part. [WRITES]: "The graduate will." Now it says here
 83 [READS CHECKLIST ON BLANK FORM]: "Behavior, generally stated. Related to the subject."
 84 Now, to me, "generally stated" means I don't have to get real specific about what they're
 85 going to do. So [READS HER WORK]: "The graduate will." Now, what I'm trying to determine
 86 here is if they even need to graph. I see graphing as like a step, but eventually they get to
 87 the point where they see where these two things are going to intersect without even having
 88 to graph. So I'm not even sure [PAUSES]
 89
 90 C: But since everything I'm doing revolves around graphs, perhaps I should just leave it as
 91 "interpret graphs to make decisions."
 92 R: Is that, would you say that's analogous to using a calculator to arrive at numbers you're
 93 going to have to interpret? So that the calculator is the tool. Would graphing be the tool?
 94 C: Um, graphing is one means of arriving, see, what you're really trying to do is arrive at the
 95 point where, can you have two different equations that represent something.

96
97 C: Like they might represent a salary plus commission, or they might represent phone rates,
98 like the first minute is this much and every minute after that is so much. But you've got two
99 different kinds of rates, where it's not immediately apparent which one is better. Um, I mean,
100 like, if the phone rate or just a flat rate—10 cents a minute and the other is 15—well, obviously
101 10 cents a minute is better. But if one is 10 cents a minute but you've got to pay \$5 a month
102 to get that, that's not going to be better unless you make more than a certain number of
103 calls.
104
105 C: So what you're trying to determine is, what is that magic number where one becomes
106 better than the other. So what they're really trying to do is to determine what's the point
107 where they're equal.
108 R: Is there any other way to do that?
109 C: There is another way to do that. So, but I was focusing on graphing. You can do it by
110 graphing, and where the graphs intersect, that's the magic point, but you can also do it by
111 solving the system algebraically.
112
113 R: Would it be easier to graph it, and then visually you can see the intersection? Or would it?
114 C: Um. It depends on the person. So, um, I was trying to make this simple and not make it
115 too complicated, because I thought, well, what I'm trying to teach is graphing in this particular
116 setting [INDICATES ASSIGNMENT #1] and I'm trying to show how it could be used in the real
117 world. And then later on, when I teach solving a system, that could be used in the same way.
118 So I think maybe what I'll do is stick with this, but if he, you know, if I get feedback indicating I
119 need to do something different, then I will.
120
121 C: So [READS HER WORK]: "The graduate will." [WRITES]: "Interpret graphs of, graphs." I'm
122 trying to decide how specific I need to be about what kind of graphs they are.
123 R: Now are you working on [PAUSES]
124 C: I'm working on the course goal behavior. [READS CHECKLIST ON BLANK FORM]:
125 "Purpose and behavior." Okay, the behavior is "interpret," and the purpose is "to make
126 decisions." So, "will interpret graphs of." I'm trying to decide how to word this so a lay person
127 will understand what it means.
128
129 R: And actually, I think that's the purpose of [CEP 808], that if you can do these
130 [OBJECTIVES] so well a sub can come in and, that's supposed to be the ultimate test.
131 [LAUGHS]
132 C: Oh, okay. [LAUGHS]
133 R: It may be pie in the sky [LAUGHS]
134 C: [LAUGHS] Okay. "Will interpret graphs of," but we don't have to give examples here. We
135 give examples later, so I guess that would take care of some of my problem. Uh, I'm going to
136 go back and look at the example he gave us [ANNOTATED MODEL], just to see. It says here
137 [READS ANNOTATED MODEL]: "graduates will solve division problems."
138
139 C: All right. It doesn't give an example of what kind of division problem in the course goal. It
140 just says "solve division problems." So I think I can just say [WRITES]: "interpret graphs of
141 linear systems to make financial decisions." So [READS HER WORK] I have my purpose, to
142 make financial decisions, my behavior is interpret graphs of linear systems. Okay, and that's
143 going to be the same for the practice and the project. Okay.
144
145 *COURSE TERMINAL OBJECTIVE
146 Now, the course terminal objective, which is [READS BLANK FORM]: "the course final exam."
147
148 C: Okay. What did I say here? [READS HER WORK]: "Given two different job offers involving
149 salary plus commissions, student will, 1. write the terms of the offers in the form $Y=MX+B$, 2.
150 graph the two lines, 3. find the point of intersection, 4. interpret the results, 5. decide which
151 job to take based on what they believe their sales will be."
152 R: So that's what you wrote earlier, right?
153 C: Um hm. Let's see. Now I'm going to look at the example [ANNOTATED MODEL] and see
154 what they have.
155
156 C: [READS EXAMPLE]: "Given a written
157 description of any common management problem involving dividing resources with whole

158 numbers, using long or short division, with or without remainders." [READS NOTE]:
 159 "All skills from all units." Okay. "Students will." Okay. I think I have it
 160 specific enough here. [READS HER WORK]: "Given." [READS ANNOTATED MODEL] Okay.
 161 Now, what I'm trying to decide is whether the condition is too specific, because I gave an
 162 example.
 163 C: And actually on the real final exam I would have more than one problem and they wouldn't
 164 all be job offers. So, maybe I should say [SIGHS], "Given two different situations involving
 165 rates, for example, two job offers involving a starting salary plus commission. [LOOKS AT
 166 ANNOTATED MODEL] What I'm trying to figure out is, is this where he told us to use "such
 167 as"? He told us how to write objectives.
 168 R: So was this in class on Wednesday or what?
 169 C: Yeah, and he gave us a format for writing objectives, and I don't see that this format's
 170 being followed out in this example [ANNOTATED MODEL], so I'm wondering if I'm supposed
 171 to use that format for the course terminal objective or for the unit terminal objective? [READS
 172 UNIT TERMINAL OBJECTIVE IN ANNOTATED MODEL] It sounds like the unit terminal
 173 objective has to be a lot more specific, because it has to have criteria and all that. I don't
 174 know if the course one [OBJECTIVE] needs criteria. [READS COURSE TERMINAL
 175 OBJECTIVE IN ANNOTATED MODEL] Well, yes!
 176
 177 C: The course one [OBJECTIVE] has criteria too. [POINTS TO ANNOTATED MODEL, IN
 178 WHICH CRITERIA ARE OPTIONAL] It has conditions, behavior and criteria, but is says
 179 "optional."
 180 R: That's part 3?
 181 C: This is part 4, Course Terminal Objective. It has condition, behavior and criteria, but under
 182 criteria it has "optional."
 183
 184 C: [READS ANNOTATED MODEL] Now, I didn't get the impression in class that it was
 185 optional, but maybe it's not optional on the unit objective. Maybe it's optional on the course
 186 objective but not on the unit objective. I mean, yeah. Okay, so, I think that probably what I
 187 have is okay and I might just expand on it. [COMPARES HER WORK WITH ANNOTATED
 188 MODEL] So. [READS BLANK FORM]: "Course terminal objective." So this will be the same for
 189 both, because it's only when I get down to the units that my practice is different from my
 190 project.
 191
 192 C: So [READS FORM]: "Condition." [WRITES]: "Given two different, uh, two different, um." [READS
 193 ANNOTATED MODEL] I don't know what I should put, two different scenarios, two different
 194 situations. Two different but related situations involving rates, then give an example.
 195 [WRITES]: "Two different but related situations involving rates, such as two job offers
 196 involving salary plus commission, the student will, 1. write the terms of the situations in the
 197 form $y=mx+b$," and I wonder if I should explain what that means? Well, I think I'll just wait, and
 198 if he asks me to explain it, I'll explain it later. [WRITES]: "In the form $y=mx+b$, 2. graph the two
 199 lines, 3. find the point of intersection."
 200
 201 C: I should say "find and name the point of intersection." [ERASES AND WRITES] Or "find
 202 and label." I should say "name" or "give." "Find and name the point" because they can find it,
 203 but can they tell what it is. [LAUGHS] "Find and name the point of intersection, 4. interpret
 204 the results." I don't know if I need to explain what interpret means, because interpret is kind
 205 of, like he said, we need a behavior. Interpret is not really a behavior. I could be interpreting
 206 and not be doing anything.
 207
 208 C: So, maybe I need to change that. "Interpreting the result" or "interpret the results by
 209 stating." How about that? "By stating when, uh, under what conditions, under what
 210 conditions, the first job would pay more, or the first situation is better, and under what
 211 conditions the second one." I don't know if I should stick with the job example.
 212 R: Why? Why are you uncertain?
 213 C: Well, because I started, because, um, they don't get specific in theirs. [READS
 214 ANNOTATED MODEL]
 215 R: Where, in the model?
 216 C: In the model. They don't get specific in terms of a specific problem. And since not all of my
 217 problems would involve jobs, I'm not sure that I should say "jobs" in the objective.
 218
 219 C: I think maybe, because one situation might involve jobs, another situation might involve

220 phone rates, or something like that. So by stating [WRITES]: "Conditions under which the first
 221 scenario is the best offer, is the best offer, is the best, and under conditions the second is
 222 the best." I need more room there. I took my diskettes in to get the formats on diskette, but I
 223 forgot to take them in Monday, so I took them in Wednesday, so I won't have it till Monday.
 224

225 C: So what I'm going to do, if I can get, I have a word processor here.
 226 R: Oh, you do?
 227 C: So if I can get it, he said he had it [ASSIGNMENT FORMAT] on DOS, so if I can use the
 228 word processor, I'll just use my own [COMPUTER] and we can met here [AT HER HOUSE].
 229 But if it [FORMAT] won't work on my word processor, then I'll have to go to the computer lab.
 230 R: Um, when I was his TA we made several versions of these formats.
 231 C: Yeah, he said he had one in DOS, and if it's WordPerfect, then I'll be all set.
 232

233 C: See, I gave him two diskettes, and one I labeled, you know, DOS, WordPerfect, and the
 234 other I labeled Microsoft Word for a PC.
 235 R: For Windows, or [PAUSES]
 236 C: Yeah. Well, I didn't say Windows. I thought it always came in Windows.
 237 R: I think Word did start in Windows.
 238 C: Okay, so this [COURSE TERMINAL OBJECTIVE] will be the same for both [PRACTICE
 239 AND PROJECT], and I could say [READS ANNOTATED MODEL] I don't, I'm not going to say,
 240 I'm not going to say the criteria because for one thing I'm going to run out of space, and for
 241 another, he said it was optional.
 242 R: All good reasons. [LAUGHS]
 243 C: So I'll say that later.
 244

245 C: So that'll be the same. So the only thing that's going to be different for my practice and
 246 project will be my number 5, unit goal.
 247

248 *UNIT GOAL
 249 So the practice unit goal is [READS HER DIAGRAM]: "Graph lines of the form $y=mx+b$ and interpret."
 250 So condition would be [PAUSES]
 251 R: Was that your Preliminary Assignment you were looking at?
 252 C: Yes.
 253 R: And what were you looking at, just what you had written, or?
 254 C: What I had written is my practice and what he had added.
 255 R: Which was "and interpret"?
 256 C: "And interpret." Now, unit goal. In the real world they're probably not going to graph this
 257 stuff, but they might. Okay. So it's the same conditions. [WRITES]: As managers of financial
 258 resources in a business or a family, the graduate will." Mm, okay, I'm going to look back to this
 259 format. [READS ANNOTATED MODEL] I'm looking back to my [PAUSES]
 260 R: What's your question you're pondering?
 261 C: Well, it's just, I don't think it's that realistic that they're really going to graph this, but later
 262 on there is a point where we do state how realistic it is. So, I don't know.
 263

264 C: [READS NOTES]: "What grads will be able to do in the real world
 265 after this unit. General description of pert, performance after unit in real situation. Thus,
 266 general description of unit final exam." But this is not the objective. This is the goal, and I
 267 thought the objective was the final exam. And this one [ANNOTATED MODEL] says: "As
 268 managers at home or in business, for problems with whole numbers involving division." See,
 269 maybe I need to be more specific, because they tell what kinds of problems. So I guess I
 270 need to tell what kinds of problems too.
 271

272 C: [UNINTELLIGIBLE]
 273 R: And that's the model you were looking at?
 274 C: yeah, I'm looking at the model and their conditions.
 275 R: And his notes, or what, or the left column, or what?
 276 C: No, I'm looking at the actual model rather than his notes. [READS NOTE]:
 277 "General givens."
 278 R: So that was to see how specific it was?
 279 C: Yeah. [READS HER WORK]: "As managers of financial resources in a business or a
 280 family," um. [READS EXAMPLE THEN WRITES]: "for problems, for situations
 281 involving a starting point and a rate of increase, and a rate of change," I'm going to say,

282 because it could be an increase or a decrease. [READS ANNOTATED MODEL THEN HER
 283 WORK]: "For situations involving a starting point and a rate of change, the graduate will
 284 graph the information." [PAUSES THEN SIGHS]
 285 R: What are you wondering about?
 286 C: Oh, I'm just wondering about how specific I need to be, about "graphing the information in
 287 the form $y=mx+b$." I could just say "graph the information," because it is in the form, it's
 288 already in the form, because I said "involving a starting point and a rate of change."
 289
 290 C: So that's already in the form $y=mx+b$. So I could just say, "The graduate will graph the
 291 information and [WRITES] interpret the graph to make projections, to make decisions
 292 [ERASES], to make decisions." Okay, that's all I'm going to say. [PUTS PRACTICE 1-5
 293 AWAY AND GETS BLANK FORM FOR PROJECT]
 294 R: So you're done with the practice?
 295 C: The practice. See, I kind of, you know, when I was taking McLeod's class, he was, like,
 296 "Don't spend so much time, you know, if you're stuck on something, don't spend hours and
 297 hours trying to figure it out, just, you know, email me or call me, or whatever."
 298
 299 C: And, you know, it was kind of good advice because, I mean, I can spend hours trying to
 300 get this perfect. But if I just do it and get the feedback, then I can [READS ANNOTATED
 301 MODEL]. Plus, I think it goes along with the example [ANNOTATED MODEL] pretty well.
 302 Although they give an example here, "for example, small portions of food."
 303 R: And that's in the, what?
 304 C: In the example [ANNOTATED MODEL].
 305 R: In the unit goal?
 306 C: In the unit goal. So I could give an example.
 307
 308 C: Um, I could give an example. [WRITES]: "For example, um, As managers of financial
 309 resources in a business or a family, for situations involving a starting point and a rate of
 310 change." I've already used the job thing as an example, so I could use a different one. I
 311 could say [WRITES]: "For example, phone rates involving a monthly fee plus a permanent
 312 charge, monthly fee and a per-minute charge." [ERASES] [UNINTELLIGIBLE] See, with my
 313 word processor, if I could type this, I would. But you can't see what you're typing on it. You
 314 can't see where you're typing. [LAUGHS] So it's not much good.
 315
 316
 317 R: So you do have a computer here?
 318 C: It's just a word processor, you know, it's really, it's not a computer. It does WordPerfect,
 319 that's about it. Okay. [READS HER WORK]: "Interpret the graph to make decisions." Okay. So
 320 now all I've got to do is my [PAUSES]
 321 R: Boy, you're just whipping along here, aren't you?
 322 C: Yeah. I can keep going, if you want to go till noon.
 323 R: No, that's fine. I've got a new baby to get back to. [LAUGHS]
 324 C: Um, yeah. So now I'm working on my project. Now everything's going to be the same,
 325 down to number 5 [LOOKS BACK AND FORTH FROM PRELIM TO CURRENT WORK],
 326 because the course goal, the course terminal objective is the same, but the unit goal is
 327 different because it's a different unit.
 328
 329 R: So that's your Preliminary Assignment you're looking at when you [UNINTELLIGIBLE] back
 330 and change [PAUSES]
 331 C: I'm looking at my Preliminary Assignment and I'm looking at my project now [ON PRELIM],
 332 because this [BLANK FORM] is my project. So I'll just copy this [COURSE GOAL AND
 333 COURSE TERMINAL OBJECTIVE] later, since it's all the same. [READS HER WORK] And the
 334 conditions of my unit goal will be the same, except instead of one situation, they'll have two
 335 situations that they're comparing. So it would be like [WRITES]: "As managers of financial
 336 resources, in a business or a family."
 337 C: I'll tell you, some people came to class with these beautiful laid out things. I was
 338 embarrassed. Mine's, you know, like this [INDICATES HER HANDWRITTEN ASSIGNMENT].
 339 R: You know what? Dr. — doesn't care. He really, really doesn't.
 340 C: Well, I figured, by looking at this [ANNOTATED MODEL]! [LAUGHS]
 341
 342 [Digression on plastic binders and Calvin & Hobbes]
 343

344 C: Okay. [READS HER PRACTICE THEN WRITES]: "In a business or a family, for situations
 345 involving comparison, for situations involving comparisons of, um." I don't know if I want to
 346 use "situations."
 347 R: So that's what you wrote before, right?
 348 C: Yeah, because I used [PAUSES]
 349 R: Is that still applicable?
 350 C: Yeah. Yeah, because you're still, you're doing the same thing but now you're comparing
 351 two different ones. I think I'm going to say, "for comparing two different situations involving."
 352 [ERASES THEN READS HER PROJECT]: "As managers of financial resources in a business
 353 or a family, um, who are asked to compare." I think I'll put it that way, or who need to
 354 compare, or who want to compare. Who need to compare. Who are comparing?" [LAUGHS]
 355
 356 C: [WRITES]: "Who are comparing two different situations involving a starting point and a rate
 357 of change, for example." And I can use the same example [FROM PRACTICE]: "Phone rates
 358 involving a monthly fee and a permanent charge." I shouldn't say "phone rates" because I've
 359 used "rate" to mean something specific.
 360 R: Where did you use that, in the other?
 361 C: In the other one [PRACTICE].
 362
 363 C: Because really the permanent charge is the rate, so I can't really use "the rate" to mean
 364 the whole thing, because that's not mathematically correct. "Rate" has a special meaning in
 365 math. So I could say, for example, "phone charges." [WRITES]: "Phone charges involving a
 366 flat monthly fee and a permanent rate." I should probably change the words in here
 367 [PRACTICE UNIT GOAL] because that's a little more specific. [READS PRACTICE UNIT
 368 GOAL]: "Involving a flat monthly fee and a permanent rate." [ERASES] That's more precise,
 369 it's more precise, and it's more mathematical, I mean using the words in the same way we use
 370 them in math.
 371
 372 C: So, [READS PROJECT UNIT GOAL]: "Involving a flat monthly fee and a permanent rate."
 373 Hm. Okay. And then the behavior. [WRITES]: "The graduate will graph." [READS PRACTICE]
 374 I don't know if that's specific enough, but. I think what I really might need to say is, "The
 375 graduate will express the information in the form $y=mx+b$, and then graph it and interpret the
 376 graph." I think I probably need to say that.
 377 R: This is moving up to the [PAUSES]
 378 C: I think I probably need to say that in both of these [PRACTICE AND PROJECT].
 379
 380 R: Both the unit goals?
 381 C: The behavior, the unit behavior. Because you can't graph it if you don't express it as an
 382 equation first.
 383 R: Um hm. Unit goal behavior for both practice and project.
 384 C: Unit behavior. Yeah. So, I'm going to say [WRITES]: "The graduate will express, will write,"
 385 because he wants specific [UNINTELLIGIBLE] expressed, and there's no specific in
 386 [UNINTELLIGIBLE]. "Will write, will address." Oh, wait a minute. This is a goal. Goals don't
 387 have to be that specific. [ERASES] Okay. [WRITES]: "The graduate will express each
 388 situation in the form $y=mx+b$. Graph each of the equations, um, find."
 389
 390 C: I don't know if I'm being too specific here or not. "Find the point of intersection and make
 391 decisions, [ERASES] and interpret the information to make decisions." Because he said
 392 interpret," so I guess I should have the word "interpret" there.
 393 R: It probably [UNINTELLIGIBLE]
 394 C: [LAUGHS] "The information to make decisions about which." [GLANCES AT ANNOTATED
 395 MODEL] I don't see, see, here what I'm trying to decide is "to make decisions, period" or to go
 396 on about "the decisions." You know, what are you deciding.
 397
 398 C: "To make decisions about which, which." Whew. "To make a decision, to make decisions."
 399 I'm just going to say "to make decisions." [ERASES] If he wants to know more he can ask. "Or
 400 decide between the two alternatives." I could say that. [WRITES]: "To decide between the
 401 two alternatives." Okay, so [READS PROJECT UNIT GOAL]: "As managers of financial
 402 resources in a business or a family, who are comparing two different situations involving a
 403 starting point and a rate of change, for example, phone charges involving a flat monthly fee
 404 and a permanent rate, the graduate will express each situation in form $y=mx+b$, graph each
 405 of the equations, find the point of intersection, and interpret the information to decide

406 between the two alternatives."
 407
 408 C: Probably not too realistic, but.
 409 R: Why?
 410 C: Because I don't think they're going to graph it.
 411 R: You don't think they'd have to in the real world?
 412 C: I don't think so.
 413 R: Why?
 414 C: I think what they would do is say, I think they'd probably say something like, "Well, if it's 10
 415 cents a minute but I've got to pay \$15 to get in the program, that means I have to pay 50
 416 minutes up front. And they'd somehow try to figure out how many minutes they'd have to talk
 417 before it would be advantageous to do that. And, uh, but, but this is a way that they could do
 418 it, and actually people who are in business might use graphs. I'm not sure.
 419 R: To be able to show others [PAUSES]
 420 C: That a family might use a graph, but a business might actually do this, use a graph. So.
 421
 422 C: And now what I'm going to do is, make a couple changes on here [PRACTICE], the ones I
 423 made on here [PROJECT]. Let's see, "the situations," I had already changed that. Or maybe I
 424 already did make that. "Situation." No, that's what I was going to change. [ERASES] I hope
 425 I'm not getting in too deep with this thing. [LAUGHS]
 426 R: That's pretty much what everyone wonders. [LAUGHS]
 427 C: Because, I mean, it's a complicated process, really. But I was thinking, do I want to do
 428 something easy or do I want to do something I can use? And this is something I can use. I
 429 mean, this is something that the kids have trouble with every year.
 430
 431 R: Well, this is definitely something you should do, then, and get the feedback.
 432 C: And uh, so, this is something I want to work on. So. [WRITES]: "The graduate will express
 433 the situation."
 434 R: Now you're adding this to both project and practice?
 435 C: Right.
 436 R: And what are you adding?
 437 C: "In the form $y=mx+b$."
 438 R: Oh, the more specific [PAUSES]
 439 C: Um hm.
 440
 441 C: Now, he might want me to say what these things mean, which wouldn't be a problem I just
 442 didn't have a lot of room. You know, he might want me to say what is Y, what is M, what is X,
 443 what is B. But that wouldn't be a problem. We could do that. [WRITES]: "Graph the equation
 444 and interpret the graph to make decisions." I hope he can read this. I think it's pretty
 445 readable, but [PAUSES]
 446 R: Well, you know, he has nothing to say about illegible handwriting. [LAUGHS]
 447 C: [LAUGHS] Oh man.
 448
 449 R: Frank had a word in his that he couldn't understand. I couldn't understand it.
 450 C: A word in his feedback.
 451 R: Feedback. And, you know, I've had a lot of experience looking at his handwriting, but I
 452 couldn't get it. [LAUGHS]
 453 C: I'm just going to say this was my draft. So I'm going to put "draft" on it so I don't hand it in
 454 by mistake. [WRITES] I think I'm done.
 455 R: Great!
 456 C: Unless you want me to do some more.
 457 R: No. Okay.

Observation Session #3

3 *COURSE TERMINAL OBJECTIVE
 4 C: [READS PRACTICE FEEDBACK] And I thought the purpose was supposed to be after the
 5 behavior, but I guess that's not a big problem. To me the purpose is to make financial
 6 decisions. I don't know if that's part of the behavior? But that's easy enough to change.
 7 Okay. [READS PRACTICE FEEDBACK]: "Am I right? Does this include all skills?" [READS
 8 CHECKLIST]: "Close representation of real conditions and real behavior for all skills." I'm not
 9 sure what he means by that.

10 R: What's that a note for?
11
12 C: I said [READS PRACTICE COURSE TERMINAL OBJECTIVE]: "The student will, 1. write
13 the terms of the situations in the form $y=mx+b$, 2. graph the two lines, 3. find and name the
14 point of intersection, 4. interpret the results by stating under what conditions the first scenario
15 is the best and under what conditions the second is best." And he said [READS FEEDBACK]:
16 "Am I right? Does this include all skills in the whole thing?" Yeah.
17 R: He's wondering if that list [PAUSES]
18 C: He's got this little diagram [DRAWING OF BUBBLE DIAGRAM], so I'm assuming he means does it
19 [COURSE TERMINAL
20 OBJECTIVE] include all the skills in this [PRELIMINARY ASSIGNMENT]. Yeah, it does. So I
21 guess that's good.
22 C: Uh. [READS FEEDBACK] Okay. Nothing.
23 R: So this is the feedback for one through five [PRACTICE PARTS 1-5].
24 C: For the practice, yeah, one through five. For the practice, right. Now [READS PRACTICE
25 UNIT GOAL]: "As managers of." [READS CHECKLIST]: "Real role." I think he wants. [READS
26 PRACTICE UNIT GOAL]: "As managers." [PAUSES]
27 R: That's down in number 5?
28 C: [UNINTELLIGIBLE] [READS CHECKLIST]: "Unit goal is one whole piece." [READS
29 FEEDBACK]: "Yes." He's got "yes." so I assume that means it's okay. And then he's got "in,
30 or." [MISREADS "OK, OK" UNDER "REAL ROLE AND SETTING" IN CHECKLIST.] [READS
31 FEEDBACK]: "Decisions about, to make." Oh! "To make decisions about, with slight change,
32 purpose OK." Well.
33
34 C: Okay. I'm going to type this. When we get down to here I think I can figure out what he
35 means here.
36 R: Okay. I think this is [POINTS TO CHECKLIST THEN PAUSES]
37 C: [READS PRACTICE UNIT GOAL]: "As managers of financial resources" [PAUSES]
38 R: "A. In a business."
39 C: I have "in a business." Does he want me to put the "in" earlier?
40 R: Wait, that's an "OK," isn't it? Is that an "OK"?
41
42 C: [READS PRACTICE UNIT GOAL]: "As managers." [PAUSES] Could be. Could be. Yeah,
43 kind of looks like his "OKs." [READS PRACTICE UNIT GOAL]: "As managers of financial
44 resources in a business or a family, in order to make decisions about situations." Okay, that's
45 what he wants me to say, "in order to make decisions about situations involving." The rest of
46 it's okay. [READS FEEDBACK]: "Put above in the conditions." So he wants me to put the
47 "make decision" thing above. Right here [POINTS TO UNIT GOAL CONDITION].
48 R: [UNINTELLIGIBLE]
49 C: Okay, that's clear. It won't take me that long to type this.
50
51 R: Okay, now, where are you going to put your notes, over there [TO LEFT OF COMPUTER]?
52 C: Um, do you want me to put them here [TO RIGHT OF COMPUTER]? I can [PAUSES]
53 R: No, I can come over behind you. [MOVES CAMERA]
54 C: Um, I'm probably going to have to get out, I'll have to get out the rest of the assignment
55 from my big binder. So I have, this is page 699. I got it out of the back. Now, I'm looking for
56 the rest of Assignment #1. [LOOKS THROUGH COURSE PACK] Okay, I found it.
57 R: That's the blank format for [PAUSES]
58 C: The blank forms for Assignment #1.
59
60 C: [PLACES 2 C. OF BLANK FORM AT RIGHT OF COMPUTER] And, so now I don't need
61 this [COURSE PACK] [UNINTELLIGIBLE]. Okay. Here's my sample [AT LEFT OF
62 COMPUTER].
63 R: Oh, the model?
64 C: That's the model. So now I'm going to just type this in real quick.
65 R: What are you typing in?
66 C: I'm going to type in all the stuff that he gave me [FEEDBACK].
67 R: Oh, that's the stuff from parts 1-5, that you handwrote?
68 C: Right. And then I'm going to, I'll just do the practice because I can do the project, I can
69 retype this later. It's almost the same.
70

71 R: Uh huh. So you're going to make the changes that he indicates there [IN FEEDBACK]?
 72 C: Yeah. So. [TYPES FROM FEEDBACK]
 73
 74 C: Hm. "Involving rates." Okay, so.
 75
 76 C: Okay, so, I'm on number 4 right now.
 77
 78 C: Okay, now I'm on 5, which is the one I have to change. So.
 79 R: The main change was what?
 80 C: It was in number 5, putting the purpose up in the condition. So. [TYPES]: "As managers of
 81 financial resources, in a business or a family, in order to make decisions about," about what?
 82 [SIGHS] "In order to make decisions about. [READS FEEDBACK] Oh, about situations."
 83 Okay. [TYPES]: "about situations involving a starting point and a rate of change, for example,
 84 phone charges involving a flat monthly fee and a per-minute rate." Okay. "The graduate will
 85 express the situation as a linear equation in the form," [PAUSES]
 86 R: Did he question that? Ask what it meant?
 87
 88 C: [READS FEEDBACK] He's got "yes"! You know, and I'm just thinking about this as I'm
 89 reading it, and it's not very realistic, but we're addressing the realism later, I guess. He put
 90 "yes" and he put an arrow to it and he's got it underlined.
 91 R: An arrow from what?
 92 C: From where it [CHECKLIST] says "one whole piece," he circled that, wrote "yes" next to it,
 93 and drew an arrow down to where I have $y=mx+b$. "Graph the equation."
 94 R: "One whole piece." Is that what it says? "One whole skill"?
 95 C: [READS CHECKLIST]: Unit goal is one whole piece." This is my practice here.
 96 [UNINTELLIGIBLE]
 97
 98 R: Actually, all he's saying is that, I think what it means is that, that can stand as one whole
 99 lesson, thing to teach.
 100 C: Right. But he didn't question it. He didn't say, "Well, yeah, this isn't realistic."
 101 R: Well, you were wondering if he would want you to explain what it meant.
 102 C: I was wondering [PAUSES]
 103 R: But since this is your objective [PAUSES]
 104 C: Okay. [READS PRACTICE UNIT GOAL]: "The graduate will express the situation as a
 105 linear equation in the form [TYPES] $y=mx+b$, graph the equation, uh, and interpret the
 106 graph."
 107
 108 C: And "to make decisions" already went in a different part [CONDITIONS] so I think I'll say
 109 "interpret the graph," period. So I'm done with this, revisions. [READ FEEDBACK]: "Carol,
 110 apply practice feedback.," Oh, well, I was going to do that anyway.
 111 R: He writes that on everybody's.
 112
 113 *PART 6 - UNIT TERMINAL OBJECTIVE - PRACTICE
 114 C: Okay. Now. Unit terminal objective.
 115 R: Okay, so this is part 6.
 116 C: This is the new part. Um.
 117 R: And that's the blank form you're looking at?
 118 C: I'm looking at the blank form. Practice is what I'm doing first. And if we have time I can go
 119 back and work on the project.
 120
 121 C: [READS CHECKLIST]: "Number of cases or situations." Okay, now I'm looking at the
 122 example. [READS UNIT TERMINAL OBJECTIVE FROM ANNOTATED MODEL]: "Given ten
 123 problem cases, in written form." Okay.
 124 R: So that's the annotated one [UNIT TERMINAL OBJECTIVE]?
 125 C: Right. Well, I think I would say, "Given." I don't think I'd give them ten. If they could do five,
 126 they'd die. I would say, "Given five." [TYPES]: "Given five." And this is the, "Given five."
 127 They're not too specific about the, oh, yes they are. [READS CHECKLIST FOR UNIT
 128 TERMINAL OBJECTIVE]: "Such as." Okay. Yeah. So, [READS CHECKLIST]: "Complete
 129 description of the givens." [TYPES] "Given five problem cases in written form." Okay. [READS
 130 CHECKLIST]: "Complete description of the givens." [TYPES]: "that involve an initial cost or
 131 starting point and a constant rate of change."
 132

133 C: Now this is not [READS ANNOTATED MODEL] apparently the place where I tell if they can
134 use calculators or not? It says: "Complete description of the givens," but then it says
135 "problems of what kind." So I don't know how specific I need to be, that I'm giving them graph
136 paper, and calculators? Um, really, they wouldn't need calculators. [READS PRACTICE UNIT
137 TERMINAL OBJECTIVE]: "Given five problem cases in written form." [READS ANNOTATED
138 MODEL]
139 R: What does it say in the model?
140
141 C: Um, well, in the model it doesn't say anything about calculators, or. I'm trying to see if it
142 says anything about it later, because. [READS UNIT TERMINAL OBJECTIVE IN
143 ANNOTATED MODEL]: "Criteria." Um, I think I will just go ahead and put it in here
144 [CONDITIONS] anyway, because I don't know where else it would go. If it doesn't go there, I'll
145 cross it out. Because in this example [ANNOTATED MODEL], they're talking about
146 elementary students, where maybe they wouldn't want them to have calculators, so maybe
147 they wouldn't mention it. I would say, "Given five problem cases in written form."
148
149 C: I'm going to go back up to my givens. And I'm going to say, "comma graph paper." Well, I
150 should say, "and graph paper but without calculators." Because they won't need calculators.
151 [TYPES] But that doesn't make sense grammatically, to say, "Given five problem cases in
152 written form, and graph paper, no calculators," and then, "that involve?" Because that relates
153 to the problem case, so it doesn't sound right. Hm. Maybe that goes later, under the
154 conditions. [BUT SHE IS WRITING THE CONDITIONS.] I guess that goes under the
155 Conditions.
156
157 C: [READS CHECKLIST]: "Close representation of real conditions: time and," I don't even
158 know what that means, "place in unit goal."
159 R: Are you doing unit goal or unit terminal objective?
160 C: I'm doing the unit terminal objective, but on the example [ANNOTATED MODEL] it doesn't
161 say anything. It just says [READS CHECKLIST FOR UNIT TERMINAL OBJECTIVE IN
162 ANNOTATED MODEL]: "Close representation of real conditions." I think that's where I would
163 put it, though. So that's where I'm going to put it. Okay.
164
165 C: [READS PRACTICE UNIT TERMINAL OBJECTIVE]: "in written form." I'll just go back to
166 that. [READS PRACTICE UNIT TERMINAL OBJECTIVE]: "that involves an initial cost or
167 starting point and a constant rate of change." And then, "for example." [READS ANNOTATED
168 MODEL] It needs examples. Hm. Okay, I see what I'm, part of the reason I'm having a
169 problem is these things [CHECKLISTS ON BLANK FORM AND ANNOTATED MODEL] don't
170 match.
171 R: Oh, no?
172 C: No. This [checklist on blank form] says: "Number of cases. Complete description of givens."
173 Oh, that [ANNOTATED MODEL] says: "Complete description, the way the situation," Yeah, I
174 guess it does match.
175
176 R: Oh, it's just he's gotten things written in there?
177 C: [COMPARES ANNOTATED MODEL AND BLANK FORM]: "Describes the test situation.
178 Close representation of real conditions: time and place." [SIGHS] [READS CHECKLIST ON
179 ANNOTATED MODEL] I already said of what kind. "That involve an initial cost or starting point
180 and constant rate of change. such as." [READS ANNOTATED MODEL] Okay. Such as. Such
181 as, um, let's see. [UNINTELLIGIBLE] a problem. [TYPES]: "Such as a rental car costs \$30,
182 uh, per day plus 10 cents." Okay. [READS ANNOTATED MODEL THEN TYPES]: "10 cents a
183 mile. Uh, Show this information." Maybe I should say "write this information." This is a unit
184 objective, so it's got to be specific.
185
186 C: Behaviors, [UNINTELLIGIBLE]. [READS ANNOTATED MODEL] Oh, this isn't what I have
187 to do right now. Okay.
188 R: What did you think you had to do?
189 C: I was thinking I had to tell the specific behavior, but I don't. This [THE "SUCH AS"] would
190 be an example of a problem I'm going to use, and then later I have to tell the behavior. Okay,
191 so. I'm just going to say [TYPES]: "Express this as a linear equation." Okay. "Graph the
192 equation," uh. Then I would ask them to, by reading the graph, uh, let's see, find. [PAUSES]
193 R: What are you thinking about?
194

195 C: I'm thinking about "Find and label the point on a graph that shows what it would cost to
 196 rent the car for a day if you traveled 500 miles."
 197 R: This is your "such as"?
 198 C: Yeah. This is my problem.
 199 R: Is it the wording or what?
 200 C: It's, uh, [PAUSES]
 201 R: that you were sighing about.
 202 C: Well, because my objective initially had something to do with interpreting a graph. I think.
 203 [READS PRACTICE PARTS 1-5] My real world performance had to do with interpreting a
 204 graph. Yeah, so I think that would be appropriate. so [TYPES]: "Find and label" [PAUSES]
 205
 206 R: So, were you just looking at your assignment that you handed in?
 207 C: Yeah, [READS FORM] my unit goal real world performance. [TYPES]: "The points on the graph that
 show
 208 how much it would cost to." See, I'm not, I, you know, this. Actually, this example might not be
 209 very good. I should probably change it.
 210 R: Why?
 211 C: Well, because you're really talking about two rates. You're talking about a per-day rate of
 212 \$30 a day, plus a per-mile rate. And that could get confusing.
 213
 214 C: It would probably be better to talk about something like phone rates, where it's like, even
 215 though you're talking about a per-month rate, you can keep it at a month. Uh, unless I say,
 216 "graph the equation that shows the possible costs for one day." I could say that, and then
 217 that defines, um, you're only talking about renting it for one day. I think I'll do that. [TYPES]
 218 Oops. Okay. "Shows the possible costs for one day."
 219
 220 C: Okay, and then, "Find and label the point on the graph that shows how much it would cost
 221 to rent the car for one day and drive 500 miles." Okay, that's my "such as." Specific examples.
 222 Now. [READS CHECKLIST ON ANNOTATED MODEL]: "Close representation of real
 223 conditions." What conditions and where? I need a different example. This is not [LOOKS
 224 THROUGH COURSE PACK]
 225 R: The annotated model isn't, uh [PAUSES]
 226 C: It's not, uh, detailed enough, because there's nothing written in here [CONDITIONS OF
 227 UNIT TERMINAL OBJECTIVE IN ANNOTATED MODEL]. It just says "like." I'm not going to put
 228 "like conditions in unit goal." But I don't know if there is another one [EXAMPLE]. Let's see. I
 229 know what I'm supposed to put in there, I just don't know how to, you know, I kind of get
 230 hung up on grammar sometimes.
 231 R: You're not alone, believe me! [LAUGHS]
 232 C: [LAUGHS]
 233
 234 C: Well [READS CHECKLIST ON BLANK FORM]: "Such as." Okay. "Describes the test
 235 situation."
 236 R: So what are you looking at now, the blank form?
 237 C: Yeah, the blank form. Okay, "close representation of real conditions: time and place in
 238 unit." I, I [PAUSES]. "Time and place in unit goal." I don't, I don't get what that means.
 239 [READS CHECKLIST ON BLANK FORM] Oh, okay, I get what it means. He wants as close
 240 representation of the time and place we specified in our unit goal.
 241 R: Okay. How did you figure that out?
 242 C: Because it says "close." It says "colon, time and place in unit goal." I think that, okay, the
 243 unit goal has a time and a place. So that's what he means.
 244
 245 R: Okay, you were looking over on that side [LEFT COLUMN OF ANNOTATED MODEL].
 246 Were you looking at the criteria on the left, that's the same as on this blank form?
 247 C: I was looking, yeah. And then this person [READS NOTE] says, "like conditions
 248 in unit goal," but their unit goal, where's their unit goal? [READS NOTE]
 249 They say, "like conditions in unit goal."
 250 R: What are the conditions in the unit goal?
 251 C: In their unit goal, "As managers, at home or in business, for problems with whole numbers
 252 involving division of small resources into equal parts, using short division, no remainder."
 253 [UNINTELLIGIBLE] specific! I don't know if I'm being specific enough, but anyway. Um, okay.
 254 So maybe, so I wonder if he wants us to write that whole thing out again.
 255

256 C: [READS EXAMPLE] I, hm. See, because in the example
 257 they didn't write anything. They put, you know [READS ANNOTATED MODEL]: "same as, like
 258 the conditions in the unit goal." Okay. Anyway, "such as, blah, blah, blah." Um, I'm just going
 259 to put, "with, without calculators."
 260 R: What part are you on now?
 261 C: The part where I have to have a close representation of real conditions [UNIT TERMINAL
 262 OBJECTIVE].
 263 R: Oh, the conditions part?
 264 C: [TYPES]: "Without calculators but using graph paper." I don't know what else to put. I'm
 265 going to stop with that. I don't know if I'm supposed to put "as managers of" [PAUSES AND
 266 SIGHS]. Okay, [UNINTELLIGIBLE]. And then [READS
 267 UTO ON BLANK FORM], terminal behaviors. Okay. So here's where I put what they will do.
 268 [READS EXAMPLE]: "The student will." [READS CHECKLIST??] You've got to use action verbs with
 269 objects.
 270
 271 C: Well [READS PRACTICE], that ought to be all right. [TYPES]: "The student will, 1." Oh,
 272 maybe I need to be really specific. I don't know, but this one's not [ANNOTATED MODEL]. It
 273 just says "write out the problem mathematically." So I guess I don't have to be that specific.
 274 So [PAUSES]
 275 R: How specific were you?
 276 C: Well, I was going to say "the student will put the initial cost as B, the rate as M," [PAUSES]
 277 but I'll just say [TYPES], "The student will write the problem, the information in the form
 278 $y=mx+b$." Okay. "To graph linear function."
 279
 280 C: Now what I'm trying to determine is should I say how I want them to graph it, or [PAUSES]
 281 R: How do you want them to graph it?
 282 C: I'm trying to figure out if I need to give details about this graph. [READS FEEDBACK
 283 FROM PRACTICE] "Graph the linear function so that." Well, I would at least want the Y-
 284 intercept to be clear, and. Hm. I think I'll just say "Graph the linear function." [TYPES]: "And
 285 3." Uh, let's see. [READS FEEDBACK FROM PRACTICE] Find and label, okay, label, find.
 286 Circle, maybe I should say that. I'll just say label.
 287
 288 C: [TYPES]: "Find and label a point on the graph by." I think I need to say how they will label.
 289 "by darkening the point and naming it by writing the coordinates." Yeah.
 290 R: That was, the um, behavior?
 291 C: Now, the only thing that I'm wondering about is, I said "interpret." And I'm wondering if he's
 292 going to say, "Well, what behavior indicates they can interpret?" To me, finding and labeling
 293 the point indicates that they can interpret it, because if I say "Tell me how much it costs to go
 294 500 miles," and they can tell me.
 295
 296 C: Well, I guess they need to take it one step farther. [READS PRACTICE]: "Find and label a
 297 point on the graph by darkening the point and naming it by writing the coordinates." And
 298 then, "4. explain in writing what the coordinates mean." I guess that would be the
 299 interpretation part. [TYPES] Okay.
 300 R: Okay, so what have you got there?
 301 C: I've got , as far as behavior, "The student will, 1. write the problem in the form $y=mx+b$,
 302 graph the linear function, find and label the point on the graph by darkening the point and
 303 writing the coordinates, and 4. explain in writing what the coordinates mean."
 304
 305 C: In other words, it means if I go 500 miles, this is the cost. So, because they might be able
 306 to label the points and still not know what it means. So I need to know they know. And what
 307 that represents. Now. [READS CHECKLIST ON PRACTICE]: "The object of the action verb."
 308 Let me go back. [READS PRACTICE] I've got action verbs and objects. Yeah, everyone of
 309 them does. Everyone of them has an object. Because "write problem, graph function, find
 310 point, explain coordinates."
 311
 312 C: Okay. [READS CHECKLIST ON PRACTICE]: "Close representation of real world
 313 performance." [READS NOTES ON ANNOTATED MODEL]: "Writing out shows how the
 314 student solves the problem." Oh, okay. Those are his. Okay, I see what this is!
 315 R: What are you looking at right now?
 316 C: Well, on the model, apparently, these are just notes. I don't, apparently I don't necessarily
 317 have to write something for every one of these things [THE FOUR BEHAVIORS], because on

318 the model there's nothing written here.
 319 R: Where? About?
 320 C: [READS PAGE 76 OF ANNOTATED MODEL]: "Close representation of real conditions,"
 321 under number 6, there's nothing written.
 322
 323 C: And the same way under Terminal Behaviors, under "Close representation" there's nothing
 324 written there except for his notes. So I'm assuming that means I don't have to put anything
 325 there. So I'm going to [delete?] that point. Now, doing the practice, er, doing the project will
 326 be a little more complicated because it's a more complicated skill, but I'm just going to finish
 327 up the practice, I guess.
 328 R: Okay. Are you going to do part seven now?
 329 C: [LOOKS AT PRACTICE] Yeah. "Justification of Unit Skill." That's seven.
 330
 331 R: Oh, you're not done with six.
 332 C: I think I'm done with it. [LOOKS AT PRACTICE] I've got terminal behaviors. [LOOKS AT
 333 MODEL] Uh oh. Shoot!
 334 R: [LAUGHS] I don't know if I should have told you that.
 335 C: Oh, Lordy. "Criteria." This is so tedious.
 336 R: Can you see doing this for all your [PAUSES]
 337 C: [LAUGHS] I can just, yeah, for every, yeah. But I can see that it would be valuable.
 338 R: He says if it's something easy, you know, a few steps, you don't need to bother.
 339 C: Right. The thing is, if they wouldn't give us so many preps, we could do this. I mean I
 340 would really like to be able to do this, for [PAUSES]
 341
 342 R: Well, like that thing — showed you in class, that he did for L.A.
 343 C: Um hm.
 344 R: Is that cool or what?
 345 C: [LAUGHS] We got that, too, but nobody uses it. It's not a checklist, but we have a
 346 curriculum thing that tells they're supposed to learn this skill in eighth grade, and this one in
 347 ninth, but when they give you a textbook and they say, "Go through this textbook," and
 348 you've got to be through Chapter 12 by the end of the year, you're not looking through that.
 349 You're saying, "Okay, I have to finish this chapter because we're behind schedule. We have
 350 to get through this by the end of the year."
 351
 352 R: Yeah, two separate systems going on.
 353 C: Yeah. Okay, if they'd write the textbook to go along with what we already have set as our
 354 curriculum. But see, our, actually, our textbooks do go, because what we did, we consulted
 355 the textbook first, then set up the curriculum things. We said, "Okay. This is covered this year.
 356 This is covered this year."
 357 R: Yeah, that's what he did for that, yeah.
 358 C: Oh, let's see. Okay. [READS MODEL ON PAGE 77]: "The work shown will." Okay. Here's,
 359 here's the criteria.
 360
 361 C: [READS CHECKLIST]: "So well that. Not applicable here. Built-in
 362 checklist. Follow the sense of the information given." I, I don't even know what that means.
 363 Okay. [UNINTELLIGIBLE] [READS BLANK FORM] Okay, let's see. "Checklist." Okay, I think
 364 these are just suggestions.
 365 R: Which ones?
 366 C: The Criterion. I don't have to do all of this.
 367 R: What's that, the "according to" or [PAUSES]
 368 C: "So well that. Built-in checklist." Built-in checklist is probably what I would use. Um, so.
 369 Okay. Um
 370
 371 C: [READS PRACTICE THEN TYPES]: "The work shown must fit the following criteria." Okay.
 372 "One." [READS MODEL] Okay, we. Let's see. [UNINTELLIGIBLE] [TYPES]: "The initial
 373 amount is, um, shown in the." Okay. Maybe I should, no, I'm going to go back and
 374 [UNINTELLIGIBLE]. Okay. Um. "In the equation $y=mx+b$," [UNINTELLIGIBLE] I should,
 375 actually I should that [UNINTELLIGIBLE]. Okay. "In the equation $y=mx+b$, the value which
 376 students uses for B will be the initial, um, cost or starting point. The value used for M will be
 377 the rate of change." [PAUSES]
 378 R: What's the word you're thinking about?
 379 C: How to describe this so that it's clear.

380 R: Describe the criteria?
381
382 C: How much detail I have to go into. This is a lot more complicated than division. [READS
383 EXAMPLE]: "Or a logical substitute to the T.D." What's the T.D.?
384 R: Task description.
385 C: Oh. [Reads Practice]: "The value used for M will be the rate of change." I should actually
386 put all of that under number one [CRITERION #1]. Okay. Um, [UNINTELLIGIBLE]. [TYPES]
387 Okay, so that takes care of the equation, the criteria for how they've got to write the
388 equation. [READS PRACTICE]
389 R: Okay. What do you have now?
390 C: "In the equation $y=mx+b$, the value the student uses for B will be the initial cost or starting
391 point, and the value used for M will be the rate of change." Okay, because those were the
392 two things that were given in the problem.
393
394 C: Okay, now I'm going to look at the graph. [TYPES]: "The graph will show the correct Y
395 intercept, which is B, and the correct slope, which is M." Okay. The, let's see, then I ask them
396 to find and label a point, so I have to say [TYPES]: "The point they have labeled will be the
397 correct point and will be correctly labeled."
398
399 C: [TYPES]: "The point do they have," darkened, maybe I should say, "will be the correct
400 point and will be correctly labeled." And then the last part. The, let's see. Uh, it has to do with
401 interpretation. Interpreting, um. [READS PRACTICE]: "Correctly labeled." Um. It would be so
402 much easier if I could use an example.
403 R: Instead of having to describe [PAUSES]
404 C: In general. Uh, I'll just say [TYPES]: "The explanation of what the point, of the
405 information." [UNINTELLIGIBLE] Okay, number four (behavior #4) says [READS PRACTICE]:
406 "Explain in writing what the coordinates mean."
407
408 C: So I should say, "The explanation of what the coordinates mean is correct." [TYPES] "Is
409 correct." Okay, there's my checklist.
410 R: Okay, read your checklist again.
411 C: Okay. "The following criteria: 1. In the equation $y=mx+b$, the value which students uses for
412 B will be the initial cost or starting point. The value used for M will be the rate of change." So
413 what I was trying to say is that they have to put the values into the equation correctly. Um,
414 [UNINTELLIGIBLE]. "And, 2. The graph will show the correct Y intercept (b) and the correct
415 slope (m), 3. The point they have darkened will be the correct point and will be correctly
416 labeled, and 4. The explanation of what the coordinates mean is correct."
417
418 C: I shouldn't say "will be" and then "is." That's grammatically, I can change it later. But that's
419 basically. Okay. [READS MODEL ON PAGE 77] And then I have to, okay, they [MODEL]
420 used a checklist. That's what they used in the example. And there really aren't any
421 substitutes to this. They really have to do all of this. And I've told what the result needs to be.
422 Okay, and then the Lower Limits. [READS FORM]: "Number of repetitions." [READS EXAMPLE] I
423 would say, for my kids, three out of the five problems have to be completely correct, with no
424 errors. Okay, so. [UNINTELLIGIBLE] [TYPES]
425
426 C: Okay. [READS BLANK FORM]: "Quality." Oh! [UNINTELLIGIBLE] in one.
427 R: So what have you got there?
428 C: He wants it in two? [READS MODEL] Well, he wants number of repetitions and then
429 quality. Okay. So I just need to separate it. I have "three of the five problems must be
430 completely correct with no errors," but I think he wants me to separate it. "Three of the five
431 problems" goes in one spot, and then "completely correct with no errors" in the other spot.
432 R: Do you, how did you figure that out?
433 C: Because of the model. It has two different places [FOR REPETITIONS AND QUALITY]
434 R: Were you looking at the model or the [PAUSES]
435 C: I was looking at the model, yeah. But on here [BLANK FORM], too, the number of
436 repetitions and quality.
437
438 R: Oh, are you looking at the blank form?
439 C: Yeah. So that's not a problem. "Three of the five problems." I don't think I should use
440 "must be." I think I should use "are." [READS PRACTICE]: "Three of the five problems,
441 completely without errors, will be passing." Actually, for my kids, three of the five correct, that'd

442 be like a B.

443 R: [LAUGHS] Well, that's probably what I did. I'd be thrilled with myself as a student.

444 C: Okay. So now, I think I've completed unit, number 6. Now I've got to do seven. So.

CAROL'S FINISHED ASSIGNMENT WITH FEEDBACK -PAGE 1

NAME _____ ASSIGNMENT FORMAT #1

- PROJECT _____ I have read the assignment and I have read the model
 PRACTICE _____ I have read the annotations on the model
 I have a physical or mental skill whose steps and decisions I know well enough to describe step by step in assignment 2

School subject 1. COURSE/SUBJECT NAME Algebra

Course - whole 2. DIAGRAM OR OUTLINE SHOWING COURSE GOAL & UNIT GOALS
 Unit - part (Use back of page if needed)

Each unit is a skill (see following page)

Star unit developed

3. COURSE GOAL - REAL WORLD PERFORMANCE

Condition As managers of financial resources in a business or a family, to be able to make financial decisions

Real Grad. behavior Behavior the graduate will interpret graphs of linear systems.
 Generally stated
 Related to subject

4. COURSE TERMINAL OBJECTIVE (Course Final Exam)

Close representation of real conditions & real behavior for all students Condition Given two different but related situations involving rates, such as two job offers involving salary plus commission the student will

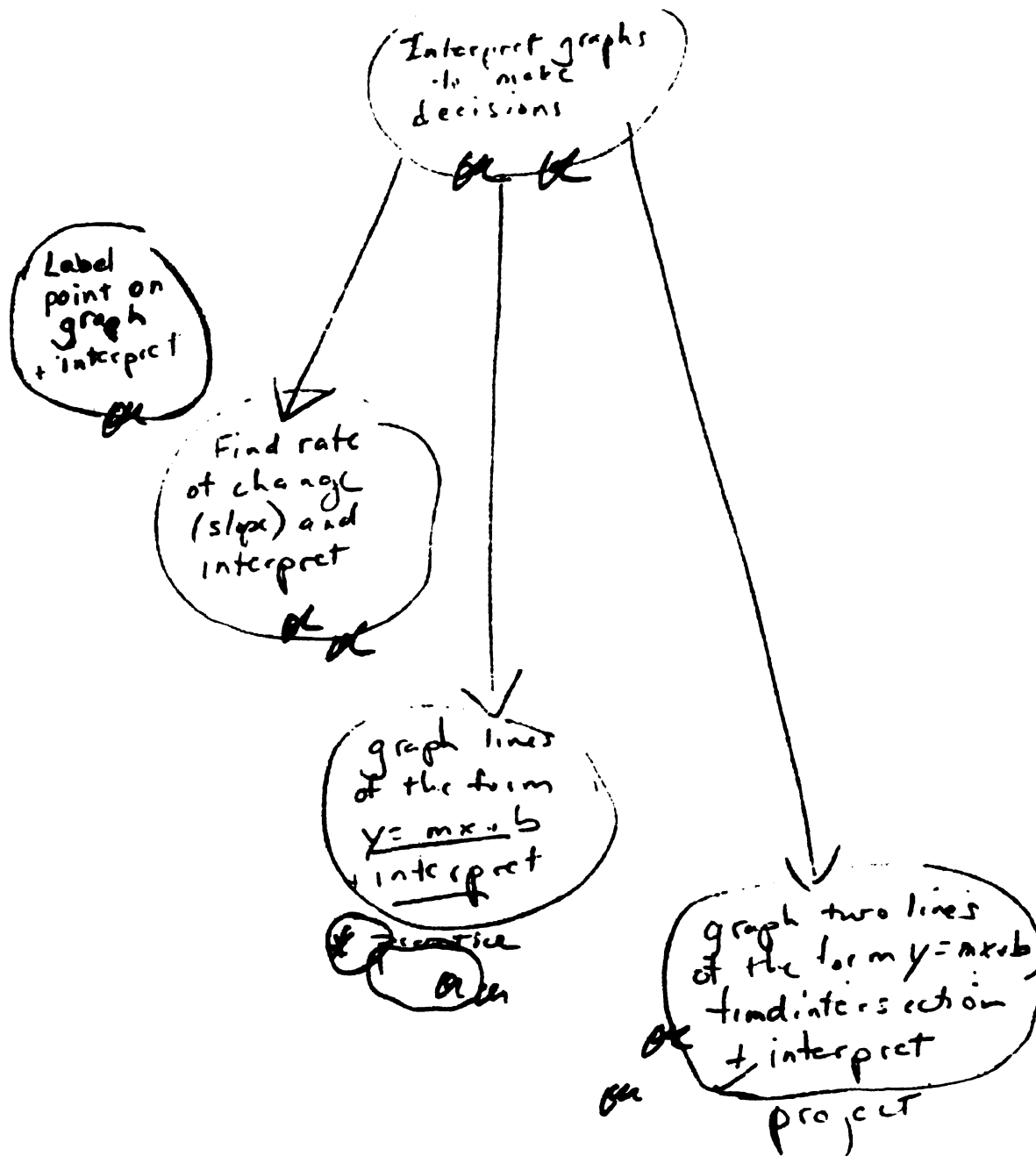
- Specifically stated version of course goal Behavior
 "Test" of students at end of course
 1) write the terms of the two situations in the form $ymx + b$
 2) graph the two lines correctly
 3) find and label the point of intersection
 4) interpret the results by stating under what conditions the first scenario is the best, and under what conditions the second is best.

5. UNIT GOAL - REAL WORLD PERFORMANCE

Unit goal is one whole piece of the real world course Condition As managers of financial resources in a business or a family, in order to make decisions about situations involving a starting point and a rate of change (e.g., phone charges involving a flat monthly fee and a per minute rate)

Real Grad. behavior Behavior the graduate will express the situation as a linear equation in the form $ymx + b$, graph the equation and interpret the graph.
 Generally stated
 Real performance
 Real Grad. behavior

CAROL'S FINISHED ASSIGNMENT WITH FEEDBACK -PAGE 2



CAROL'S FINISHED ASSIGNMENT WITH FEEDBACK -PAGE 3

6. UNIT TERMINAL OBJECTIVE (Unit Final Exam)

Conditions:

For cases/ situations

Given five problem cases in written form

Complete descriptions of

that involve an initial cost or starting point and a constant rate of change such as:

"gives"

The way situation is presented on the test "Medium"

"Such as"

describes "test" situation

Close representation of real conditions: time and place in unit goal

The rental car costs \$30.00 per day plus \$10 a mile. Express this as a linear equation of the form $y = mx + b$. Graph the equation that shows the possible costs for one day. Find and label the point on the graph that shows how much it would cost to rent the car for one day if you drive 500 miles.

Without calculators, but using graph paper

Terminal behaviors:

Behavioral terms

Object of the action very clear

If more than one behavior then listed and numbered

Close representation of real performance in unit goal

The student will

1) write the terms of the situation in the form $y = mx + b$

2) graph the line

3) Find and label a point on the graph which corresponds to a given value of x (such as 500 miles) by darkening the point and writing the coordinates next to it

4) explain in writing what the coordinates mean.

Criterion:

According to or so well that or time

Built in checklist

Criterion for each behavior

If more than one criterion then listed and numbered

The work shown must fit the following criteria:

1. In the equation $y = mx + b$, y is the total cost or amount, m is the rate of change, b is the initial cost or amount and x is the variable that determines the total (such as miles, minutes, sales)

2. The graph will show the correct y -intercept (b) and the correct slope (m).

3. The point that is darkened will be the correct point and will be correctly labelled.

4. The explanation of what the coordinates mean is correct. (e.g. "The cost to rent a car for one day when you drive 500 miles is \$80.00.")

Lower limits:

of times done on test

of repetitions:

Quality:

Quality cutoff: # of errors within a situation/item

Three of the five problems

completely correct, with no errors will be passing.

APPENDIX D

DANA'S STORY

OBSERVATION SESSION #1

Assignment: Write a diagram of the course structure in terms of a course and unit goals and select units to develop for practice and project.

Orientation

During session #1 Dana worked on the course diagram. Before starting to write she familiarized herself with the preliminary assignment by looking at the course outline and calendar, then marked the page containing the instructions for the assignment. Then she looked for examples of diagrams in the course pack by looking for "bubbles" because the diagram's goals were circled and connected by lines to each other.

Dividing Course Goal into Units

Dana first read the instructor's suggestions for selecting a course topic. She chose finding a percent of a number as her course topic because she felt it was important for children to learn and it was a task done in the real world. She looked in the Interpretation of Goals and Objectives for Math, by the State Board of Education to see how they divided finding percent of a number into units, then decided to do mentally finding a percent of a number as her practice unit topic. She decided to choose the more challenging of the two units to be developed as her practice so she could get feedback on it from the instructor.

She looked at the Example to see how the course goal was worded, then rewrote the units from the Board of Education book to fit the wording of the Example. She also derived rules from the Example for how to divide or group the units under the course goal, and to see if her units were too large or too small to develop in the assignment.

Strategies

When Dana had questions she would look in the course pack for answers. Frequently she turned to the Example, but sometimes it was not sufficient and she would look for other examples. She thought that the real world performance of the course goal in the Example diagram was less important than hers and sometimes found the Example too simple to help her.

Errors

Dana made two errors during session #1, but one she did not discover until reading the instructor's feedback during the next session: the instructor had wanted her to print the assignment right onto the Form (P2, 51-53). The second error she discovered herself after the session but before she turned the assignment in: she had left out the verb and

object in her diagram goals. She discovered this by reading the Checklist, which she did not do at all during the session. This made her realize she had better read the tools more carefully.

Problems

During session #1 Dana worried if her unit was too small or too large to do for the assignment, if the units were related but not necessarily prerequisites to other units, how many levels she should divide the course goal into, how to word the course goal, and how specific it should be. She also wondered what the difference was among course, unit and major goals, as labeled on the Example. Four of these problems she was able to resolve by reading the Example, especially the problems concerning wording and levels of units. Dana's completed diagram is shown in the Appendix.

CHRONOLOGY OF TOOL USE

Following is a chronological list of the actions Dana took while writing her assignment during session #1. This list is followed by a summary and model of the chronology.

ORIENTATION

- Review assignment with course calendar and outline and examples.
- Organize materials.

COURSE DIAGRAM

- Consider difference between course goal / major goal / unit goal.
- Consider real world performance for math classes.
- Reconsider real world performance.
- Take units from State Board of Education guidelines.
- Read Example to see how it is divided into units.
- Compare Example with own course and units.
- Write course goal for diagram.
- Compare course goal to Example to see if course goal is too specific.
- Read Example to see how many levels of goals it has.
- Write unit goals from State Board of Education guidelines.
- Consider number of units by looking at Example.
- Choose more challenging unit for practice.
- Consider prerequisites and if Example units are related to each other.
- Consider size of unit and look at Example to derive rules for size.
- Reconsider real world performance for a math class.
- Reconsider how many units to have and their size. Look at Example and other examples for help.

Summary of Tool Use

Dana used several tools before writing to learn what she should write and how it should be written. She wrote the course and unit goals, then used the Example to gauge if she had written them correctly. She revised the unit goals, used the Example again to gauge their correctness, then revised them a second time. After that she used the tools many times to resolve problems of how many units to divide the course goal into, how big

they should be, which to develop for the practice and which for the project, and how to show which units were prerequisite to the others. She did not revise the diagram any more, however.

Model of Tool Use

Figure 77 below shows a model of Dana's tool use during session #1. The horizontal line represents time. The area above the line indicates the tools Dana used and the purpose for which she used them. The area below the line indicates which part of the assignment Dana wrote at that time. The abbreviations used in the model are:

EX = Example; ex = additional example; instr=instructions; explan=explanation;
→ = prevent error; ← = detect/correct error

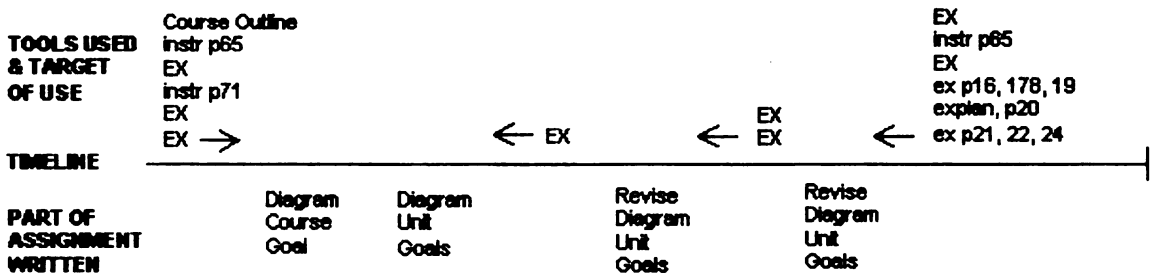


Figure 77: Model of Dana's Tool Use during Session #1

HOW DANA USED THE TOOLS

In this section I will describe which tools Dana used, how frequently she used them, for what purpose she used them and what tasks she did with them, what cued her to use them, and what characterized her practice of the assignment and her use of the tools.

Dana used the major tools (Example, Checklist, Form, Annotations) ten times and the other tools in the course pack 11 times, as shown in Figure 78 below. The other tools used were instructions, the course syllabus, and additional examples in the course pack.

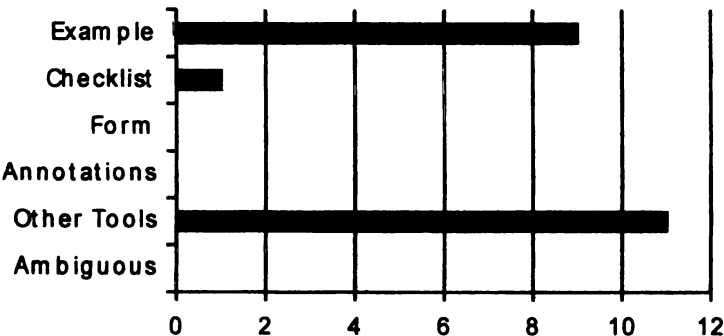


Figure 78: Dana's Frequency of Tool Use during Session #1

Dana used the tools at the beginning of the assignment to learn what was expected of her and how extensive the assignment was. She used the tools while she was writing to determine what components to include and how to write them. After she finished writing she used the tools to help her gauge the correctness of what she had written. She also used the tools to resolve problems as they came up.

Dana consciously responded to three cues to use the tools:

- 1) when she was uncertain what to write, such as when she started a new part or when she did not understand the tools or instructions,
- 2) when she had questions about or disagreements with the tools or instructions, and
- 3) when she wanted to check what she had written to see if it was correct.

Dana's tool use during observation session #1 was for the purpose of preventing errors by resolving problems, to help her attempt to detect errors, and to detect and correct an error. She used the tools to prevent errors seven times, to attempt to detect errors 13 times, and to detect and correct and error one time, as shown in Figure 79 below.

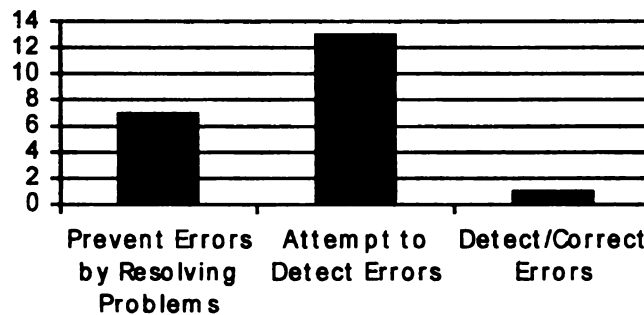


Figure 79: Dana's Frequency of Tool Use for Preventing, Attempting to Detect, and Detecting/Correcting Errors during Session #1

Dana used the tools in various ways to help her prevent , detect and correct errors. Table 29 below lists the tasks she did to accomplish these purposes.

Prevent Errors By Resolving Problems	Attempt To Detect Errors	Detect/Correct Errors
Derive Rules – 2 Guide Writing – 1 Learn Extent – 4	Derive Rules – 11 Gauge Writing – 2	Gauge Writing - 1

Table 29: Dana's Tool Use Tasks during Session #1

Dana's main tasks to prevent errors were to learn how to use the tools and to learn the extent of the assignment. Her main task for attempting to detect errors was to derive rules for writing the diagram from the examples. Figure 80 below compares how frequently she did the tasks.

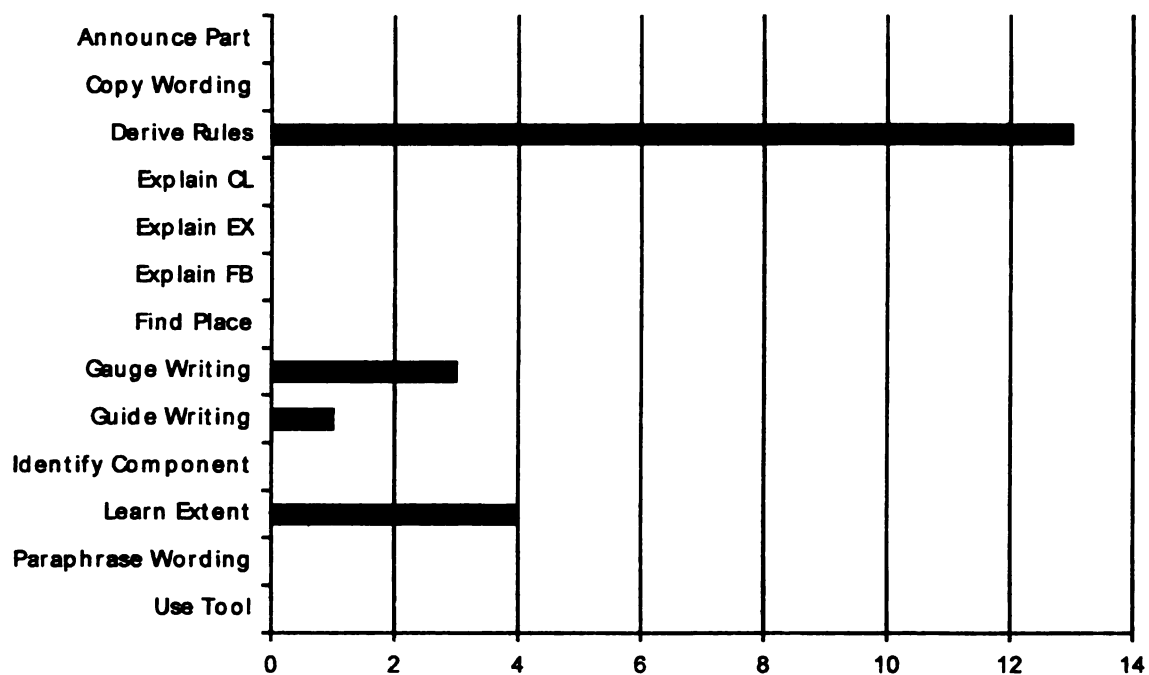


Figure 80: Dana's Frequency of Tasks during Session #1

Immediate Result of Use of Tools

Dana encountered six problems during session #1. The immediate result of her use of the tools was that she was able to prevent four errors by using the tools to resolve four of these problems (the second, third, fourth and sixth problems listed below). The others she resolved without the use of the tools.

- What is the difference among the course, unit and major goals? (P1, 25-27)
- How to word the course goal? (P1, 60-61)
- How specific should goals be? (P1, 90-94)
- How many levels of units should she divide the course goal into? (P1, 97-108 & 299-355)
- Is the unit small enough? (P1, 190-200)
- Does not understand if units are supposed to be related to each other. (P1, 267-272)

Dana made two errors during the session:

- She had not written her course diagram goals with a verb and an object. (P2, 7-27)
- She had not printed the diagram on the Form. (P1, 51-53)

She detected and corrected the first error after the session, when she used the Checklist to gauge her work. The second error she discovered by reading the instructor's feedback that she received back after handing in her assignment.

Dana's use of the tools during session #1 was characterized by her carelessness in using them. She did not read them carefully, which resulted in the two errors she did not

detect during the session. When she used the Checklist after the session to attempt to detect errors in her diagram and did detect an error, she then realized she had not been paying enough attention to the tools, and so started paying more attention to them.

Dana's practice of the assignment was characterized by her concern about dividing her course goal into units. Most of her tool use related to this problem. She was concerned that she select units to develop that had real world performance.

OBSERVATION SESSION #2

Assignment: Revise course diagram and write course title, course goal, course terminal objective and unit goal

During session #2 Dana worked on the assignment in the order in which it was presented on the Form: part 1, then part 2, and so on. She did not have time during session #2 to write part 5, the unit goal, although she did work on it later, after session #2.

Dana began session #2 by commenting on how useful she had found the Checklist after observation session #1. After session #1 but before session #2 she had been getting ready to type her assignment from session #1 onto the Form and had been checking to see if everything was correct before typing. She had finally noticed the Checklist, which she had not used during session #1, and had discovered, upon comparing her assignment with it, that she had not included a verb and object in the goals in her diagram. She decided at that point that she had to read the tools more carefully and started highlighting parts of the tools she felt were important.

Revise Part 2 – Diagram

During session #2 Dana read the instructor's feedback to the assignment done for session #1—the diagram—and found she needed to print her assignment right on the Form. The instructor had also asked her if her practice and project units could be done in 6 to 12 steps, or if they were too small. After talking to the instructor, Dana had decided to add the skill “and round off” to her units to make them larger. They had then become “Calculate 15% of a number mentally and round it off” for the practice and “Calculate 25% of a number mentally and round it off” for the project. The instructor had also wondered if the practice unit was a whole skill in the real world. Both he and Dana had thought so.

Part 3 - Course Goal

Dana read the Form to orient herself to the assignment and to the part she had to do next, the course goal. She read additional examples in the course pack to derive rules for writing it, then read the instructions. She noted that the Assignment instructions did not look the same as the Preliminary instructions because they were not so “checky-offy” (P2, 341-359). She liked the Preliminary instructions better because they were numbered and formatted more like a checklist.

From the main Example of the assignment she identified the role and setting of the conditions and used the Example as a template from which to paraphrase the conditions. She then wrote the conditions. She did not check it for errors but decided to just get it done and edit later.

She read the Checklist before starting to write the course goal behavior and noticed it mentioned “graduate.” She wondered what the graduates were graduating from and realized they would be graduating from the course she was developing. She read the Checklist again, then the Example, annotations and Example again. Then she wrote the course goal behavior and checked it against the Example. She was dissatisfied with her course goal. so she looked at additional examples and the other tools to analyze why she was dissatisfied. In this way she discovered that her course goal did not mention purpose. She saw that the purpose was stated before the behavior in the Example but not in the additional examples in the course pack and wondered which way she was supposed to write it. She typed her course goal into a computer file, but still had not realized she was to type it onto the Form. She started typing the parts of the Form into her assignment, such as the headings and subheadings.

Part 4 - Course Terminal Objective

Dana started working on part 4, the course terminal objective, reading the Form, Checklist, Example and additional examples, then the Checklist again. After reading some more examples, she realized she was reading one for the unit terminal objective, part 6, and was thinking on the unit level rather than on the course level. She read the tools again to learn more about the course terminal objective.

She wondered if a written “given” meant the students had to do something written. She encountered other problems, such as:

- Did she have to write both an outline and a diagram of the course structure?
- Were the condition and behavior sections in the course goal supposed to be separated on the Form?
- Could she include an example of test in the course goal?

She read the tools and other parts of the course pack to find answers to her questions. After using the tools to answer questions, to see how to word the objective and to see what was needed, she wrote the conditions of the course terminal objective.

She then read the Example to see how to write the behavior so all the unit skills would be mentioned and to find out why the Example now referred to students rather than to graduates as the course goal did. Then she wrote the behavior, using the Example as a model and template. She wondered again if a written objective required written behavior by the students, but resolved the problem by deciding to require the students to do both a role play and a written behavior. She then wrote the criteria, again using the Example as a model and a checklist.

Part 5 - Unit Goal

Dana did not have time during observation session #2 to write Part 5, the unit goal. She wrote this after the observation session.

CHRONOLOGY OF TOOL USE

Here is a chronological list of the actions Dana took while writing her assignment during session #2. This list is followed by a summary and a model of her tool use.

REVISION

- Decide to use Checklist as checklist because of Preliminary Assignment.
- Read instructor's feedback.
- Consider difference between whole skill and subskill.
- Consider number of steps in units and decide to move to higher level for more steps.
- Consider what lines and arrows in Example mean.
- Use Checklist to learn instructor's expectations.
- Again decide to do parts only when required by calendar.
- Decide to use Checklist as a guide to components and characteristics of assignment.

COURSE GOAL

- Orient self to assignment by reading Form.
- Orient self to Part 3 (course goal) by reading its headings in the Form.
- Again use Checklist as a guide.
- Again decide to do parts only when required by calendar.
- Create examples of mentally calculating percent by looking at Example.
- Reconsider problem of specific focus when need general focus.
- Read headings in Form to learn what to do in Part 1 (title or subject) and Part 2 (course diagram).
- Read heading in Form and annotation to learn if need to show course structure in both diagram and outline.
- Decide to read tools more carefully.
- Read heading in Form to remember purpose of course goal.
- Read Checklist to learn which components go into course goal.
- Read examples to derive rules for course goal.
- Read examples of course goals.
- Consider how "understanding of the world" from example just read can be a course goal.
- Review assignment instructions for what needs to be done before next class.
- Read Example for instantiation of assignment instructions for all parts.
- Note that assignment instructions not formatted same way as Prelim. instructions.
- Use Example as template for phrasing of role of the course goal.
- From examples derive rules for how to write course goal condition.
- From Example identify role and setting.
- Use Example as template for course goal conditions.
- Write course goal conditions.
- Use strategy "just get it done."
- Use checklist as guide to course goal behavior.
- Consider what "graduates" are graduating from.
- Again use strategy "just get it done."
- Read behavior-relevant checklist, then Example, then annotation, then Example.
- Write course goal behavior and check it against Example.
- Look at examples and Example to analyze why she is dissatisfied with her course goal (it doesn't have a purpose).
- Consider why purpose is to be stated before behavior in assignment but not in examples.

COURSE TERMINAL OBJECTIVE

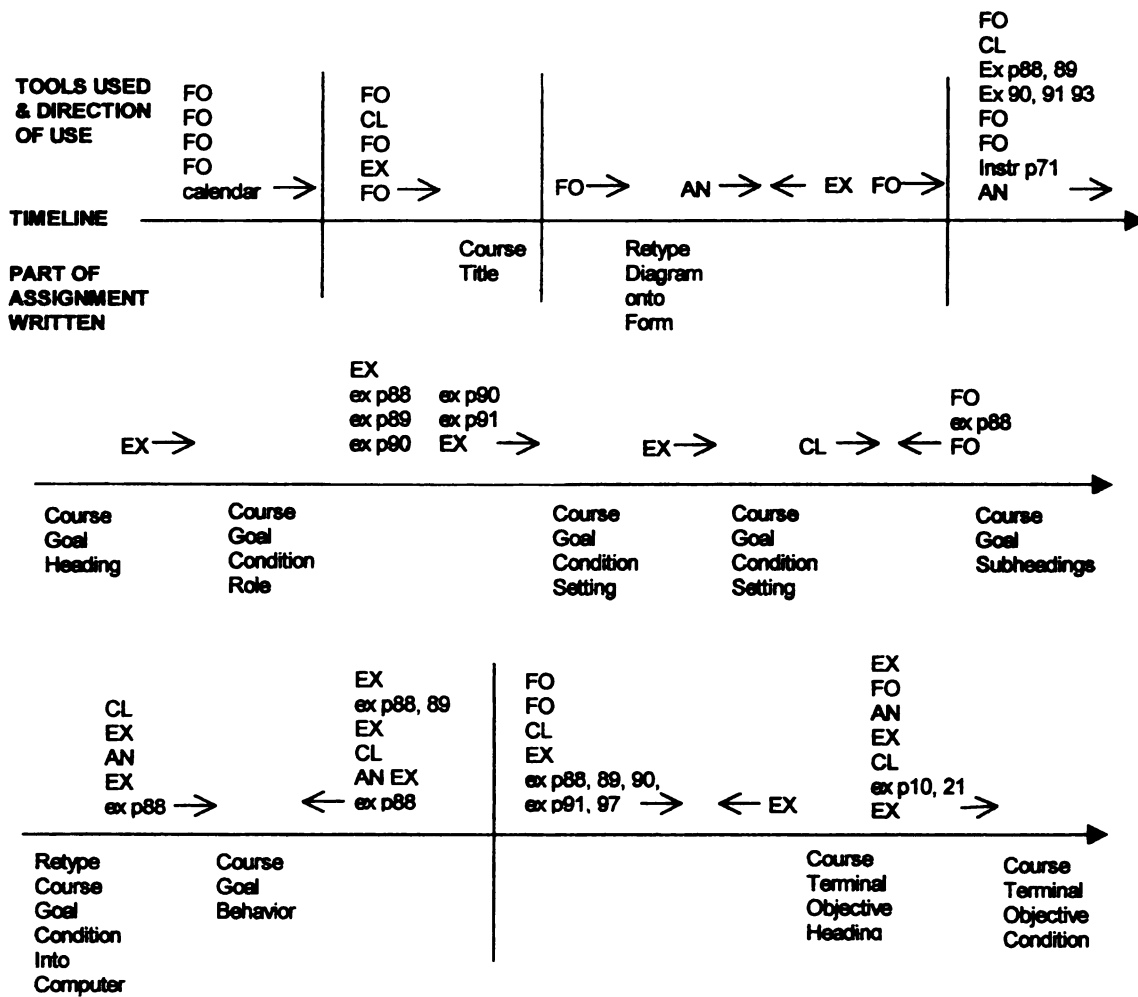
- Orient self to next part by reading heading.
- Use checklist to check course goal.
- Learn in which part "givens" go by reading examples and Example.
- Reconsider problem of specific focus when need general focus.
- Study Example for course terminal objective.
- Reconsider problem of specific focus when need general focus.
- Gather information about course terminal objective through course pack.
- Read Example and examples of real world performance to clarify it for course terminal objective.
- Consider if written objective requires written behavior.
- Consider what is given in conditions by reading Example.
- Reconsider problem of specific focus when need general focus.
- Read Example to clarify difference between "givens" in course and unit terminal objectives.
- Read annotation for further information about condition of course terminal objective.
- Reconsider problem of specific focus when need general focus.
- Use Example as template for conditions of course terminal objective.
- Reconsider problem of specific focus when need general focus.
- Read Annotation and Example and realize course terminal objective tests all unit skills.
- Reconsider if written objective requires written behavior.
- Read Example and consider if can give example of givens in course terminal objective.
- Reconsider problem of specific focus when need general focus.
- Consider how to phrase conditions of course terminal objective.
- Consider how to write conditions for varied behavior (oral, mental, written).
- Write conditions of course terminal objective.
- Read Example to see how to write behavior of course terminal objective so all units mentioned.
- Consider why Example now refers to students rather than graduates as in course goal.
- Write behavior of course terminal objective, using Example as model and template.
- Reconsider if written objective requires written behavior.
- Resolve by requiring both role-play and written behavior.
- Write criteria, using Example as template and checklist.

Summary of Tool Use

During session #2 Dana used the tools mostly to prevent errors by resolving problems she encountered. She would read the Form first to orient herself when starting a new part of the assignment. She consulted various tools before writing each component of a goal or objective to learn what components she should write, how they should be written, how they should be formatted, and how to put them on the Form. Only when she was sure she knew what she was doing would she write the component. As problems came up she referred to the tools to find answers. Occasionally she would use the tools after writing to check if she had written correctly, but sometimes she would start right in on the next part.

Model of Tool Use

Figure 81 below shows a model of Dana's tool use, with tool used and what it was used for.



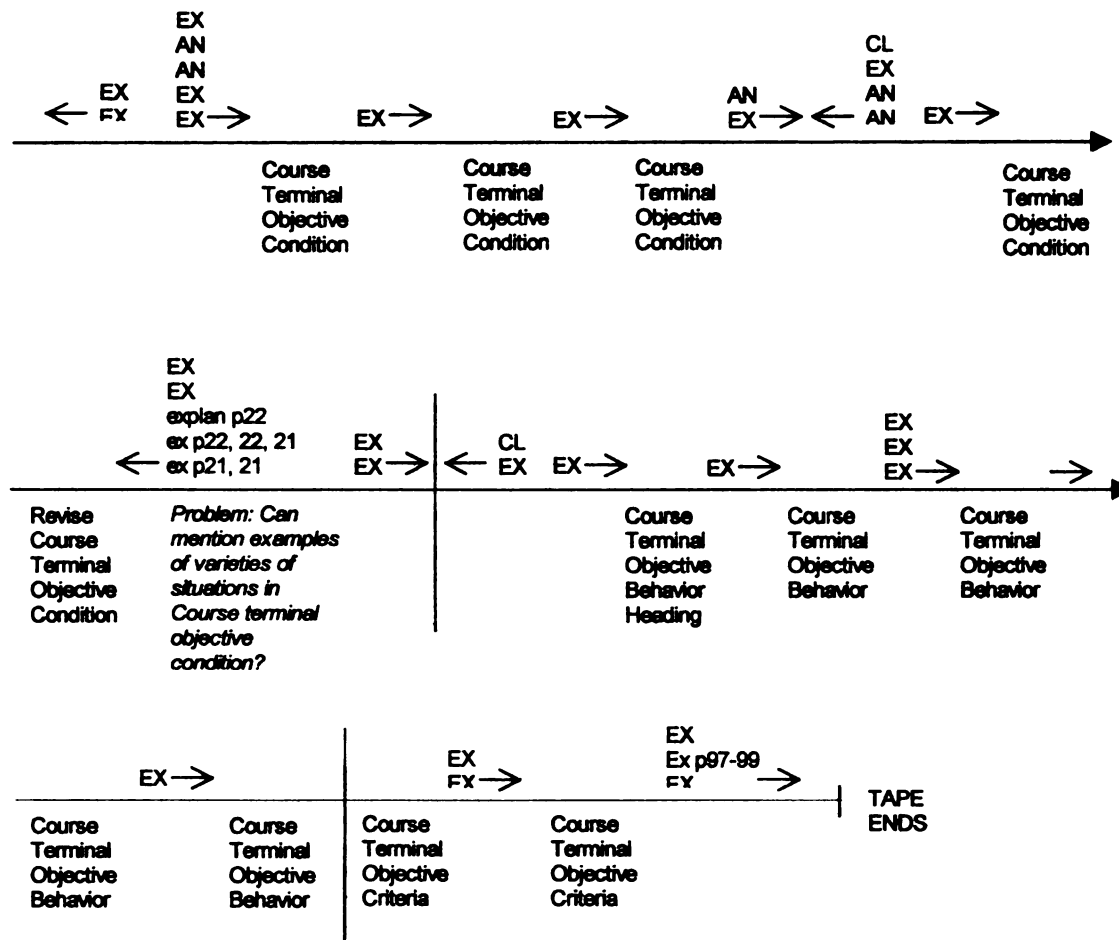


Figure 81: Model of Dana's Tool Use during Session #2

HOW DANA USED THE TOOLS

In this section I will describe which tools Dana used, how frequently she used them, for what purpose she used them and what tasks she did with them, what cued her to use them, and what characterized her practice of the assignment and her use of the tools.

Dana made use of all four tools during observation session #2. She used the tools 116 times: the Example 39 times, the Checklist 9 times, the Form 17 times, the Annotations 10 times and the other tools in the course pack 33 times, as shown in Figure 82 below. In addition, eight times the use of the tool was ambiguous, either in which tool was used, or which task was done or for which purpose it was used.

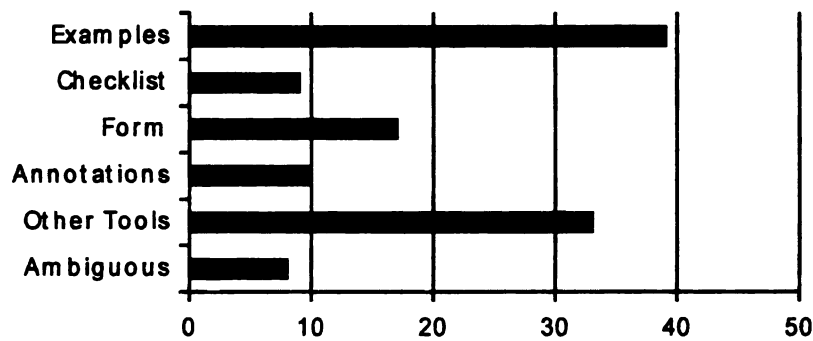


Figure 82: Dana's Frequency of Tool Use during Session #2

Dana used the Example more often than any other tool, but she used the other tools in the course pack almost as often. She used the Checklist the least often in session #2.

Dana used the tools at the beginning of the assignment to orient herself by learning what was expected of her and how extensive the assignment was. She used the tools while she was writing to determine what components to include and how to write them and to resolve problems and questions that arose. After she finished writing she used the tools once in a while to help her gauge the correctness of what she had written.

Dana consciously responded to four cues to use the tools:

- 1) when she was uncertain what to write, such as when she started a new part or when she did not understand the tools or instructions,
- 2) when she had questions about or disagreements with the tools or instructions,
- 3) when she wanted to check what she had written to see if it was correct, and
- 4) when she had found an error and wanted to know how to correct it.

Dana's tool use during observation session #2 was mostly for the purpose of preventing errors, as shown in Figure 83 below. She used the tools 84 times to prevent errors, 26 times to attempt to detect errors, and four times to detect and correct errors.

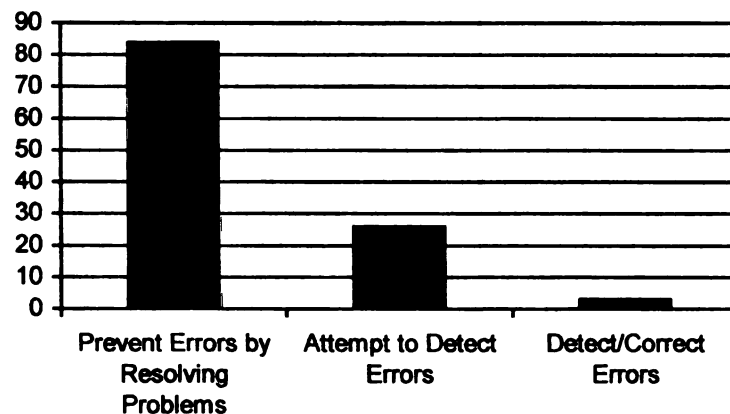


Figure 83: Dana's Frequency of Tool Use for Preventing, Attempting to Detect, and Detecting/Correcting Errors during Session #2

Dana used the tools in various ways to help her prevent, attempt to detect and correct errors. Table 30 below lists the tasks she used to accomplish these.

Prevent Errors By Resolving Problems	Attempt To Detect Errors	Detect/Correct Errors
Announce Part – 6 Copy Wording - 2 Derive Rules – 16 Explain Checklist – 4 Explain Example – 3 Find Place - 2 Guide Writing – 29 Learn Extent – 6 Paraphrase Wording – 8 Use Tool - 7	Derive Rules – 6 Explain Example – 3 Gauge Writing – 11 Use Tool - 2	Derive Rules – 2 (for same error) Find Place - 1 Gauge Writing – 1

Table 30: Dana's Tool Use Tasks during Session #2

Dana's main task for preventing errors was to use the tools as a guide to what components to include in her writing and how to write them, as shown in Figure 84 below. Her main task for attempting to detect errors was to use the tools as a gauge to see if she had included the required components and if she had written them correctly. She did not use the tools to explain feedback or identify components.

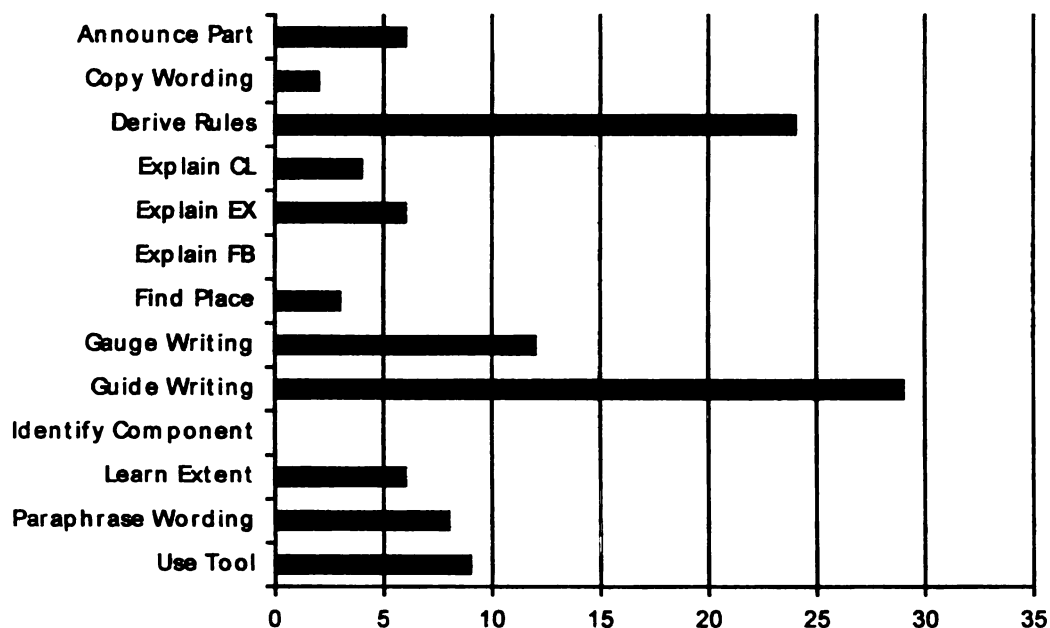


Figure 84: Dana's Frequency of Tasks during Session #2

Immediate Result of Tool Use

Dana encountered 11 problems during session #2. The immediate result of Dana's use of the tools was she was able to prevent five errors by resolving five of those problems

by using the tools. (The rest were resolved without using the tools.) She was also able to use the tools to detect and correct three of the four errors she made. The fourth error was detected and corrected after session #2 through reading the instructor's feedback.

Dana's use of the tools during session #2 was characterized by her extensive use of the Example and her growing ease with using the rest of the tools. For the most part she knew where to find information in the course pack and made use of the additional examples provided by the instructor. Although she sometimes found the annotations confusing and did misread an abbreviation in one of them, she nevertheless liked them because they were personal and showed how the instructor gave feedback.

Dana's practice during session #2 was characterized by her effort to prevent errors by spending the majority of her time preparing to write: deriving knowledge, answering questions, resolving problems, planning content, planning wording. She spent only a small fraction of her time after writing checking for errors.

OBSERVATION SESSION #3

Assignment: Revise as needed course title, course diagram, course goal, course terminal objective and unit goal; write unit terminal objective.

Revisions

Dana spent a little time at the beginning of the session talking about how to format her assignment to fit onto the Form. She had typed the headings of the Form herself and had pasted the Checklist onto it in session #2, but the instructor wanted her to use the actual Form for the final version that she turned in.

She then read the instructor's feedback and revised several items: She had marked both units on her diagram as project, so she needed to mark one as practice; she had included her purpose in the behavior, so she needed to move it to the condition statement. She also needed to make the setting in her course goal more specific than "real world."

Although she found she needed to add "and round off" to each unit goal in her diagram to each unit skill complex enough to have at least six steps to it, she did not want to teach rounding in her units. She got around this by making rounding a prerequisite to her course. Thus she did not have to teach it but she did have to assess their rounding skill.

She did not like to do assessment either. She did not want to have to decide how many times students had to be able to do something for her to say they knew how to do it because she felt it could be different for each student. She understood the need for assessment, but found it difficult to do.

Part 6 - Unit Terminal Objective

Dana started writing the conditions for her unit terminal objective by reading the Checklist. She had trouble staying focused at the unit level because she had been trying so hard in earlier sessions to focus at the course level.

She was concerned about what behaviors she wanted the students to be able to do. She thought because the Example mentioned “ten problem cases in written form” that she had to have her students write instead of do some behavior other than writing. She wanted her students to calculate a percent mentally by performing a role play so their test behavior would be closer to real world performance than a written test would be. She decided she could have them role play, but the scenarios they would be given would be written.

As she wrote each little step of the condition for the unit terminal objective she constantly went back and forth between what she was writing and the tools. She used them to guide her as to what to write and how to write it, then immediately tested what she had written by checking it with the tools.

Dana had trouble writing the “such as” for the condition. Rather than writing an example of a written scenario that would be given to the students on the test, she initially tried writing it as a description of a student taking the test. She realized this upon reading it over.

Her objective had more than two behaviors—orally stating the solution and writing the solution out—so she was going to write two “such as’s.” After talking the problem out, she realized she could have the students do the role play, then go back to their seats and write out the solution they had just presented orally.

She started to write the behavior and read the Example to help her, but when she read the Example, she detected an error: she had already written the behavior in the “such as.” She was able to detect and correct the error before she turned her assignment in to the instructor.

She wanted to include a statement that calculators would not be allowed, and remembered she had read something like it in the course pack, but she could not remember where. She could not find it, so she decided to state it in her condition. Later she found it in the practice test on page 125 and compared that page to her own, then changed the wording to paraphrase what was on page 125. She realized that the examples given on the practice test were not great because each of them had an error the students in CEP 808 were supposed to find, but they were useful to her just the same. She then used page 123 as a checklist to see if she had included all the required components.

As Dana worked her way through the unit terminal objective, occasionally she went back and rechecked earlier parts of it, even though she had checked them before.

Initially Dana did not understand what the Checklist item “close representation of real conditions: time and place in unit goal” meant, but the accompanying annotation “Like conditions in unit goal, as real as possible, similar to times, places, purposes, roles intended” explained it to her.

The videotape ran out before she was finished writing the unit terminal objective, so there is a record of her actions only to the beginning of writing the criteria section.

CHRONOLOGY OF TOOL USE

Following is a chronological list of the actions Dana took while writing her assignment during session #3. This list is followed by a summary and a model of the chronology.

UNIT TERMINAL OBJECTIVE

- Reconsider why purpose is to be stated before behavior.
- Write condition of unit terminal objective.
- Read Example to see how to Format unit terminal objective behavior.
- Write behavior of unit terminal objective.
- Reconsider why purpose is to be stated before behavior.
- Orient self in assignment be looking at heading for Part 6.
- Consider dislike of assessing students' knowledge and skills.
- Use Checklist as guide to writing lower limits of unit terminal objective.
- Feel instructor's arrows and lines no longer confusing.
- Consider if unit terminal objective is related to unit goal or to course terminal objective.
- Read heading and learn that unit goal and unit terminal objective have same purpose.
- Read Example of unit terminal objective to see how it instantiates requirements.
- Consider that Example too simple for her needs.
- Consider how specific the givens of the unit terminal objective must be.
- Read Checklist, Annotations and Example to learn about givens.
- Start writing conditions for unit terminal behavior.
- Use Checklist to check what she has written in condition of unit terminal objective.
- Consider when to give example of written scenario.
- Analyze Example and decide to give example of written scenario later.
- Use Checklist as guide to stating medium of behavior in unit terminal objective.
- Refer back to previous parts of assignment to ensure internal consistency.
- Consider number of scenarios needed to assess students.
- Finish writing first part of conditions and move on, relying on instructor's feedback.
- Orient self to current work, using Example.
- Start writing "such as" for conditions of unit terminal objective.
- Refer back to previous parts of assignment to ensure internal consistency.
- Start to write givens again, thinking she is writing course terminal objective, in which all unit skills must be represented.
- Refer back to previous parts of assignment to ensure internal consistency.
- Consider if need to use same phrasing of behavior throughout assignment.
- After referring to Example, decide phrasing does not have to stay the same.
- Consider how to write one "such as" in the condition of the unit terminal behavior for three behaviors that are oral, mental and written.
- Analyze Example and realize behavior is in condition rather than behavior section.
- Write "such as" that includes all three behaviors.
- Consider if need to specify items NOT given during test.
- Look at Example then examples and decide must specify what is not allowed.
- Look at examples for template, but settle for Example.
- Use explanation on p. 123 to check her conditions of unit terminal objective.
- Tab page that will be important to future part of assignment.
- Use Checklist to check her conditions of unit terminal objective.
- Refer to Example for how to Format conditions.
- Use Checklist to check "such as."
- Read Annotation to further explain Checklist.
- Look ahead and consider what "number of repetitions" means in Checklist for lower limits.
- Refer to heading to orient self to current task.
- Read Example and realize it uses "learner" in behavior.
- Read Example and decide to use "student."
- Feel less confused about instructor's feedback and tool use.
- Read Example to see how to write behavior of unit terminal objective.
- Write behavior of unit terminal objective.
- Read behavior and realize it includes criteria.
- Read Example to learn where to put criteria.
- Read Checklist to check if she has used an action verb.
- Use procedure in Annotation to identify object of an action verb.

- Prepare to write criteria by looking at criteria in Example.
- Read Checklist as guide to components and their characteristics of criteria.
- Read Annotations to Checklist for criteria, but do not understand it.
- Consider how to write a time criterion.
- Look at examples for time criteria.
- Tab page that will be important for future work on assignment.
- Read Example to see ways to write different types of criteria.
- Consider how to include rounding numbers in her calculating percent unit.
- Read Example to learn how to write criteria to include rounding.
- Write criterion #1, including rounding.
- Read Example to check if criterion written correctly.
- Read Checklist to see what kinds of criteria there are.
- Consider that to write criteria correctly, should put "so that" at end of criteria list.
- Read Example criterion #2, which mentions a task description.
- Consider what a task description might be.
- Consider how to write criterion for rounding so she doesn't have to teach it.
- Wait for instructor's feedback on criterion #2.
- Read Checklist for rest of criteria and Annotations for further explanation of criteria.
- Write remaining criteria, using Example as template for some phrases.

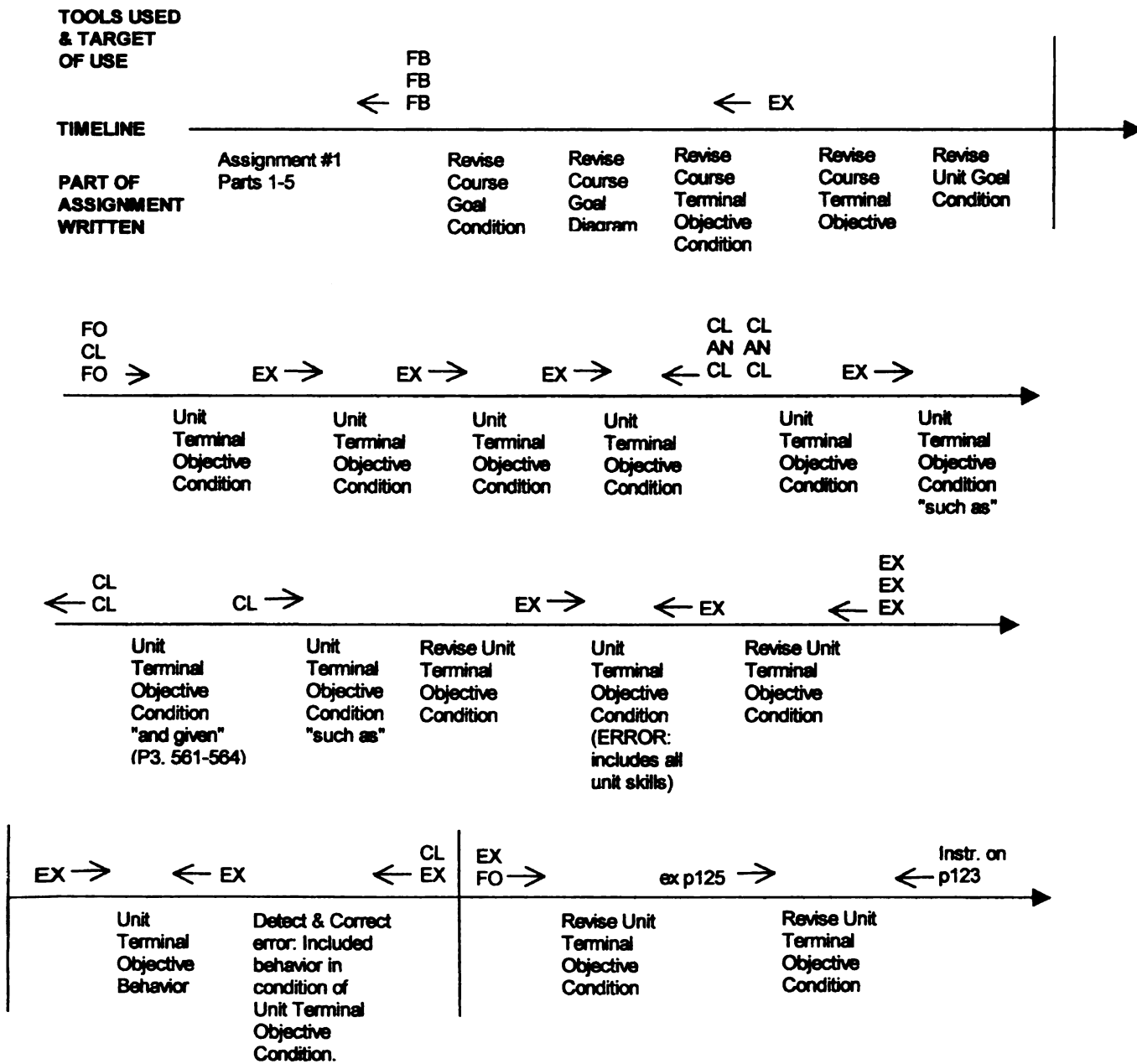
Summary of Tool Use

Dana's use of the tools during session #3 fell into two distinct patterns: for revision and for initial writing. When revising previous parts of her assignment Dana would read the instructor's feedback, then think about it. She would refer to the Example once in a while as a guide to how to revise according to the instructor's suggestions, but for the most part the kinds of revisions she needed to make did not require deep thought.

Dana's tool use for initial writing was quite different than for revising. She used the tools much more. She used them often as a guide before she wrote and as a gauge after she wrote. She skipped around within the part she was writing more than the previous two sessions, rather than following a linear path through it. She would write something, then use the tools for the next component, then return to the previous component, and so on. She particularly took pains over writing the "such as" for the unit terminal objective conditions. When Dana began a new section (such as the behavior in the unit terminal objective), she would read the subheading on the Form to announce which section she was working on. Then she would refer to the Checklist and Example to tell her what the required components were and how they were to be written. Then she would write, sometimes copying or paraphrasing wording from the Example. She would then use the Checklist and Example to see how correct her writing was. Then she would start a new component by reading its subheading on the Form and basically repeat the same procedure.

Model of Tool Use

Figure 85 below shows a model of Dana's tool use.



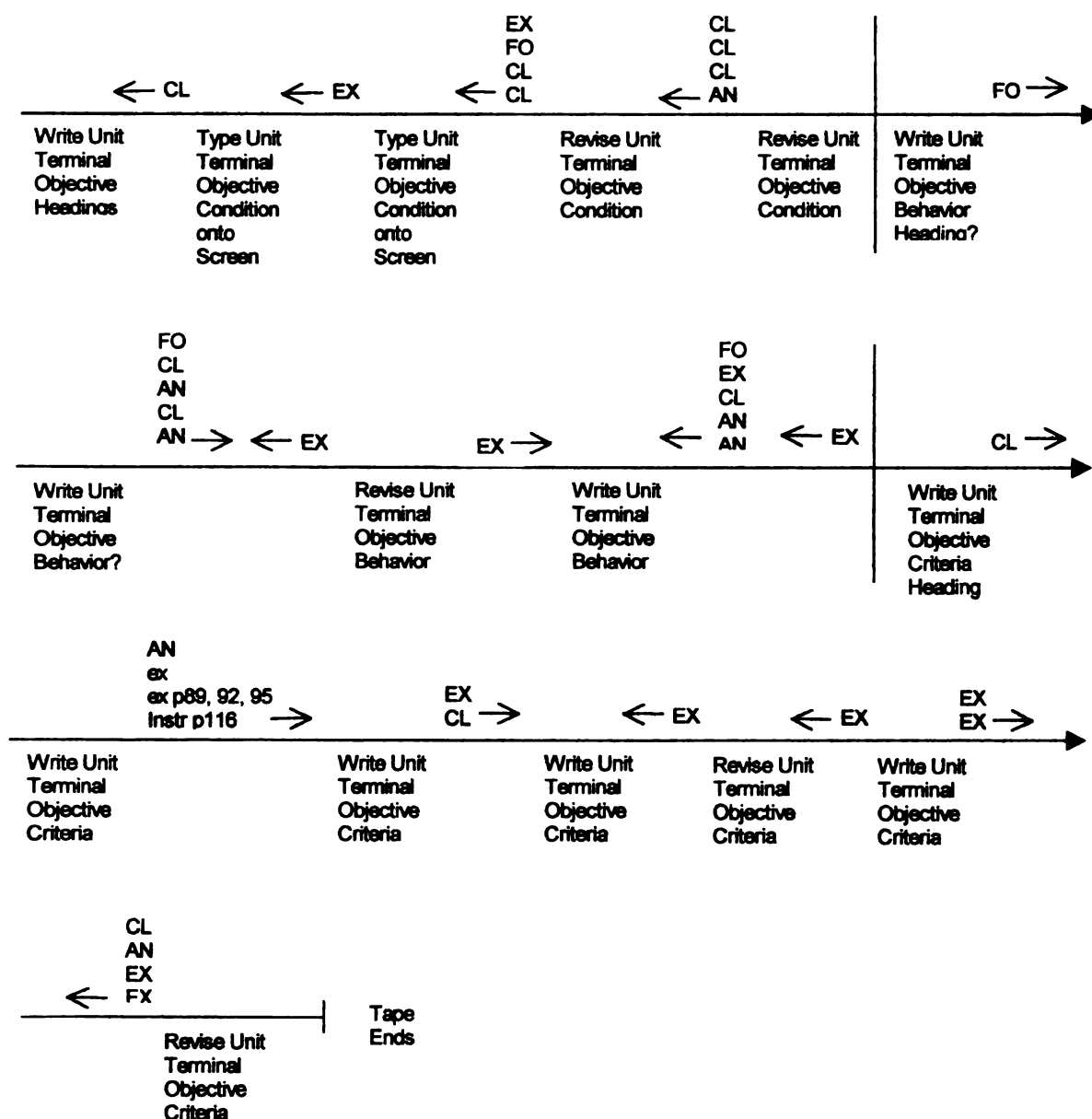


Figure 85: Model of Dana's Tool Use during Session #3

Dana made use of all four tools during observation session #3, as shown in Figure 86 below. She used the tools 75 times: the Example 28 times, the Checklist 21 times, the Form seven times, the Annotations nine times, and the other tools in the course pack six times.

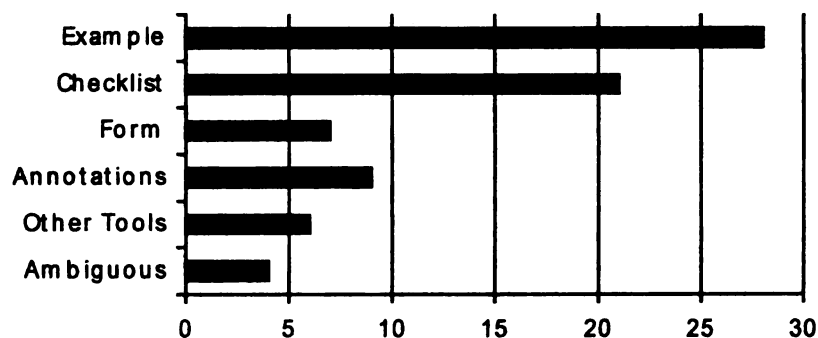


Figure 86: Dana's Frequency of Tool Use during Session #3

Dana used the tools at the beginning of the session to orient herself to the part of the assignment she was going to work on by learning the purpose of the part and what was expected of her. She used the tools while she was writing each part to determine what components to include and how to write them, to resolve problems and answer questions, and to find her place. During writing she also used the Example as a template upon which to model her wording of each component. After she finished writing each component she used the tools to help her gauge the correctness of what she had just written.

Dana consciously responded to five cues to use the tools:

- 1) when she was uncertain what to write, such as when she started a new part, when she did not understand the tools or instructions, or when she revised according to the instructor's feedback,
- 2) when she had questions about or disagreements with the tools or instructions,
- 3) when she wanted to check what she had written to see if it was correct,
- 4) when she had found an error and wanted to know how to correct it, and
- 5) when she wondered where she was in the assignment or how extensive it was.

Dana's tool use during observation session #3 was for the purpose of preventing, attempting to detect, and detecting/correcting errors. She used the tools 33 times to prevent errors, 38 times to attempt to detect errors, and one time to detect/correct errors. These numbers are shown in Figure 87 below.

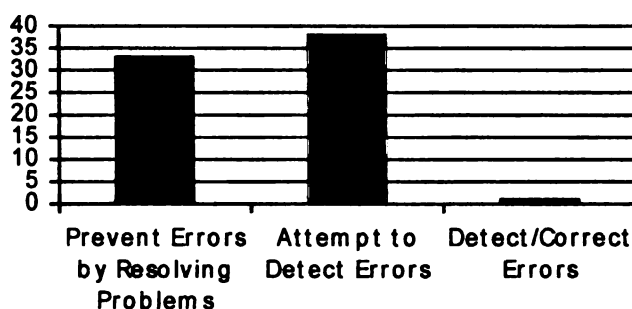


Figure 87: Dana's Frequency of Tool Use for Preventing, Attempting to Detect, and Detecting/Correcting Errors during Session #3

Dana used the tools in various ways to help her prevent, attempt to detect, and detect/correct errors. Table 31 below lists the tasks she did.

Prevent Errors By Resolving Problems	Attempt To Detect Errors	Detect/Correct Errors
Announce Part – 5 Copy Wording – 2 Derive Rules – 4 Explain Checklist – 3 Find Place – 1 Guide Writing – 19 Learn Extent – 1 Paraphrase Wording – 2	Announce Part – 1 Copy Wording – 2 Derive Rules – 3 Explain Checklist – 4 Find Place – 1 Gauge Writing – 24 Paraphrase Wording – 1	Gauge Writing – 1

Table 31: Dana's Tool Use Tasks during Session #3

Dana used the tools in eight ways to help her prevent errors by resolving problems. Her main task for preventing errors was to use the tools to guide her writing. Her main task for attempting to detect errors was to use the tools to gauge the correctness of her writing. The frequency with which she did the tasks is shown in Figure 88 below.

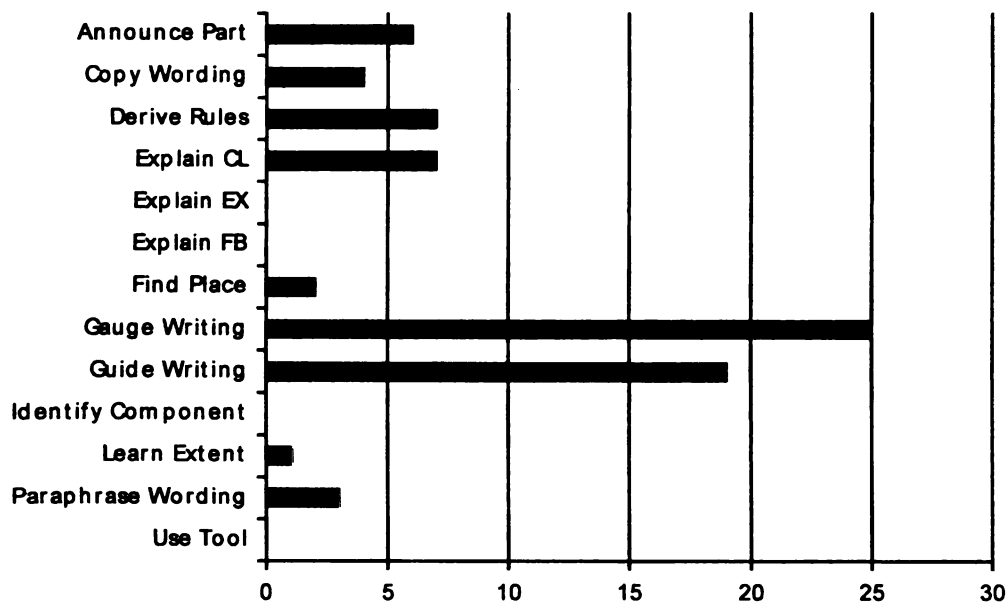


Figure 88: Dana's Frequency of Tasks during Session #3

Immediate Results of Tool Use

During session #3 Dana encountered 11 problems. She was able to prevent four errors by resolving four problems using the tools. Using the tools, she was also able to detect and correct one of the five errors she made. Three other errors she detected and corrected during session #3 by referring to the feedback she received to the assignment

she had turned in after session #2. The fifth error Dana was able to detect and correct during session #3 by referring to her own assignment.

Dana's use of the tools during the final session was characterized by her increasing use of them to detect errors. She developed a facility with and ease in using the tools. She stated that the lines and arrows in the annotated Example were less scary than they had been during session #1. She had also learned how to use the Checklist, and was able to explain how the annotations worked.

During session #3 Dana's practice of the assignment was characterized by confidence and reliance on the tools and the instructor's feedback to tell her what needed to be changed in her assignment. She used the tools to check her writing as soon as she finished writing each component, and sometimes went back and rechecked her writing when she came upon a relevant problem or question. She took note of what the instructor tracked in the previous feedback she had received and made sure to do it. She said she was willing to take a risk because she knew the instructor would tell her what needed to be fixed and because she was not receiving a grade on the practice unit.

DANA'S VIDEO TRANSCRIPT

Observation Session #1

3 P: [Turns to her class notes and puts a tab on a page.]
4 D: Just do your assignment and what I'll do is ask you questions every now and then.
5 What I'd like you to do, or try to do, is, as you're doing your assignment, tell me what
6 you're thinking, why you're doing something, almost a nonstop monologue describing
7 what you're thinking and why.
8
9 I have done a little thinking on this before. So, what I'm going to do first is just review
10 what it is I'm supposed to do, because I'm not real clear on this. [Opens course pack.]
11
12 D: What will you use to review?
13 P: I'm going to use his course outline and I'll have a calendar because he suggested
14 getting a personal calendar and putting dates on it, so I did that so I don't have to
15 rely on his.
16
17 And what I'm going to look for are anything with the little bubbles on it, so I can just
18 get a general idea again what it is I'm looking for. [Looks through Intro. section of
19 course pack, then tabs a page.]
20
21 D: What page is that?
22 P: This is page 65 and this is in the introduction. It's not in the actual teaching unit,
23 but I remember him referring to this as he was going through the introduction. I'm just
24 going to mark that at the top if I need to come back to it.
25 And what I wasn't real clear on what a course goal, major goal and unit goal was,
26 to get it shortened. So I was going to look and see if I could figure that out. Because
27 to me a course is like math for the whole year. So this has got to be pared down.
28
29 P: [Reads page 65.] I did look at this before, I remember that.
30 D: Page 65?
31 P: Yeah.
32
33
34
35 [Leafs through course pack] Here's another example on page 74, so I'm going to
36 mark that. [Turns back in course pack.]
37
38 And this would be Unit 1. And then he gives suggestions for the project, so I'm just
39 going to read through again what it says on page 71 for assignment 1, real quickly.
40 [Reads.]
41
42 P: And all week I've been trying to think of what to do.
43 D: Because?
44 P: Because sometimes I don't really know, when I look at his course objectives and
45 how they're written, how that can be a real world, how it's real world performance. I
46 know why they need it for the next class.
47 D: Oh, because you're not dealing with real world performance. You're dealing with
48 school.
49
50 We're developing skills for the next [class] and then the next [class]. Also, the — in
51 math now, there used to be two tracks in math: a general math and a college math.
52 And now it's you will all take algebra. And I think it's harder to think that all people are
53 going to be able to do this real world performance with that. So that's what I mean.
54
55 But I did have one [course goal]. I wanted to do—remembering that people said it has
56 to be something small—was percent, eventually thinking of getting it down to an idea
57 where people can estimate the amount of a tip that they need. And that's a real world
58 performance with percent, and that's something that's done with kids already.
59

60 But I didn't know how to word it (DIAGRAM COURSE GOAL), so that's what I'm working on now.
 [READS EXAMPLE]:
 61 "What students will be able to do after the course."
 62
 63 So, the reason I brought this along [Interpretation of Goals and Objectives for Math,
 64 by the Michigan State Board of Education], I started to use this a little bit more in my
 65 teaching, rather than just the textbook, just to get an idea of what they're [Bd. of Ed.]
 66 thinking. And so I looked at the [objectives for] percent.
 67
 68 [Leafs through book.] And they put fractions, decimals and percents together now.
 69 And it's more realistic because they're simple things, they're not — real world. —
 70 [Marks a page in the book.]
 71
 72 So, I'm not familiar with this setup [in the book]. And I'm thinking it fits the bubbles
 73 because it has processes and mathematical topics. I thought the processes would be
 74 the bubbles. I'll have to reword all this [objectives in the book], but the general idea
 75
 76 P: [Reads page 74].
 77 D: So what are you looking at now?
 78 P: Well, how he [instructor] breaks it down, the whole course goal. So mine's going to
 79 be [flops back and forth between book and course pack, page 74.]
 80
 81 D: You're looking at page 74?
 82 P: Yes, 74 again.
 83
 84 P: To find a percent of a number. That will be something about graduates are going
 85 to use, be able to find the percent of a number.
 86 D: Is that your course goal?
 87 P: That would be my course goal. Because he has "solve long division numbers and
 88 whole numbers," so to me that's basically the same.
 89
 90 [Reads from book.] I'm going to have to reword this. [Writes "Percent of a Number" as
 91 course title or subject?]
 92
 93 P: Now I don't know if that's too specific [flips to p. 74] but that [course goal on p. 74]
 94 seems pretty specific, too.
 95 D: Seems like the same level?
 96 P: Seems like the same level. [Reads from p. 74.] But then he breaks it up into "Solve
 97 problems using short division," "Solve problems using long division." So this book is
 98 taking that topic [percents] and dividing it into 1) conceptualizing, which would be
 99 necessary to find a percent, to understand percent, 2) mental arithmetic, which is
 100 what I'm interested in, because when you're in a restaurant, I think it's bad enough, I
 101 tell kids you're not going to impress a girl when you pull out your chart.
 102
 103 P: And estimation with fractions. That's a big push right now with me. And then 3)
 104 calculators, but I didn't really want to do a lesson with calculators. So I thought that I
 105 will put those topics, because these are the processes . . . I haven't a clue. [laughs]
 106 D: What don't you have a clue on?
 107 P: If this is the right way to break it down. I'll check it.
 108
 109 At first I was thinking of doing percent and then problems involving cost,
 110 measurement. And then I couldn't think of any other, not that you couldn't have two
 111 bubbles, but I couldn't think of how else to break it down. I wanted to break it down
 112 way beyond three steps, and he's only going to three [bubbles] to get to a specific
 113 thing. So I thought, oh, well.
 114
 115 And there's being able to estimate with percent and calculate the percent. [Writes.]
 116 Also, their [the book] last thing [math process] was application to problem solving, but
 117 I saw that as using those four things [other math processes from the book] to do that.
 118 So this is going to be the problem solving application one [bubble], and these [math
 119 processes] are all the things you need in order to do that.
 120 D: And those four things [conceptualization, mental arithmetic, estimation and calculators] are

121 what you apply?
 122 P: Yes, to do that.
 123
 124 P: And then, this is the one I want to do.
 125 D: Which one is that?
 126 P: That's the mental arithmetic. I could do the fraction one but that's too hard!
 127 [laughs]
 128 D: [Laughs] This is on tape, you know.
 129 P: I know! [laughs]
 130 D: I'll have to play this for your school. [laughs]
 131 P: I'd do it but [pauses]
 132 D: I think fractions are hard.
 133
 134 I have done a lot of conceptualization with the kids, too, and that's a possibility, but I
 135 really wanted to do the tips, so that would be mental arithmetic. [Reads book.]
 136
 137 P: One neat thing about this book, and I don't know if I'm cheating by using this book
 138 [pauses]
 139 D: No, no, no. This is real world performance.
 140 P: Okay.
 141 D: This is what you would do.
 142 P: This is what I'm doing as a teacher, and I don't do it as much as I should, but it's
 143 cool. I think it is the right way.
 144 D: It's the right way, using that book there?
 145 P: Well, looking at the objectives and what I'm supposed to be teaching. I think
 146 teachers use the textbook, and the textbook tells teachers what they're supposed to
 147 teach.
 148
 149 P: Right now, the state is telling me. And this comes from the national math—
 150 D: And this is what determines what's on the test, right?
 151 P: That's right, and that's what's — But it's real world performance, and it does match
 152 the national council, the NCTM, which is directing the nation to this conceptualization,
 153 real performance math. But parents don't like it.
 154
 155 D: Why?
 156 P: Well, they don't like it because they [parents] can't help them [their children]
 157 because they grew up doing computation. They don't, they're not —
 158 D: Well, my son's three, so I have a little way to go yet. [laughs]
 159 P: It'll be straightened up.
 160 D: Yeah. Sure. [laughs]
 161
 162 Anyway, they have ITN, a new course right now, 1983, so I'm looking at the [grade] 7
 163 through 9 comments, not the 4 through 6. And it has three different things: [reads
 164 from book] "evaluation stressed on —, with teachers asking students to calculate
 165 50%. Students will be given unlimited amount of time to respond. Selected percents
 166 include the following.
 167
 168 And what they do is, these are more realistic, and they use common things like
 169 finding 1%. I really wouldn't divide it up [into lessons] like what they do. They have
 170 1%, 10%, 50%, 100%. So what I would do, I would say 1%, 50%, 100%. Because we
 171 always teach estimation — zero — So I'm going to just change it. [Draws 1%, 50%
 172 and 100% in one bubble.]
 173
 174 So now I don't know if this is right, [Looks at book then glances at Example]
 175 to just lump them together or not. But then I'd have all
 176 these bubbles [gestures widely across page, then looks at p. 74 again] Well, I'll see. I
 177 might change it..
 178 D: This is why you use a pencil. [both laugh]
 179
 180 P: That seems better to me. And then I would do—
 181 D: So what did you write: 1%, 50%, 100%?
 182 P: I wrote 1%, 50%, 100%, lumping them together because they're [students] so

183 used to estimating with fractions for zero, half and whole. That's easier for kids to do
 184 together.
 185
 186 And then they [the book] have a 10% [lesson?] there, but what I would do is take
 187 10% and multiples, like how to go from 10% to 20%. And then, I think, they [looks at
 188 book] have — And then I'm going to do halves, tips are 15, well, 20% now, but 15%
 189 for some. So they have to know how to take a half so that would be like 5%, 15%
 190 and maybe 25%. —
 191
 192 P: And then they need to know the multiples of 100%. That's hard for kids because
 193 they can't think of anything over [pauses]
 194 D: Everything.
 195 P: 100%. Yeah. It's a hard concept. so now we'll put multiples of 100%. [Writes third
 196 bubble.]
 197
 198 Now what I'm afraid of is comments from other people that say you want to pick
 199 something really tiny [to do for the CEP 808 assignment #1]. And I don't know if
 200 these are tiny enough.
 201
 202 Now what I want to do, and another reason I'm using this [book] is they give
 203 examples of story problems, examples of problems that involve that, like estimate your
 204 total bill when purchasing a video if something cost 4% sales tax.
 205
 206 D: So read me your real world performance there.
 207 P: Okay. I don't have it worded right, but the gist is these graduates are going to be
 208 able to solve problems by finding a percent of a number.
 209 D: And the problems are like figuring a tip?
 210 P: Right. Figuring the tip, find your percent sales tax, you could say how much off, like
 211 this is a 50% off sale.
 212
 213 D: Are these sort of daily kind of problems, not [pauses]
 214 P: I think so. Yeah, those are not just for certain people taking math. I think this
 215 would be for all students. I think this is something all people should be able to do. I
 216 do. Because even when you go to a bank, you have to understand they're going to
 217 charge you 8.5% on your, I mean [pauses] That is a real world thing that you would
 218 have to know. Consumer-wise, not just mathematicians, not just a specific career.
 219
 220 D: We got a coupon for 10% off of a restaurant meal. I'm going, "70 cents? Big deal!"
 221 P: You know, a lot of people, "Gee! Wow!" They don't even know.
 222 D: Yeah. Big savings.
 223 P: See, that's a big one, too. So I think so. More so than what he [instructor] says
 224 [points to p. 74] I don't know: "Solve division problems with whole numbers."
 225
 226 Then, in order to be able to do that, there are certain, first of all you have to
 227 understand percent. That's conceptualization. Which would [reads from book]
 228 "recognizing and using meaning of percent in finding percentage of a whole number
 229 when percentage rate is given." What does 20% mean? That means 20 out of a
 230 hundred. So you're building an understanding of percent. And they have to be able
 231 to do that in order to solve problems.
 232
 233 Also, speaking of this bubble [indicates right bubble on her notebook page],
 234 estimating percent, for example 27%, I don't know where they would even run into
 235 that. They've given an example [in the book]: "Which is closest to 27%?" But you get
 236 the general idea that that's close to 25%, which is a fourth, so you could estimate
 237 and get a general idea of how much that was.
 238
 239 [Looks at book] They give an example here of a bill coming to \$216.95. It's not a nice
 240 round number to work with. Plus 4%. That's 100, that concept of 1%. So I didn't really
 241 want to do that one.
 242
 243 And calculators, I really think that kids need to learn how to use the calculator. I think
 244 that's important. There's a disagreement in the schools now, but I've worked so much

245 with kids that we, they do not understand what it does — they don't understand the
 246 display is wrong. They think if you put it in, the display is correct.
 247
 248 So we always work on, when the display is there, is it feasible. So I think that's
 249 important, too, and I do believe that many people nowadays use calculators. I use
 250 them, all the time. So I think that's important. [Points to her major unit goal, then
 251 course goal, then major unit goal, then subunit goal.]
 252
 253 D: Do you think you're at a level to choose a practice and project? Which would you
 254 choose?
 255 P: Well, this is what I don't know. To do, I don't know if I'd like to do the tip thing on
 256 my own or what, for him [instructor] to critique., but this [don't know which subunit] is
 257 harder. So maybe if I had him critique this one [points to bottom right of page]. That
 258 sounds awful, to be graded on something —
 259
 260 D: Well, somebody else had exactly the opposite logic. And to me your logic makes
 261 more sense. But it was a challenge.
 262 P: Well, it would be, but I'd rather do the challenge with the feedback. Because when
 263 I'm out there, I won't know, so if I pick something challenging now, and I'm the
 264 apprentice and he's [instructor] the master, I'll be getting much more feedback on the
 265 challenging material. So that's my thinking.
 266
 267 So I'm thinking, but the problem with that is, I see it right now. It didn't pop into my
 268 head until right now. In order to do 15%, you have to be able to do 10%. So now, do
 269 I break, see —? This is the question I don't understand, — his standards [lays hand
 270 flat on p. 74]. I don't understand if one [subunit] is related to the other.
 271 [Points to visual course model on annotated model on p. 74]. His [instructor's] are not
 272 related. [Pauses] Well, they are.
 273
 274 P: You just have to know long division.
 275 D: Are they prerequisites?
 276 P: But yeah, prerequisites. But that's right. I don't have to teach prerequisites, I just
 277 need to show what they are. Ah!
 278 D: Right, because you assume they've learned those in another class.
 279 P: I have to write that down. [Writes "prerequisites" on side of her note paper.]
 280
 281 D: It's not a magical word.
 282 P: I'm not starting from the beginning.
 283 D: No.
 284
 285 P: So my thinking, then, is that I would do the challenging one for practice. I think it's
 286 the half percents, the 25%, the 15, because it's a combination of two skills.
 287 D: So you'd do that for the practice, and what would you do for your project, then?
 288 P: Well. [Looks at her course model.] I think 10% and multiples because, and that's
 289 important, too, lots of people are leaving 20% [tips] now.
 290
 291 [digression on tipping at restaurants]
 292
 293 P: And then for other services, I don't even give 10%. So 5% like when I go to the
 294 hairdressers. I just sort of get a ballpark in my mind, and then I just decide if it's
 295 enough.
 296 D: Close enough. Yeah.
 297 P: Or if it seems right.
 298
 299 But this one [points to left subunit] I really like because it goes with fractions, so it's
 300 1%, 50%, 100%. But see, there's three skills there, so I don't know if I should break
 301 all these down into little 1%, 50%, 100% [separate bubbles], multiples of 10, if I
 302 should — that —
 303
 304 D: Hmm. they take different solving steps?
 305 P: They take different solving, so maybe [pauses]. I don't know, I might have to go
 306 back and lump them together. [Erases subunit bubbles from her model.] That's why I

307 wanted to go again. [Indicates a lower level of bubbles she would like to create.]
 308
 309 But if I did, because these [gestures to her map] are important: 1%, 50%, 100%.
 310 Those are real common. That's too easy. I can't — that one. [Writes 1%, 50% and
 311 100% as subunit goals, then indicates the left one.]
 312
 313 1%, 50%, 100%, and then build 10% and multiples because that's common. And
 314 then this combines [pauses]
 315
 316 D: Would you say that they're on the same level, coming out from mental arithmetic
 317 [bubble]? Or are there any prerequisites?
 318 P: Well, you have to understand, you would have to understand. So I guess you
 319 would. And I could still just teach them how to do it. But sill-wise, I think they're
 320 [pauses]
 321 D: The same?
 322 P: The same.
 323
 324 I don't know about this one. [Taps right subunit.] See, I'll tell you why I'm starting to
 325 break it down even more along here [at the subunit level] because he [instructor] has
 326 [points to p. 74, the annotated model] "with remainder," "without remainder," so
 327 there's no lumping together.
 328
 329 P: [Looks at page 65.] The first one. See, he had adding fractions, adding decimals,
 330 adding mixed numbers, and then he breaks fractions down into like fractions, that's all
 331 treated the same. and unlike fractions all treated the same.
 332 D: You're on page sixty [pauses]
 333 P: Five.
 334 D: Sixty five.
 335
 336 P: I wish he had more examples.
 337 D: More of those examples he gave in class?
 338 P: Yeah. I remember him showing them but I didn't — [mark them?] So now I'm
 339 thinking maybe I'd better [pauses] But is that too many bubbles?
 340 D: But you're only going to choose [pauses]
 341 P: One. So I'd better get it down to a specific one-approach-type thing.
 342
 343 P: These are all the same. [Points to left bubbles.] These four are good. [all bubbles
 344 except rightmost but one] are good. This one [pauses]
 345 D: That's different?
 346 P: This is different because, this one's different because [pauses] 5% is fine
 347 because that's finding, like cutting 10% in half. But then 15% is combining 10% plus
 348 half of it. 25%'s the same because you're taking 20%, but then that's like —
 349 D: — three steps, yeah.
 350 P: So, and I don't think we'd ever do much more than these [indicates subunits, then
 351 erases some], I think being realistically real world.
 352
 353 P: I think these are the common ones [percents]. So I would do 5%, 15%. [Pauses] I
 354 don't know if I'd have to do 5%. But, yep. I would because, and one that combines
 355 multiple and then — [about calculators?]
 356 D: I see why it's so difficult to decide.
 357 P: This is why, this [model] is great, but I think it's very hard. When I asked him
 358 [instructor] in class, I said is it justifiable to be teaching something to get ready for the
 359 next course, because that's what math does. Because you don't want to shut doors
 360 on any kids yet.
 361 D: Um hmm. You're not going to be [pauses]
 362 P: You don't want to say [pauses]
 363 D: You didn't graduate to this real world performance —
 364 P: But you don't want to say [pauses] I don't know.
 365 D: So if a child stopped math after your class, that would not be a good thing?
 366 P: Well, they could do percents, though.
 367
 368 I just think in math, there are some things you learn, and you're not going to use

369 them unless you're in a specific career. I wouldn't want to decide that for anyone at
 370 this age. [pause] But I don't have to worry about that now.

371

372 What I need to worry about is this [points to bubbles on her course model]. I'm
 373 wondering if there's too many [bubbles]. But I think, from looking at what he
 374 [instructor] has [points to p. 74] [pause] Where's the one on the health food? [leafs
 375 through course pack]

376

377 P: Oh. More. See? These [points to pp. 16-19].

378 D: Where's that?

379 P: Sixteen, seventeen, eighteen and nineteen.

380

381 In the Overview. [Reads p. 17] He has the course goal, the major unit goal, subunit.
 382 And then he has the fitness program [p. 16]. [Reads Fitness Program course model
 383 on p. 16]

384

385 [Turns pages, then taps p. 19] This one, page 19. [Reads example of 3 levels of
 386 goals.] "Plan menus. Reduce fat, reduce calories. Maintain flexibility, stretch and
 387 activity." [Looks at her course model.]

388

389 D: Did he say anything about how many levels each should have?

390 P: [P glances at her model.] He didn't say, but everything shows three. I know you
 391 have to go down further because you have to do enabling [pause]

392 D: I would think it would have to depend on your topic. What are you looking at now?

393 The flowchart?

394 P: Yeah. [Reads title from page 20] "The Relation of Course and Unit Objectives and
 395 Content."

396 D: What page is that?

397 P: That's page 20.

398

399 [Reads about course terminal objective from p. 20.] "A specific course outcome to
 400 match the goal." That would be this. [Points to her course goal.] "Course content
 401 needed to achieve the objective. Test." That would be these [points to her unit
 402 goals].

403

404 I think I'm OK. [Reads from p. 20] "Content needed to achieve" [pauses] Well, this is
 405 the content. [Points to her subunit goals.]

406

407 P: Now I'm on page 21.

408 D: Is that another example?

409 P: It's the same, yeah, it's the nutrition one, where he gave, uh, demonstrating three
 410 levels of goals on page 19, only now I think it's written out [on p. 21], written as
 411 objectives. [Compares pages 19 and 21 about Fitness Program.]

412

413 I'm trying to see where I'm going with this. I guess, after that [reads lesson goal at
 414 bottom of p. 21] "Recognize a healthy diet. Recall sources of fat, sugar and salt.
 415 Explain results of nutrient intake. How to plan a health producing menu."

416

417 P: [Turns to page 22.] Page 22. I guess I got it right. I'm thinking, I'm worried about
 418 [turns to page 24 and reads, the points to her notes page] The prerequisites helps.
 419 Because if we did 15% as a prerequisite, then they'd have to know how to do 10 and
 420 5.

421 D: Just as long as you know what the prerequisites are and can identify [pauses]

422 P: Yeah. Right. If you can state those [pauses]

423

424 P: I'm just going to do that specific skill, so there are certain things you'd have to do
 425 to know each one of these, so that's a given. And so, I think that helps me with this.
 426 To understand that I'm not doing it, just taking somebody from nothing. Which I think
 427 is what —

428 D: Right.

429 P: That they're coming in with some skills, just like they do into your classroom. But
 430 somehow now it's a problem. [laughs]

431 D: Right You wouldn't assume [pauses]
 432 P: We'll just assume that they have these prerequisites so that when I do this further
 433 [more detailed level], because I know I was looking at the — one. See that's where,
 434 that's more where I'm those little stepping stones. I think I'm thinking more down in
 435 farther [points to level below subunit goals].
 436
 437 D: I think the enabling ones come later, right?
 438 P: Yes. I think, I'm not sure, but I think three [levels] is enough. [Points to 3 levels on
 439 her model]
 440 D: So now, how does that change [pauses]
 441 P: Do I have to do [points to the 3 unit goals], no. Okay.
 442 D: How does it change, though, what you're going to do for practice and what for
 443 project? [laughs] We're not done?
 444 P: [Laughs] Dam! No, we're not done yet.
 445
 446 P: [Looks at her course model.] I think for my practice I might do 15%. You probably
 447 can't answer this. What I'm wondering is, do we, after this, break this [subunit goals]
 448 down any further?
 449 D: I can answer that. Yes.
 450 P: Okay. And then for my project I will probably do 10% and multiples to get to the
 451 20%, 30%. But this is the one I think is hard [indicates the 15% subunit.]
 452 D: Because it's several steps?
 453 P: Uh huh. And so, I'm thinking I would like his help with it. So this one [15%] would
 454 be my practice and I would get lots of feedback from that. And this [10%] would be
 455 my project, with the goal in mind of the specific tips is the big one that comes to mind;
 456 sales would come to mind. Those two are big things in the real world. So that would
 457 be realistic, too.
 458
 459 P: What if I change this [indicates her course model]?
 460 D: It's okay. It's okay with me. It's not going to hurt my research.
 461 P: I don't think I will.
 462
 463 P: Does that, do you understand what I'm saying about why I would get him the
 464 challenging one, that would be challenging for me?
 465 D: Absolutely. That's what I would do.
 466 P: Might as well take advantage of it.
 467 D: Sure.
 468 P: I'm in here [CEP 808] for a purpose, and I would like to get as much as I can from
 469 him.
 470
 471 D: Okay, so are you satisfied, then, with what you've got now?
 472 P: Yep. I do have some questions, though.
 473 D: Well, that's why you're going to turn it in on Monday.
 474 P: I'm going to turn it in on Monday. Yes, I'll do that. I think [pauses] I don't need to
 475 state these [course model goals] as objectives now. I think that's my next thing, which
 476 you're going to tape me doing.
 477

Observation Session #2

3 D: Okay, this is observation session number two with Peggy.
 4 P: Do you want me to say what I said before [before taping started]?
 5 D: Yes.
 6 P: I said that I learned something last week, that I need to review the page format,
 7 this format [indicates BF]. Because I realized that this [her diagram] didn't have all the
 8 pieces to it. It didn't have the verb or object.
 9 D: Oh, okay, so, so you need to look at the blank assignment form and the part, the
 10 criteria list on the left side [of the form]?
 11 P: That's right.
 12 D: And how did you figure this out?
 13 P: Because when I went to do the assignment, I saw I was following the form, to type
 14 it up, before I handed it in, and I noticed that I hadn't done it. So that's when I called

15 you to see if I could change it. And I just did anyway.

16

17 P: Because it wasn't right. [Reads AM] So that was on page 66. Page 65, I read this

18 over.

19 D: Oh, that's the instructions for the preliminary assignment.

20 P: Yep, that's what it was. And then the preliminary choice [p. 66-BF]. I was reading

21 that over and realized I hadn't done that on my work.

22 D: And that's, the reason you hadn't done it was because [pauses].

23

24 P: Uh, I don't know why I didn't do it. [pauses] I didn't check it over. Let's put it that

25 way. I didn't check it over to see if it was in final format. I had the idea down. I

26 thought that was good enough. When I went home [after observation. #1 in library] to

27 put it on a computer, I read it over and it wasn't all done. So I thought maybe I better

28 make sure if I say I'm done, I better tell you when I'm done.

29 D: Okay.

30 P: So I better use these [indicates BF w/CL].

31

32 D: You got your feedback from the instructor [on prelim. assignment]. What does that

33 tell you?

34 P: Well, he, I did know to break down the course goal, and that my unit goals are

35 subskills. He approved that. I am a little confused on, uh, I was a little confused on

36 this being a whole skill. So I think I'm a little confused on whole piece in the real world

37 versus. I wasn't sure about that comment [Feedback #1], and I don't know if this [her

38 practice and project units] does have enough steps [because of feedback #2].

39

40 D: Which?

41 P: That would be both the project and the practice.

42 D: Which are?

43 P: Which are [reads CM]: "Calculate 15% of a number mentally" and "Calculate

44 multiples of 10% of a number mentally." He might be thinking that's not enough steps.

45 But he did put OK by it.

46

47 P: So I'm going to see. If it doesn't, then I'm going to go up [indicates a major unit

48 goal one level higher in the course model].

49 D: And what's that one [goal]?

50 P: To this major unit goal, which is "Calculate selected percents of a number

51 mentally." I think, I think, I don't know. And then I need to make sure I put this criteria

52 [indicates CL in BF] on the side [of her assignment] because he uses that as his

53 grading rubric. And I've done that before, too, so I can see where that would be

54 appreciated. I didn't have enough room. I didn't make it small enough.

55

56 D: You've used that kind of thing [checklist] before in your own class?

57 P: Yes. Checklists of [pauses]

58 D: Things that they need to include or have done?

59 P: To include, mostly not on daily homework but on projects. [quotes from her rubric]

60 "You have the title. Do you have this? Is this included?"

61

62 P: Why did I do that [use a rubric]? Because the results weren't satisfactory. [laughs]

63 D: Why did you do what?

64 P: Putting this [a checklist] on the side of the kids' projects.

65 D: Did it help?

66 P: Oh, yeah. A lot.

67 D: You still do that?

68 P: Only on the bigger projects or on things I'm trying to improve, like maybe

69 appearance of work. So for awhile we'll do checklists.

70 D: And do they seem to follow that?

71 P: For awhile. [laughs]

72

73 D: Oh.

74 P: This is seventh and eighth grade, actually.

75 D: that explains a lot. [laughs]

76 P: They do if it's there, they do use it. You have to teach them to use it, though. It's,

77 like, not automatic.
78 D: What do you do, tell them it's there, and why and [pauses]
79 P: Tell them it's there and then if they don't use it, the next time I say "Look. Did you
80 do this? Did you go through this? Check it?" Just exactly what I didn't do? [indicates
81 her prelim. assignment]
82 D: [laughs] Seventh grade, are you?
83 P: [laughs] Exactly! Exactly! So, anyway, that's what I didn't do.
84
85 P: So! I'm going to the assignment format [annotated model]! And what's confusing
86 for me is all this writing and arrows [indicates instructor's handwritten notes on AM].
87 D: The annotation on the model?
88 P: That's hard, but that's when I use a highlighter.
89 D: Why is that hard?
90 P: Well, it's here and there and everywhere.
91 D: Confusing? You don't know where to find stuff?
92 P: It's confusing. You have to follow [indicates hand-drawn arrows].
93 D: Oh, you have to follow the arrows?
94 P: But it's kind of a personal touch because these are his notes. And that's exactly
95 what he does [follows the checklist when grading]. [P indicates the CL on the BF.]
96
97 P: So I just need to [pauses]
98 D: So this, so this [annotation on model] gives you a little [pauses]
99 P: See, look at all those arrows [points to arrows on AM].
100 D: Yeah. It's like [pauses]
101 P: So this gives you a little familiarity with how he works, but on the other hand, you
102 have to follow the arrows, is that right? You have to figure it out.
103 D: Yeah.
104 P: Yeah.
105
106 P: So, what I learned from last time is, I'm going to the assignment format [blank
107 form], number 1, and I'm going to read it. Because I need to do one through five [assignment #1, parts
1 - 5].
108 *COURSE TITLEP: So I've already got [pauses]
109 D: Part 1 is?
110 P: Assignment, what it is? [pauses]
111 D: Number one. Part one of that assignment.
112 P: Course subject name, which I already have.*COURSE DIAGRAMP: The diagram [CM]. So I would
just run
113 another copy of that [points to CM] off and include it [in the next version of
114 assignment #1].
115
116 D: Um hm. But you're going to have to shrink it.
117 P: But I have to have all this still [indicates CL on BF]. And that [blank form] says use back of page if
needed (for diagram).
118
119 D: Oh, yeah. You could!
120 P: And I have a copier, so I could, oh, I could figure it out.
121 D: Well, you could just Xerox, well [pauses]
122 P: That's what I'm saying. Make another copy.
123 D: And stick it on the back. Yeah.
124
125 P: Okay. [reads BF] Now, what's new are the three, four and five [parts of assignment
126 #1]. Right? [Flips back to look at calendar.] Have to do items one through five.
127 D: Right. Number 2 is the preliminary.
128 P: Right. [Reads]
129 D: what were you looking at just then?
130 P: Well [pauses]
131 D: Was that the instructions?
132
133 P: [Leafs through CP and happens to stop at pp. 85-86, "Advance Organizer--
134 Overview." Then looks at calendar.] I was looking at the project draft. "Whole
135 assignment."

136 D: The project draft?
 137 P: The whole assignment is due next Monday.
 138 D: Oh, are you looking at the calendar?
 139 P: Yep. And so, just one second here. [looks at calendar]. Yeah, that is project one,
 140 one through five.
 141 D: The whole, project one is assignment #1, all parts. And that's due on the 28th,
 142 isn't it?
 143 P: [checks her personal calendar] But the draft is due the 21st. That must be where
 144 you turn it in and he gives you feedback?
 145
 146 P: [looks at personal calendar again]
 147 D: I think that it's parts one through five that's due Monday, which is the 21st? Right?
 148 P: Right.
 149 D: Yeah. And then the rest of it, all of it [assignment #1], right?
 150 P: Practice and project are due [pauses]
 151 D: The 28th?
 152 P: Whole assignment is due the 28th.
 153 D: Yeah, so you do one through five now.
 154 P: Right.
 155
 156 D: And then you do six and seven next week.
 157 P: Okay. Okay, and then on the Wednesday he gives us the feedback. Yeah. [Turns
 158 to p. 74.]
 159 D: Right, except that I'll get yours on Monday if you still want to do it [participate in 3rd
 160 taping session] on Tuesday.
 161 P: Probably. That'll be good, force me to get it done. [Flips through pages of
 162 examples on 88-91.]
 163 D: On the other hand, I'll have to talk to Linda, because she was signed up for
 164 Tuesday.
 165 P: That's fine, and it doesn't matter.
 166 D: Because I could meet with you on Friday.
 167 P: Yep. It does not matter.
 168
 169 P: [Flipping through CP] All right. Okay. So I'm going to get, this is me. It's hard to get
 170 started. So this is why I can't sleep at night. — [turns to BF] So. Conditions, behavior,
 171 real world performance. Now the question I have [pauses]
 172 D: What are you reading now? That's the blank form, right?
 173 P: Um hm.
 174 D: And what page is that?
 175 P: This is page 81.
 176
 177 P: And this would be what I would go through like I did last week, after I left you. I
 178 would make sure, this time, that I had all this included [reads from CL on 87], where
 179 he has "goal has real role, setting, time, place, purpose." I would make sure that what
 180 I've written has all that in there before I say I'm done.
 181
 182 P: And I would make this [reads from CL]: "Behavior, generally stated, related to
 183 subject," I will make sure this time that I've done that. And I only go this far [indicates
 184 bottom of 81, which is part 5 of assignment #1].
 185 P: Now I'm going to go back to what he did. [turns to AM on 74]. And I'm just, I need
 186 to kind of study. Because I'm, I wasn't good in class. Listen to me. Because I, it
 187 should be so easy, but I cannot think of the steps.
 188 D: The steps to your?
 189 P: To the objective. When he gave the examples [pp. 6-12 in Overview]? [Quotes
 190 instructor]: "Well, what could you say here?" I was, like, shhh [gestures to show an
 191 empty mind].
 192 D: Examples of the objective?
 193 P: Even though I did it. Yeah. I just, I'm already down to the little steps, instead of
 194 thinking [gestures high, to show the big picture]. I'm thinking already of enabling, and
 195 I need to be [again gestures high, to show the big picture].
 196 D: Um hm. I think that's a common thing that people do.
 197 P: Yeah, well.

198 D: That teachers do who already learned this, but now they're doing it another way.
 199 P: Yep. And that's why I'm in the class.
 200
 201 P: All right. So, I'm not going to write down "Mathematics" because I know that's going
 202 to be included [as the subject of the assignment].
 203 D: For?
 204 P: But I am going to put it on here [points to S].
 205 D: Are you starting part 3?
 206 P: No, I'm going to do [points to part 1 - Title].
 207 D: Oh, the title, part 1?
 208 P: I'm just going to put it up here, and I probably have to move this down, but at least
 209 I'll get it on here [S]. [Reads FORM] Oh, I don't want to use title. I'll just say subject.
 210
 211 P: And I'm not a fast typist.
 212 D: Did you get the diskette version from him [instructor]?
 213 P: No, because he said Mac. Does he have PC?
 214 D: Well, when I was a TA he did.
 215 P: Oh, well, that would be worth asking.
 216 D: I don't know if he still does. Yeah.
 217 P: I'll probably cut and paste it [checklist] on the side.
 218 D: Yeah, that's fine, too.
 219 P: But, you know what? How much room are you going to need for that? [Studies S
 220 and sets tabs.]
 221
 222 P: All right. I'm going to do that. Maybe that'll help. Or, better yet, okay. That's the first
 223 thing.
 224 D: Are you looking at the model?
 225 P: The model again, on page 74. I'm just going to say [reads from AM part 2]: "Use
 226 back of page if necessary," so [types] "See back of page."
 227 D: For the diagram [CM].
 228 P: Um hm.
 229
 230 P: All right, now to the [reads CL]: "What students will be able to do after the
 231 course. Generally stated."
 232 D: Now, are you writing the course goal now?
 233 P: I'm looking at that, but I was seeing where he said he put this in outline form: A. B.
 234 1) 2) 1. 2.? [Refers to parts of Behavior section in AM.]
 235
 236 P: And I'm wondering if I need to do that. Or if the diagram is enough.
 237 D: The diagram is enough.
 238 P: Okay. So now [pauses]
 239 D: I think that's an alternative way. Now, some people do both, if it helps you.
 240 P: I don't see where that would be a help.
 241 D: Does he say "or" in there [annotated model]?
 242 P: [Reads AM.] Nope.
 243 D: Hmm.
 244
 245 P: Uh oh. [Flips to 73 then back to 71.] But it might be. Well, it says [points to part 2
 246 on AM]: "Two." Oh, yes it does! Ooh! There it is, right there. [Reads part 2 of AM.] "Or.
 247 Diagram or."
 248 D: I think I just blew my research here, but [pauses]
 249 P: Sorry.
 250
 251 P: I'll highlight that. [Highlights "Diagram or outline" on AM.] I won't ask you.
 252 D: I'm not sure what it shows you.
 253 P: It does. Okay. That's what I learned last time. I need to read more carefully. All
 254 right, I'm going to go with that [the diagram rather than the outline of the course
 255 model].
 256
 257 P: Okay. [Reads FORM]: "Course goal. Real world performance." I know that. I
 258 need a real world performance. [Highlights "real world performance" in title of part 3.]
 259

260 P: [Reads CL for part 3] : "Goal has real role, setting (time and or place or purpose)."
 261 All right. Now, what I need to do is, because he had several examples of course
 262 goals [flips back to example on 88] he did in class. [Reads example on 88]: "Role,
 263 setting, purpose, behavior. As a healthy adult at home." Okay. [Flips to next example
 264 on 89.] As this and this. [Flips to next example on 90.] As this and this. [Flips to next
 265 example on 91.]
 266
 267 D: And those are examples of the course goal?
 268 P: Um hm, and they're all set up the same. "As this, where" [pauses]
 269 D: What page is it on.
 270 P: These are all on 88-91.
 271 D: Okay.
 272
 273 P: Okay. [Turns to 93] Course, and this is 93. He gives more [examples]. [Reads 93]:
 274 "Role, who or what the person is; setting, the job, profession, avocation, daily life
 275 situation." That's what I am. I'm daily life. This is for daily. As a consumer, mine is, but
 276 it might be more than that. [Highlights "daily life situation" under Setting on 93.]
 277
 278 [Continues to read 93, Setting.] I don't understand why "understanding of the world"
 279 is a setting.
 280 D: Is that in an example? Or is it a type?
 281 P: He has down "Strategy for Deriving Objectives, [93]" and he has "Write a course or
 282 unit general goal," which I'm trying to do.
 283
 284 P: He has role and setting. I understand role. Setting, I understand job, profession,
 285 avocation, your daily life, intellectual pursuit [pauses] Oh. Okay.
 286 D: Is that what intellectual pursuit is?
 287 P: Yeah, understanding real world, yeah. [Shrugs.] Maybe not. I do puzzles for no
 288 reason. [laughs]
 289 D: [Laughs.] They have no reason. They have no purpose. Okay. [Reads from 93]:
 290 "General statement of competence [unintelligible]." Hmmm. I should have read this
 291 before.
 292
 293 P: [Reads from 93]: "You should ask before continuing if the skill can be learned
 294 easily and quickly in the real world. If the skill can be learned efficiently, you may not
 295 want to bother with it." I don't know. I don't think people even understand percent.
 296 They use it all the time, so maybe that's right. [Flips forward from 93.] In back.
 297
 298 P: Okay, this is not, I'm just trying to see how far it [course pack examples] goes.
 299 D: Um hm. Are those examples of the other parts?
 300 P: Um hm. Here's an example. Right. He goes "lower limits." That's [pauses]
 301 D: Oh, that's [pauses]
 302 P: That's for [pauses]
 303 D: Oh, that's, is that part 5?
 304 P: Is that what I have to do? Oh, it is! [Flips to 107 then to 74, then 75.]
 305 D: I think [parts] 6 and 7 are justification and motivation.
 306 P: [Reads from 75]: "Condition, behavior, criteria." That's it. Criteria's optional.
 307 D: And you're looking at the, uh. [pauses]
 308 P: Back to 75.
 309 D: You're looking at the annotated model?
 310 P: Um hm.
 311
 312 P: [Turns back to 74, then to 72-73.] Well, there's a spot, okay. I'm sorry. I'm going
 313 back to this again [71].
 314 D: Oh, that's fine. That's fine.
 315 P: Assignment one.
 316 D: Um hm. And is that, is that [pauses]
 317 P: And I've got page 71.
 318 D: Oh, it's the instructions?
 319 P: [laughs] That's right, instructions. All right.
 320 P: I have to [reads from part 2 on 71]: "You will write a course goal, course objective,
 321 unit goal, unit objective, and justification." [Highlights each of these on 71.] Correct.

322 Okay. I have to write [reads and highlights part 3 on 71]: "course and unit goal,
 323 course and unit terminal objective." Okay. [Reads 71.] Okay. That's right. This is
 324 before. All right. [Turns to 73-74.]
 325
 326 D: What's the "okay" for?
 327 P: That is what I read last Saturday, and that [pauses] This is a general thing. It's not
 328 really giving you [pauses]
 329 D: Which page is that?
 330 P: Seventy one.
 331 D: Seventy one.
 332
 333 P: It's an overview of assignment 1.
 334 D: Oh, the overview of assignment 1. Okay.
 335 P: It's not really each piece. It's the [pauses]
 336 D: It's the whole, overview of the whole.
 337 P: Review of the whole thing. And, uh [pauses]
 338 D: and the "okay" meant that, what?
 339 P: I read that already.
 340 D: Okay. Oh, that you recognized that you already read it?
 341 P: But that wasn't what I really wanted. I'm looking more for [turns to 75]. I guess this
 342 is it.
 343
 344 D: What, the model?
 345 P: What I have to do. Yeah.
 346 D: You're looking for what you have to do in the model?
 347 P: Um hm. I'm looking for what's due, I'm looking for, right. [Looks through AM, 74-
 348 80.] It's not as "checky-offy [numbered like the checklist, as in the instructions for the
 349 preliminary assignment on 65] as the last one was. Which was [pauses]
 350 D: Why is this, do you think?
 351 P: See how it [65] says "1. 2. 3."?
 352 D: Oh, that's in steps and this is [pauses]
 353 P: This is [pauses]
 354 D: Well, those were [pauses]
 355
 356 P: It's in steps. It's showing you what he means, and that's his style.
 357 D: But if it were in numbered steps, it would look easier or [pauses]
 358 P: For me, it would be less confusing. I'll probably get used to it. All right. And it's over
 359 here [points to NOTE]. He's just showing you examples [OF NUMBERED LISTS].
 360
 361 *COURSE GOALP: All right, I need [gets her blank notebook out]. Course goal. My course goal is
 362 "Able to find percent of a number." And I kind of am going to go back and forth here,
 363 because [indicates notebook and monitor, then starts writing in notebook].
 364
 365 P: [Reads EXAMPLE]: "As." That's "as." [Types]: "Consumers in the real world."
 366 [laughs] Where else would you be?
 367 D: In school! That's the unreal world.
 368 P: Oh. Uh huh. [Reads part on 74]: "For any problems needing division of resources
 369 at home or in business." "For any problems." Let's — and see what else he has.
 370 [Turns to 75-76, then 77-78.] I need to go back to the examples again, now that I'm
 371 finally getting focused here [turns to 88].
 372
 373 P: And I'm just going to read this one more time. [Reads from 88]: "As a healthy adult
 374 at home (setting)." [Reads 89]: "Responsible employee." Ah. [Reads from 90]: "A self-
 375 sufficient [pauses] citizen, financially solvent citizen." [pauses] I see what he's doing.
 376 D: What's he doing?
 377 P: Well, the, who it is is related. For example, he has "As a self-sufficient, financially
 378 solvent person." That's related to the goal, "Making wise investments." When he says
 379 "Responsible employee in a business setting," that's related to his [goal]
 380 "Communication of the message."
 381 D: So why do you think he's doing that?
 382
 383 P: Because our, the role has to fit your, who the course is for. Your goal, the person

384 it's for. So I'm not going to put down here, for example [reads 88?] Well, I think
385 consumers because I want to do tips, and loans, possible, buying car; I want to do
386 grocery store sale. Those are all related to consumers.
387
388 P: I wouldn't necessarily say "As teachers in the real world," because my goal is not
389 really just aimed at teachers. You see what I'm saying here? So, at. Now, where am
390 I? [turns to 89-90 and reads]: "Consumers in the real world." That's a real setting.
391 [Reads 90]: "Faced with decisions at home to save" — [turns to 91-92].
392
393 P: [Reads from 91]: "Of the community. Active members of the community." [Turns
394 back to AM-74.] That's the role. "As a consumer." The setting is real world, but I might
395 have to be a little more specific. [Reads course goal from 74]: "For any problems
396 needing division of resources at home or business."
397
398 P: [Types] "Girl. For any" [looks at AM] I wonder if I can do a "such as" or if that comes
399 later. [Turns to AM, 75-76.] I think that comes later [in part 6]. [Reads 75-76.] Well, if I
400 don't like it [her course goal], I'll change it.
401
402 P: [Types]: "Setting involving problems encountering percent problems in the real
403 world." [Laughs] — I'll have to work on that. I need, I'll come back. I need to just get it
404 done. [Reads CHECKLIST]: "Behavior. Real graduate behavior." I don't like that,
405 graduate from what? That's what they are from the course, I guess. Maybe I can deal
406 with it.
407
408 P: [Reads AM] Oh! I probably have to break this down, not just write it down like this. Like he did?
409
410 D: Mm. Probably.
411 P: That's the condition, so [pauses] One second. I'm flipping to the example again.
412 [88-89] [Reads from 88]: "Course goal." I think I should set it up like this [indicates
413 example on 88].
414 D: What's that?
415
416 P: Well, what I'm debating about right now, and that's not even getting into it yet, is
417 where do I put his labels and stuff. Do I put the role, this is the setting, this is
418 behavior and this is the purpose.
419 D: You mean do you have to identify them [parts of an objective or goal]?
420 P: Yes, or does [pause] Because he breaks it apart here. [Looks at AM p. 74 then
421 75. Reads]: "Condition. Behavior." Or is that a teaching tool?
422 D: I think he wants it like that.
423 P: Like this [indicates AM], not necessarily like this [examples on 88].
424 D: That means you don't have to identify.
425 P: See, I don't think that's fair, but that could be because I didn't read it. Like last
426 time, you know.
427
428 P: Okay [S], so I'm going to, then, put, uh, three, this is number [part] 3. And that is
429 condition, course goal. [types]
430 D: So, what did you just type?
431 P: What I've done is, I'm telling him exactly what I'm working on. I'm working on the
432 course goal, which is the real world performance, and I'm working on the condition.
433 "As consumers encountering percent problems in the real world" and a setting.
434 "Encountering." Well, I don't like how that is. I guess I want to make it fancier. It
435 doesn't, it just sounds too [pauses] So I'll come back.
436 P: Now, we'll go to the beginning here. [Types.] Realizing I never typed until I went
437 back to get my Master's degree, you'll understand — [slow typing?]
438
439 [Digression about P's typing skills]
440
441 P: All right. [Reads CHECKLIST]: "Real graduate behavior." [EXAMPLE]: "Graduates will solve
division problems."
442 [NOTE]: "Will be able to do after the course. Thus, general discussion of final exam as well."
443 [Reads EXAMPLE]: "Graduates will solve division problems." [Looks at EXAMPLE]
444 That's it?

445 D: For the behavior? Is that all he has for that example?
 446 P: [laughs and turns to 88] Yeah, that's what it is. [Reads from 88]: "The graduate will
 447 plan a fitness program." Ah!
 448 D: What else do you think should be there?
 449 P: I don't know. It just seems [pauses]
 450 D: Short. [both laugh] Too easy?
 451 P: Yeah. I'm just looking for, maybe it should be harder.
 452 D: That'll come.
 453 P: I'm sure.
 454
 455 P: [Types]: "Graduates will be able to find the percent of a number." No? "Will be able to solve
 problems."
 456 [READS EXAMPLE]: "Will be able to solve division problems." Well, that's what I said up
 457 there, so [pauses]
 458 D: What's why you said "up there"?
 459 P: Up here in my course goal. I said my course goal is "Able to find a percent of a
 460 number." And that's what they have to be able to do, so. But I was thinking it's all
 461 going to be centered around real world problems, but that's already stated, I think. I
 462 don't need to say "You will solve problems."
 463
 464 P: [Reads from S]: "Graduates will be able to find percent of a number." [pauses] "Will
 465 be able to solve" [pauses] Well, that's what they need to be able to do, so [pauses] I
 466 might come back to that.
 467
 468 P: All right, this is the course goal. Now I'm not real satisfied, and the reason I'm not
 469 real satisfied is, what I'm wondering is, do I have to tell them that I'm solving
 470 problems. I mean, it's not just sitting down and doing written percent problems. [turns
 471 to 88.] Oh, look at this! [Reads]: "So that. So that." [Turns to 89 and reads it.] I didn't
 472 do the purpose. That's what's bothering me.
 473
 474 D: You were just looking at the examples, and now you're in the annotated model?
 475 P: Right. First, what's bothering me is, this is the behavior [gestures to S], what they'll
 476 be able to do after the course, general, but when I go to the goal that he has written,
 477 every single one of them state purpose. [Turns to 88] and that's what's missing
 478 [gestures toward S], that's why it didn't seem right. "Graduates will be able to find the
 479 percent of a number [reads from CL on p88]: "So that." [Nods and turns back to 74.]
 480
 481 P: That's what I need, but, you know what? I don't see that here [74].
 482 D: So that was in the examples but not in the model?
 483 P: Because he has [READS CL], well, he has "time and/or place and/or purpose."
 484 [Reads note on 74 about real purpose.] Oh! He does have [pauses] [Reads from 74]:
 485 "A manager of resources, for any problems needing division of resources." That's the
 486 purpose. [S] Well, that is a purpose, isn't it? "Problems in the real world." [Looks back
 487 and forth between screen and EXAMPLE. Reads from S.]
 488 D: What's it say?
 489
 490 P: [Reads her course goal]: "As consumers encountering percent problems in the real
 491 world, graduate will be able to find the percent of a number." See how I am. This, this
 492 is how I am. What's bothering me here, these are, these [examples on 88] seem to
 493 be a little more well-written [than 74]. [Reads from 88]: "As a healthy adult in a home
 494 setting." See, I think [reads S then types]: "As a consumer in the real world,
 495 graduates will be able to find prob, to be able to, find the percent of a number so that
 496 they will be able to solve problems. "When they encounter" [unintelligible].
 497
 498 P: [Reads 88.]
 499 D: Are those the examples?
 500 P: Mm. I'm sure it'll go along faster after I do it once. [laughs] [Reads from S]: "As
 501 consumers in the real world, graduates will be able to find the percent of a number
 502 when they encounter situations requiring competency in percents."
 503
 504 P: There's got to be another way to say that. What, I want to give specific examples,
 505 like what I'm thinking of. I think I'm going to go on, and I might come back again. But

506 it [her course goal] does have a role, it does have a setting, it does have a behavior
507 and it does have a purpose.

508

509 P: All right. Yay! [Turns from 88 to 81-BLANK FORM.] That is number three [part 3]. And I only have
510 to do one because my practice and my project aren't yet. So, [reads from BLANK FORM]:
511 "Course terminal objective." That's your test. [Reads CL on 81]: "Close representation
512 of real conditions and real behaviors for all skills." That's what we would [unintelligible]
513 have done. That was very hard for me in class.

514 D: What?

515 P: [turns to 88] The terminal objective, even though I do that.

516

517 P: [READS FORM]: "Given this." You know, I'm thinking of what I would want to do. [Gestures toward
518 S]. And then when he gave his example, like he did this one in class [example 1 on
519 88], not the fitness one because he uses that all the time, but [reads other examples
520 on 89-91] What one did he use in class? "Given this, given that, given this." Just a
521 second. [Turns to page 97.]

522

523 P: Oh, here they are. But this is unit, this is even farther down. And I'm not even
524 [pauses]

525 D: What page is that you are on?

526 P: This is, these the objectives we did in class. 97 through 99.

527 D: Okay. And you say that's too far?

528 P: [Reads example 1 on 97.] Maybe that's where I am. I have to look back in here
529 [CP].

530

531 P: [Reads AM-75] Wait. I'm not there yet. I'm not to the unit objective yet. [97] I'm just
532 to the course terminal objective. And that's not on these [examples on 97-99]. So, I'm
533 on the right track. I was thinking ahead to number 5 [part 5 of assignment 1].

534

535 [Digression on tabs and formatting of computer files]

536

537 P: [Types]: "Course terminal objective." [Looks at 75]

538 D: That's number 4? You just typed the title?

539 P: Number 4. [Pauses] Okay. [Reads from AM]: "Given a written description of any
540 common management problem involving dividing resources."

541 D: So you're reading from the annotated model.

542 P: Um hm. Page 75. [Reads 75] Yeah, this is still general. It's not till the unit goal
543 [pauses]

544 D: By general you mean pertaining to the whole course?

545 P: Right.

546

547 P: Like 8 out of 10. That's criteria. Oh, that is up here [course TO, 75].

548 D: Up where?

549 P: Page 75, under his [pauses].

550 D: Number 4?

551 P: Um hm. It's "Criteria."

552

553 P: I don't like options. All right. [Reads NOTE]: "More specific
554 description." [Reads EXAMPLE]: "Given a written description of any common
555 management problem involving dividing resources." [pauses] "Students will." I don't
556 know what they will do. That's what I have to do. I have to think of that. [Reads CL for
557 part 4 on 81-BF]: "Real conditions and real behaviors for all skills. Specifically stated
558 version of course goal." [Turns back to p. xx] I'm just going to do one thing here.

559

560 P: In the beginning, in his overview, we did some of these, real world goal. Then
561 terminal objective. [READS p10] Given a map, so to read a map, you're given a map. Student will
562 be given a start and [pauses]. So, we're talking about the student in your class, for
563 the terminal objective.

564 D: Oh, what are you looking at?

565

566 P: I'm looking at page 10. When he did his overview, he did a real quick thingy about,
567 and all I'm doing right now is looking for a little more on terminal objectives. And I

568 know he had some. I'm just kind of refreshing my memory. And after awhile I probably
569 won't need to do this. [Flips through course pack.]
570
571 P: [Reads 21]: "Terminal objectives. [Reads several examples quickly.]: "Given this,
572 given this, given this. Own activities within" [pauses] All right. [75, then types.]
573 D: That was the model you were looking at?
574 P: Yeah, that was at the beginning in his overview he gave in the first week.
575 D: I mean just now that you were looking at.
576 P: Yeah, I'm looking at page 75 again.
577
578 P: And what I need to do now is decide what they're going to do. I guess it better be
579 written form, but it'd be kind of fun to have them role play, go into a restaurant and
580 doing tips, make a poster with a sale and showing the steps, you know, just, rather
581 than just a written description.
582
583 P: But, I wonder if I can say, and he'll give me feedback on it, is, "Given a variety"
584 [pauses]. What am I going to give them? I'm going to give them [reads 75].
585
586 P: Oh! I see. Never mind.
587 D: What did you see?
588 P: What am I going to give the kids, not what are they going to give me back.
589 D: You were thinking [pauses].
590 P: I was thinking of the project already. You know, I'm already thinking of the terminal
591 behavior for number 6 [part 6 of assignment 1], which is unit terminal objective.
592 [Reads 76]: "Given 10 problem cases, here's examples of what they will do." I'm
593 thinking of that instead of right now what am I going to give them. [75]
594
595 P: Oh, but they have to show behavior, too. Well, it's going to have to be on
596 whatever format it is.
597 D: You have to show behavior in the course terminal objective?
598 P: [Nods and reads NOTE]: "More specific description", and it's
599 optional to include the criteria. All right, so. [75, then her course model]. I think the
600 course terminal objective is testing this, the course goal. [Points to her course goal.]
601 D: Which is?
602 P: "Able to find the percent of a number." And my unit goal is going to be, the
603 terminal objective is going to be this. [Points to "Calculate selected percents of a
604 number mentally" on her course model.] I have even gotten to that yet.
605
606 P: I'm still doing the course. That's this. [Points to top circle on her course model,
607 which is the course goal.] All right. [Reads 75, then types]: "Given a written."
608 [pauses] I just don't want them all to be the same.
609 D: You don't want what to be the same?
610 P: I don't want every questions I do to be a written description. I want maybe here's
611 an ad from a newspaper, maybe here's a receipt from the restaurant.
612
613 P: But are those written descriptions? [Reads screen]: "Given a, given." [Looks at 75]:
614 "Given a consumer scenario [laughs], given a written consumer scenario." Well, I'm
615 going to have to [unintelligible] that. [Types.]
616
617 D: [After P stops typing] So, what's it say?
618 P: Well, I'm using his right now, but I don't, I don't really. It says: "Given a written
619 description of any consumer problem." This is frustrating. It's got to be frustrating to
620 watch this. [Reads screen and types]: "Given a written description of any consumer
621 product."
622
623 D: I keep trying to leap into my TA role, and I'm trying not to.
624 P: [Reads screen, then 75, then types]: "Involving percent." [Reads note on 75]: "All
625 skills from all units on course final?" [Looks from screen to AM and back.] Ooh!. That's
626 all of them! [Reads AM] Oh! We're doing all of them! That would make sense.
627 [pauses] I keep thinking I'm down here [points to her subunits on her course model].
628 I'm up here, and his model says you have to include all of these [points to units on
629 her model].

630
631 D: Is that in the checklist on the side, or are you reading the annotations, or what?
632 P: He's got all skills underlined [in CL], and I didn't really see that at first, and then he
633 has, he's listing these in his example: "Using long or short division, with or without
634 remainders," and then he states it in his hand. [Reads note on 75]: "All skills from all
635 units on course final exam." That's all of this! [Points to all units on her model.]
636
637 P: [Reads note at top of 75]: "Description of course final exam." That's like semester,
638 that's your exam. That's your [gestures to encompass all] end. Okay. [Looks at
639 screen.] I wonder if I can give an example here. [Reads AM.] That's "written
640 description." I'm just wondering out loud. [Reads AM then types, looks at her course
641 model, then back and forth between model and screen, then types the unit skills into
642 her course terminal objective.]
643
644 P: [Types and looks at AM and her course model.] "Given a variety of situations."
645 [Looks at screen.] Well, you see what I'm struggling with.
646 D: Which is, you want to [pauses]
647 P: I don't want this just to be, necessarily to be a written story. I would like to give
648 them a variety of situations, such as, as I mentioned before. But I don't know whether
649 to say that [read AM] because you do that later.
650
651 P: He actually shows later that you can do that, but he doesn't show that you can do
652 that now. Because he has only one example. [Flips pages.]
653 D: One example of the course objective?
654 P: Yeah. Well, unless I just didn't go back and really look. So. [Flips to beginning of
655 course pack.] He's done it and he's got [reads course pack, page xx] it. "Terminal
656 objective." It's a "pretest, it's a plan, task description, principles, skills, rules and facts.
657 "He's got [pauses] I think I'm so used to working at the end and I'm not used to
658 looking at the overall picture. Which is a problem, I know.
659 D: Did you find any examples up there, in the front of the book?
660
661 P: [Flips pages of course pack, then reads 22]: "A specific course outcome to match
662 the goal. Under any road or weather conditions execute any driving maneuver,
663 according to the law and safety considerations." That's the goal. The real world goal
664 is to drive safely. [Reads from the top right of 22]: "Under these conditions you will
665 execute any driving maneuvers."
666 D: What page is that?
667 P: Page 22. [Reads screen]: "Under any road or weather conditions." [Reads 21]:
668 "Given own daily activities." There are many examples here. "Age and weight." This is
669 page 21. "Will write a total fitness plan." Yeah! "A variety of consumer situations."
670 Maybe, "encountered in the real world."
671
672 P: [Types] I need my thesaurus. [Laughs]
673 D: What are you trying to find?
674 P: Well, it's not like it's experience, but occasions.
675
676 [Digression about P's husband as a walking thesaurus.]
677
678 D: What do you have so far that you're trying to find a word for?
679 P: Um, I have experiences. "Given a variety of consumer experiences involving
680 percent. Given a variety." [Reads course pack, page xx.] Sorry, I'm making it too hard.
681 [unintelligible]
682 D: Well, Don't worry about me. I'm just watching.
683 P: I know. [Reads 21]: "Under any road or weather conditions." See, under any road
684 or weather conditions. "Execute any driving maneuver." [unintelligible] I mean, that
685 makes sense.
686
687 P: [Reads 21]: "Given your daily activities, age and weight, you will write." [Reads
688 screen.] No, that doesn't make sense. I mean, how am I going to present it? [Reads
689 21]
690 D: How are you going to present the problem?
691 P: [Nods.] To the kids. I mean, you have to think about it. You really have to think

692 about this [assignment 1]. [laughs]
693 D: Bummer!
694
695 P: Okay. What do I want? I want [writes in notebook], I want to give them actual
696 advertisements, I want to give them actual dining receipts, bills, whatever you call
697 them. I want to give them actual. Well, that wouldn't be. And I wouldn't mind giving
698 them some story problems, like loans, because they need to know when to estimate,
699 when they need to be exact, so they're going to need story problems involving maybe
700 a loan, that charges, well, like my parents charge me 7% if I borrow money from them.
701 So maybe they need, you know, um. [Reads her course model.] So those are the
702 things I'm really, tips! [Writes] That was it, tips. Not just in dining, but in salon, beauty,
703 hair. It would be when you're traveling.
704
705 P: There would be chauffeurs, taxis. There would be all kinds of situations. Written
706 scenarios. [Reads screen]: "Given, in writing." [types]: "Written scenarios. [Reads
707 screen]: "Given, in writing.." [Types]: "Of written scenarios, including hands-on tests"
708 [laughs]
709 D: Hands-on what? [laughs]
710 P: Hands-on manipulations. [laughs] Well, that's what they are.
711 D: That's Okay.
712 P: [Types, then reads screen.] He'll ask me about that. Yeah! Sometimes you're
713 going to have a hands-on thing. That sounds teacher-like!
714
715 P: I don't know. Where am I? [Flips toward later pages in CP] Sorry it's taking so long.
716 [laughs] I'm nervous about me doing this in front of you. I feel real stupid.
717 D: You're really, everybody does it the same way.
718 P: Oh my god. [laughs] All right. Where was I? [[annotated model-75]] [Gestures "all
719 right" then reads from AM] "Students will" [pauses]
720 D: And that's the annotated model?
721 P: Yes.
722 D: And you were reading what?
723 P: Page 75, and I'm on Behavior now. I just four, Condition.
724 D: You were reading the example, the model?
725 P: Yeah.
726
727 P: [READS CHECKLIST], CL 1] And do I have a real condition and real behavior of
728 all skills? [Keeps finger pointing at CL part 1 while glancing at screen] I have a
729 condition, which is: "Given a variety of written scenarios, including hands-on
730 manipulatives." That's not here, but [unintelligible], involving [looks at screen]. Uh oh!
731
732 D: What?
733 P: [annotated model] Oh, that's how he has it. "Using, dah de dah de dah de dah."
734 Those are all of my unit goals [points to her DIAGRAM], all the skills they'll have to be able to do.
735
736 P: [AM75, Behavior] Yeah. "Students will." [Types then reads AM] I wonder why I call
737 them students now instead of graduates. [AM74] Oh! Because they're the student.
738 They haven't graduated yet. [Types] "Students." [pauses]
739 D: What did you look at when you just said that?
740 P: Ah, page 74.
741 D: Oh, that was the first page of the model.
742 P: And realizing that the course goal is what the graduate will do, but we're in the test
743 for the student before they are the graduate. So I was just using student. I don't
744 know. I think.
745
746 P: [annotated model] "Students will." [Types] "1." Oh, what do I want them to do? And
747 it's mentally. They're going to have to write it because I can't [Pauses]
748 D: You can't read minds?
749 P: I can't read their minds, I can't [Pauses] I would not be willing as a teacher to even
750 orally assess something for the students. [Shakes head.] But they're going to have to
751 write out the mental steps [AM75, Criteria] according to a rubric that I shall design.
752

753 P: Okay. [READS EXAMPLE]: "Students will" [TYPES]: "write out all steps" [READS EXAMPLE THEN
 TYPES] "involving
 754 all steps taken to solve mentally." [Reads AM] "All steps. All steps used." [Reads
 755 screen.]
 756 D: So, what does it say now?
 757 P: That's pretty hard. That's hard for kids because they will use computation, even
 758 though you're saying mentally. They will [Pauses]
 759 D: What do you mean by computation?
 760 P: I mean working out with paper, pencil.
 761
 762 P: Is this accurate to give this in a written form if I am seeing if they can do it
 763 mentally? Because I've been teaching a long time, and they'll write it down and then
 764 they'll erase it and make it look like they did it. [Pauses] speculating. And if you can
 765 have part written and do one or two orally, like in a role play situation where I'm just
 766 observing groups. And still have some of it be written. But I really think I'm going to
 767 have to do a [sic] observation at some point, just to make sure. I wonder if that's
 768 legal, if you can.
 769
 770 P: [Reads screen] "Write out all steps used to solve mentally." So I think I've decided
 771 that we will also have to [Types]: "orally provide the solution without written, without
 772 using, derived mentally without using." Well, that would be in the criteria, wouldn't it?
 773 I'm giving [Pauses, then deletes back to mentally, then types]: "3." This really forces
 774 you to be clear, there's no fuzzy. Like you can stand up in class and be fuzzy, that's
 775 not good either, but, I mean, it's a bad habit.
 776
 777 P: [Reads screen?] "Students will: 1." They have to be able to write all the steps they
 778 used to solve mentally, how we practice that in class. They will also need to be able
 779 to prove they can do it orally. I'm not sure that's clear how I wrote it, but that's what I
 780 mean. And they will have to, oh, I know. [Types]: "Provide a written solution, and 4.
 781 provide an oral solution." Oh, I already said that. [Deletes "4." then "2."]
 782
 783 P: See, he's going to wonder, I'm wondering myself, how that is proving you did it in
 784 your head. [Current behavior after editing]: "Students will: 1. write out all steps used
 785 to solve mentally. 2. provide a written solution. That is really hard. That's going to
 786 have to be under justification. I'm going to have to be good on my justification
 787 because, but I do believe, in the behavior they must also be able to [types]: "3.
 788 calculate mentally percents, calculate percents mentally. 4. provide solution orally."
 789 Oh, I know what I want to do. I don't know if this is allowed either. [Deletes 4. and
 790 adds to 3.]: "and provide solution orally."
 791
 792 P: Okay. Criteria. [Types]: "According to " [Reads AM] a, well, checklist. [Types, reads
 793 screen then mutters something.]
 794 D: Where is that, the criteria?
 795 P: Um hm. It's optional [Laughs, then reads AM75, nods, then types]: "A guide,
 796 according to guidelines which show how to" [Pauses]
 797 D: What are you looking at, page 75?
 798 P: Um hm. and he did this in his, but more so with the goal, which we talked about
 799 back here? But these [examples on 97-99] are more course, unit goals, and I'm not
 800 quite there yet.
 801
 802 P: So, that's why [reads screen]: "according to guidelines which show how to
 803 accomplish the task." [Gestures fists down and nods.] Okay. That means we're going
 804 to have to add some guidelines. [Laughs] All right. [Reads AM] That's number 5 [part
 805 5 of Assignment #1].
 806

Observation Session #3

3 P: What I have on my other one so far [PAUSES]
 4 D: Okay. Let me make an announcement here. This is Peggy, session #3. All right.
 5 P: [UNINTELLIGIBLE]

6 D: So instead of using the PC file, you're going to type it [ASSIGNMENT #1, PARTS
7 6 AND 7] onto here [THE BLANK FORM]?

8 P: Yep. And he said, kind of what you said when you asked me if I was a
9 perfectionist. And I showed him what I did. And he said, well, that won't be good for
10 the final, but just get it done.

11

12 P: Which is what you told me he'd say: just get it done.

13 D: What won't be good for the final? Oh! Oh, yeah.

14 P: Just now I don't have anything highlighted and capitalized and blacked out
15 [FORMATTED LIKE THE BLANK FORM]. I had it pasted. This is what I did here [IN
16 ASSIGNMENT #1]. So really [PAUSES]

17 D: So you copied, you pasted then Xeroxed them together.

18 P: So all I need to do, really, I'll keep on what I'm doing. Just need the fonts and
19 [PAUSES]

20 D: Yeah, but what you should do, though, where's the blank form? Do you have any
21 more?

22 P: Yeah. [LOOKS IN BACK PART OF COURSE PACK.]

23

24 D: Actually, probably a large number of these pages [IN COURSE PACK] are blank
25 forms.

26 P: [UNINTELLIGIBLE] here.

27 D: Yeah, Assignment #1. I would format this [P'S OWN TEXT] so that I could paste it
28 right on this form [BLANK FORM]. Don't retype this form, or even this part
29 [INDICATES HEADERS].

30 P: Look how much writing I've done compared to his little dinky [PAUSES]

31 D: Well, you can move it down. You can cut it and put it on another page.

32 P: Oh, that's true.

33 D: The only stuff I would type, if it were me, is this stuff, my own stuff.

34 P: I used to do everything by cut and paste.

35

36 [Digression on how we used to format before computers]

37

38 P: All right. All right, that sounds okay.

39 D: It would save you time and it would look like he expects it to look.

40 P: That's right, because he does expect it to look like that.

41 D: That [P'S ASSIGNMENT #1] was close, though [To The Format Of The Blank
42 Form].

43 P: At least I got it to where it had to be, I think.

44 D: So tell me what feedback you got.

45 P: [HOLDS ASSIGNMENT #1 FOR A WHILE.] Well, the feedback I got [PAUSES]

46 D: And this is for parts one through five.

47 *COURSE DIAGRAM
P: First of all, I marked both of mine as project. And even on the back I had practice
48 and project, so he had to figure that out. So he said one needs to be practice for a
49 change. I don't know.

50

51 *COURSE GOAL P: And so then he said, the only thing, and I knew this at the time, if you recall,
52 when I put my role, er, the setting as in the real world, that was not specific enough.

53 D: So the setting [OF P'S COURSE GOAL] actually said "in the real world"?

54 P: The setting said, "As a consumer in the real world." So you're just saying "out
55 there." Which really I am, but he wants it [PAUSES]

56 D: What does he suggest?

57 P: He suggested to say, "As a consumer, for personal needs at home, or for business
58 needs."

59 D: Oh.

60 P: See, my thing about this is, it feels to me so contrived.

61

62 P: Right now. Maybe I'll get used to it.

63 D: Well, I'll tell you, what he has said is that it is contrived and rigid,

64 P: Yes, rigid.

65 D: but what he's trying to do is get you the detailed way to an objective, and then,
66 when you're at work, you're not going to do everything that he says.

67 P: Right.
68 D: I don't do everything that he says where I work.
69 P: And he's teaching us also to analyze what we're doing. And it does have to be
70 rigid, I think, in the beginning.
71 D: Right, until you learn it. Then you know what you can drop. [PAUSES]
72 P: It doesn't sound right to the ear.
73
74 P: So I did this. I said, "As a consumer, for personal, business, at home or in the
75 community." Because I think you, I don't know what personal needs, to me I don't
76 know, personal needs but anyway, "personal, business, at home or in the community,
77 when situations arise requiring quick answers and interpretations of percent." Now, I'll
78 tell you, I had this that will get to the next time, which was, I put the purpose under
79 conditions, but I didn't really put it there because it was a, I mean, I put it under
80 behavior, put some of the conditions under the behavior.
81 D: Oh, you mean you, which conditions?
82 P: Purpose, but he said, "Please put above. Seems better there."
83 D: Well, here's what I think.
84 P: But it doesn't sound right there.
85
86 D: No, it doesn't sound right. It's going to sound awkward and contrived because we
87 don't talk that way. I think what he wants to do is isolate the behavior so that you
88 know, this is the behavior that you're testing. And if you put other stuff in there, it's
89 going to confuse it.
90 P: Right, because when I was reading his things [EXAMPLES ON 88-91], his course
91 goal is not divided up into behavior and conditions, and it sounds better. Because he
92 had, like he said, like his example [PAUSES]
93 D: Where are you? 89?
94 P: On all these examples. Because I was reading them afterward. On 88 through 91
95 he doesn't, he has the purpose stated after the behavior.
96 D: And that's something that he'll tell you is that once you know the parts of the
97 objective [PAUSES]
98
99 P: Okay. Because I don't like how that sounds.
100 D: You can intersperse them.
101 P: Yeah. And so that's what I did. [PAUSES, THEN READS ASSIGNMENT #1]
102 D: Um hm, but not now.
103 P: Not now, no. And it doesn't sound as good, but. So I moved it [PURPOSE] up
104 there [FROM BEHAVIOR TO CONDITION ON BLANK FORM] and I put [READS
105 SCREEN]: "As a consumer, for personal business at home or in the community."
106 That's the role and that's the place, and the time is: "when situations arise requiring
107 quick answers and interpretation of percent," and the purpose: "so that he or she is
108 able to make wise consumer decisions." So I put all of them. [READS COURSE
109 GOAL]: "The graduate will be able to find the percent of a number." and that goes
110 with the bubble [COURSE GOAL ON HER MODEL], which is what you want to
111 accomplish. So I can see he's had that [COURSE GOAL BEHAVIOR ON SCREEN]
112 isolated out for just the behavior.
113
114 P: That's what he told me to do.
115 D: Okay. So that's the course goal.
116 P: I don't know if you can tell me this or not, but when he underlines things in there, is
117 that because he, that's his method of checking if they're there?
118 D: Yeah.
119 P: He's not losing sight of it?
120 D: Right.
121 P: Okay.
122 D: If he doesn't write anything next to it, that just means he was looking for it and
123 there it was.
124 P: So everything else is okay, except and then, so then down under unit goal where
125 it says: "As a consumer in the real world" he said "As a consumer for personal or for
126 business needs." And I just didn't want to use his words. He doesn't care, does he?
127
128 D: As long as they're appropriate. Now, some people just sort of parrot what he's

129 written, but it isn't appropriate.
130 P: Okay.
131 D: So long as it's appropriate, he doesn't care if you use the same words.
132 P: And as far as I got before you came is to rewrite it, was to the behavior part.
133 D: You're still in the course goal?
134 P: You know what? I'm going to tell you what I'm going to do here. See where it says:
135 "Revised #1"? [PC FILE NAME] I thought I opened up [FILE] "Assignment 1." I was
136 just going to cut, I was just going to cut and paste into my other one [PC FILE].
137 D: Sure.
138
139 [Digression on cutting and pasting and computer formatting.]
140
141 P: [READS SCREEN]: "As a consumer, for personal business or in the" [TYPES] And
142 then [READS FEEDBACK TO ASSIGNMENT #1] he said to move this [PURPOSE] up
143 [TO CONDITION], so I said [TYPES]: "when situations arise requiring quick answers
144 [PAUSES] What happened?
145 D: You must have hit enter a couple of times.
146 P: You know what? When I pasted? Could that [PAUSES]
147 D: O, that could be. You could have pasted some blanks in. do you have a thing
148 where you can turn on, where you can see the paragraph marks?
149 P: Yeah. I think it's all characters.
150 D: Can you move that [THE SCREEN] down? And then backspace to get up to that
151 line?
152 P: Oh! It's not part of your research, but [PAUSES]
153 D: No, but I like to do it.
154
155 P: Okay. Now. [READS SCREEN]: "when situations arise, interpretation of percent, he
156 or she is able to make wise consumer decisions." And then I just delete. [DELETES
157 EXTRA WORDS.] Delete. [TYPES] Okay. That's the condition. Oh, I must have
158 deleted the behavior too. [LAUGHS AND TYPES.]
159 D: [LAUGHS] And it's all on tape.
160 P: [UNINTELLIGIBLE]
161 D: Sure. This is what I wanted to see.
162
163 P: Okay. My behavior is: "The graduate will be able to find the percent of a number
164 [READS ASSIGNMENT #1] and round it off." I'd better add that. He didn't add that to
165 here [PRELIMINARY ASSIGNMENT #1], but I put it up here [IN PRELIMINARY
166 ASSIGNMENT]. [READS PRELIMINARY ASSIGNMENT.] I'd better, I'd better put it in.
167 [READS ASSIGNMENT #1.]
168 D: Are you at the course goal still?
169 P: Oh. I'm not at the real goal. And I don't have it [rounding] up there [in course or
170 unit goal on her course model]. [TYPES] He didn't say that [NOT MENTIONING
171 ROUNDING] was bad. The reason I added that was he said I would get more steps.
172 That was his solution to me not having enough steps.
173 D: Oh.
174 P: I went over and I said, "Well, they're going to know how to round off because I'm
175 going to expect them to, depending on the situation."
176
177 D: So that's probably a prerequisite that you're going to stick in there.
178 P: [NODS]
179 D: Yeah. That's all right.
180 P: Yes, and then we'll talk about when you might want to go to a whole number or
181 when you might want to go to the penny. I can't imagine ever wanting to go
182 [UNINTELLIGIBLE]. [READS SCREEN] All right. So that's that. And then [PAUSES]
183 D: So, okay. Read me what you've got, for your whole course goal.
184 P: So now I have, just a minute [WIGGLES MOUSE]. Don't act up now! All right. "As a
185 consumer, for personal business at home or in the community, when situations arise
186 requiring quick answers and interpretation of percent so that he/she is able to make
187 wise consumer decisions, the graduate will be able to find the percent or a number."
188
189 P: It just sounds so [PAUSES]
190 D: Well, yeah.

191 *COURSE TERMINAL OBJECTIVE
 P: And then I ended up with, "Given authentic materials" instead of hands-on.
 192 D: Now, this is the course objective, okay? Right, okay.
 193 P: Right.
 194 D: "Given authentic materials" [PAUSES]
 195 D: "Given authentic materials" [PAUSES]
 196 P: "Given authentic materials and a variety of written scenarios involving percent
 197 problems." As I was saying how I might want them to act it out or have actual
 198 [PAUSES]
 199 D: Um hm. Role playing in the world.
 200 P: "Requiring quick answers and interpretation of percent in the real world, using."
 201
 202 P: And here's all the skills. and he gave us a suggestion in class. He didn't really say
 203 we had to do it. But when you have something that's long like this [LIST OF SKILLS],
 204 sometimes it helps if you number them. And since he had them all underlined [IN
 205 FEEDBACK], it means he was keeping track of the skills, so I think what I'm going to
 206 do is number these [SKILLS IN COURSE TERMINAL OBJECTIVE].
 207
 208 P: [READS SCREEN AND ENUMERATES ON FINGERS]: "Using ratios and
 209 proportions, mental math, estimation." I'd better number those skills. So, and I'm
 210 putting them down. I don't know if I need commas or not.
 211 D: You know what? He's not a punctuation teacher.
 212 P: Okay. that's good to know because some teachers [PAUSES]
 213 D: Yeah. Well, he thinks it's important, but for formatting the objective [PAUSES]
 214 P: [TYPES AND HAS PROBLEMS.]
 215 D: Hit Backspace, then go over with your left arrow.
 216 P: Oh, my left arrow?
 217 D: And then hit Return or Enter.
 218 P: Oh!
 219 D: You just get a little added extra.
 220
 221 P: [READS SCREEN] I think I'll take the commas out. Okay. "Given authentic
 222 materials . . . using" [PAUSES] Oh, this has to go, I know. [REPLACES PREVIOUSLY
 223 DELETED WORD "USING" IN FRONT OF LIST OF SKILLS IN COURSE TERMINAL
 224 OBJECTIVE.] "Using" has to be left there.
 225
 226 [Digression on how to use a computer to format.]
 227
 228 P: Okay. "Using." Right. [READS SCREEN] "Given authentic materials and a variety of
 229 written scenarios involving percent problems requiring quick answers and
 230 interpretation of percent in the real world, using: 1. ratios and proportions, 2. mental
 231 math of selected percents, 3. estimation involving easily recognized fractions, and
 232 calculators, student will, students will. In case of percent mentally, students will, A." I
 233 don't think I need to do that [USE LETTERS TO PROVIDE A SECOND LEVEL
 234 OUTLINE], but he has it [GLANCES AT ANNOTATED MODEL]. "A. provide an oral
 235 solution, and B. provide written steps that describe the mental process." So
 236 [PAUSES] I think I will do that.
 237
 238 [Digression on how to use handing indents in a word processor.]
 239
 240 P: Anyway, I think that's easier to read. [READS COURSE TERMINAL OBJECTIVE
 241 FROM SCREEN]: "The student will 1. write out all steps, 2. write out a solution, 3. in
 242 case of solving percents mentally, students will a. provide an oral solution during role
 243 play without writing out steps, and b. provide written steps that describe the mental
 244 process used to arrive at the solution." And the reason I wanted to do oral solution
 245 was to make sure they didn't use paper and pencil while they were describing the
 246 process.
 247
 248 D: Have you saved this [FILE] recently?
 249 P: The one at school does it automatically. All right. Then, we're still rewriting here.
 250 [READS ASSIGNMENT #1 FEEDBACK] It says to make sure that I need to do my
 251 setting. Everything else is okay. I'm happy about that.

252 D: So does he say you don't have a setting?
 253 P: My setting is too general.
 254 D: Oh, that's the one in the real world?
 255 P: Um hm. I have a setting, but it's not specific enough.
 256 D: So what will you write instead?
 257 P: I'm going to use the one that I did up here [IN THE COURSE GOAL], which is:
 258
 259 P: [READS COURSE GOAL FROM ASSIGNMENT #1]: "As a consumer." Role. The
 260 setting is "for personal business at home or in the community" instead of the real
 261 world. [LAUGHS AT WORDING]
 262 D: Suspend your disbelief.
 263 P: Yup. [TYPES] You know that I have never had a course ever in writing objectives,
 264 and I've been teaching for [UNINTELLIGIBLE].
 265 D: This does not surprise me. My undergraduate degree is in education, and I never
 266 did.
 267
 268 [Digression on formatting on the computer.]
 269
 270 *UNIT GOAL P: [READS SCREEN, THEN TYPES] "For personal business at home." All right. Now
 271 see, here's where I don't like the wording. "As a consumer, for personal business at
 272 home or in the community, for problems requiring quick answers and interpretation of
 273 percent, such as, for example, leaving a tip, sales discount, the graduate will
 274 calculate multiples of 10% of a number mentally and round it off." That's my project.
 275
 276 P: Now I need to do this [PAUSES] I should do one back and forth, one for the
 277 project and one for the practice. so I'd better start a new [PAUSES]
 278 D: Or you might want to work straight through one, then when you have it done
 279 [PAUSES]
 280 P: Cut and paste it?
 281 D: Then do that. Yeah. Otherwise you might lose your train of thought.
 282 P: Then let me change this back to what it was, which is 15%. [READS ASSIGNMENT
 283 #1 FEEDBACK] Because this is the one right now.
 284 D: Is this the practice or the project?
 285 P: This is the practice. [READS SCREEN]: "The graduate will calculate 15% of a
 286 number mentally and round it off."
 287
 288 P: And, so. I think I've done what he said. [READS ASSIGNMENT #1 FEEDBACK]:
 289 "And please check notes and then push on." [LAUGHS] Push on is right!
 290 D: Think how many times he has to write that. for every single [PAUSES]
 291 P: I can't believe the amount of work he does. He must own stock in [PAUSES]
 292 D: The blue pen company? [LAUGHS]
 293 P: [LAUGHS] Blue markers. Okay. Now see, after you left, I started rearranging, and
 294 you know, I had [READS ASSIGNMENT #1 FEEDBACK] Oh, purpose. Why, not
 295 when. I had a "when" in there.
 296 D: Oh, this is your feedback from the preliminary assignment?
 297 P: Yeah.
 298
 299 D: That you didn't have on the form [prelim. assignment form], right?
 300 P: I, when you left I was jotting some notes down, so if you wanted to look at that, I
 301 was going through [PAUSES]
 302 D: Where are the notes? Oh, your notes?
 303 P: Mine. Because I was going through his check-off list [CHECKLIST ON BLANK
 304 FORM] and I couldn't decide [READS ANNOTATED MODEL].
 305
 306 P: All right, now.
 307 D: What do your notes say?
 308 P: My notes say, I was going down, what I learned from last time is to read this
 309 [POINTS TO CHECKLIST ON ANNOTATED MODEL].
 310 D: The left column?
 311 P: To read the left column. I wasn't sure I had [PAUSES]
 312 D: Is that [CHECKLIST] in the annotated model of Assignment #1?
 313 P: Yeah, and it's also in where it tells you what you have to do. [FLIPS BACKWARD

314 THROUGH THE COURSE PACK.]

315 D: Now, um, you say you learned that. What happened that made you notice that

316 [THE CHECKLIST]?

317

318 P: Well, the first time, because he had "OKs" next to all of them, and, oh, I know what

319 I was going to say. It wasn't that. It was, after we did the first project in the library?

320 D: Yeah?

321 P: And I was so general, and when I was reading what I was going to have to have in

322 the assignment? It was on page [FLIPS THROUGH COURSE PACK], I don't

323 remember where it was, but anyway, what I can remember, I didn't have, it must have

324 been this, page 66, "Preliminary Choice of Course and Unit Goals."

325 D: Oh, that's the preliminary assignment?

326 P: And I went back and it had to have a "how to" and a verb and an object. And I

327 went, "Ooh! I didn't do that!" I just had the theme.

328 D: Um hm.

329 P: So I was using this [CHECKLIST]. And so that's when I said I learned that.

330 D: Ah hah. You were using that to do your preliminary assignment?

331

332 P: [READS HER NOTES ON PRELIMINARY ASSIGNMENT INSTRUCTIONS ON 66].

333 So before I was going to turn it in to him, I was checking it over, and then I got to

334 thinking about what purpose—why or why not—and I didn't I, I had a "when" but not a

335 "why."

336 D: So you used that as a checklist, "Do I have this? Do I have this?"

337 P: Yeah, I used it as a checklist. Um hm. and then I, now see, I even wrote down

338 "participant in, community member, working member of society," but I didn't, I just kept

339 in "the real world." So I thought about that.

340 D: Okay. Well, here we have it.

341

342 P: Now I know. I'll do it. "Just do it!" All right. Well, what else is dawning on me here, is

343 I have to have this for both my project and my practice, whereas before everything

344 was the same except for the last sentence, and now [UNINTELLIGIBLE] my work has

345 now increased.

346 D: Now it diverges. Yes.

347 P: And that was a scary thought. So [PAUSES]

348 D: Some people actually have totally separate units from totally separate courses.

349 P: I don't know how they do that.

350 D: Well, I would assume that they don't work full time.

351 P: Because I have a whole briefcase of full time work to do from school. I don't like to

352 [FUDGE?] on my work from school, so [PAUSES]

353

354 *UNIT TERMINAL OBJECTIVE P: Anyway, [READS FORM]: "Unit Terminal Objective." This is

355 # 6 [PART 6 OF ASSIGNMENT #1]. And to be quite honest with you, this is very hard

356 for me as a teacher to figure out how to assess things, because I do not like

357 assessments.

358 D: You mean that lower limits business?

359 P: Yep. I don't know who says it takes ten of these or three of these.

360 D: Well, you're not alone.

361 P: So, and on my last course I took, it was the same thing.

362

363 P: When I get to the assessment part of how I'm going to decide, I would rather not

364 decide if they know it. I just like to do [PAUSES]

365 D: What if someone's life is going to depend on them knowing this? You know, they

366 have to figure out the rocket fuel or something. Wouldn't you like to be sure they

367 know it?

368 P: Yes. But for some it might be once and for others it might be [LAUGHS] Yes.

369 D: I know, and it is different, but [PAUSES]

370 P: And I think, because we have so many different kinds of kids in our classroom—with

371 the inclusion kids and the [UNINTELLIGIBLE]—it's just [PAUSES] I don't know, it's

372 really hard to do. I think you need to be honest and say, "Hey, you need to do it and

373 didn't reach it." But, maybe I'll reach it. [LAUGHS] I don't know.

374

375 P: So anyway, I need to have [READS CHECKLIST]:

376 "number of cases and solutions."
 377 D: Okay. Now you're reading from what page?
 378 P: Page 76, which is his annotated rubric [CHECKLIST] kind of thing.
 379 D: That's for part 6, the unit terminal objective.
 380
 381 P: And now I understand his arrows. They're not so scary as before.
 382 D: They're good arrows. Arrows are good, usually.
 383 P: Yeah.
 384 D: Sometimes they're not.
 385 P: Well, he's checking it out and showing you where it is, that it's there, so, that's
 386 probably good to keep it up there.
 387 P: [READS FEEDBACK FOR ASSIGNMENT #1] So number of cases or situations.
 388 D: That's your feedback, part 1-5?
 389 P: That's my feedback. Yep.
 390
 391 P: [READS MODEL, P76] Now, what I have to decide here is -- Do I have to move
 392 closer? [AN ASIDE CONCERNING THE VIDEO CAMERA]
 393 D: No, I'm just [ZOOMS IN ON ASSIGNMENT #1 FEEDBACK]
 394 P: I need to , I realize now my unit terminal objective. Where is that? Does that go
 395 with my course objective or the unit goal? That's just [PAUSES]
 396 D: What? does what go with what?
 397 P: [READS TITLE, P.76 PART 5] The unit terminal objective, that's your unit final
 398 exam. So they're talking about the unit goal, not the course goal because the course
 399 terminal, no, never mind. That [MODEL] answered my question.
 400
 401 P: So what I'm concentrating on is [READS HER UNIT OBJECTIVE]: "The student will
 402 calculate 15% of a number mentally, "that's what they have to be able to do. Now,
 403 how many cases, what am I going to give them?
 404 D: So you're working on the conditions for the terminal objective.
 405 P: Yeah. So, in other words, what am I going to give them? When the kids raise their
 406 hand, like they did in class, "But will we get this? Will we get this? Will we get this?"
 407
 408 P: So I said they're going to be given authentic materials. So that better be a given.
 409 And I said written scenarios, so I'd better have those.
 410 D: So these are things you said earlier in the unit goal?
 411 P: In the course goal?
 412 D: In the course goal?
 413 P: All right. And they'd better reflect problems that need quick answers, because
 414 that's what I said [IN HER COURSE GOAL]. [WRITES] Like tips. See, I can't get past
 415 the tips thing. I think that's why I repeat that, because kids can't do that.
 416 "Interpretation of percent." Like, I have a good one. I want to call Deck the Walls [A
 417 RETAIL STORE]. They have a great problem. They sent out a flyer, and it said "Sale."
 418 because do this stuff with them. And you could pick A, B or C.
 419
 420 P: [KEEPS FINGER ON UNIT TERMINAL OBJECTIVE ON 76] A was 20% off one
 421 item, or the second one was, or an item with half off for the second, or, and I can't
 422 remember the third situation. Well, it ended up that it saved me money by doing the
 423 first one, with what I brought in [PICTURES TO BE FRAMED] versus the other things.
 424 So you should know how to do that.
 425
 426 P: So that would be a good problem for other than tip, because I said in here
 427 [READS SCREEN] "sales discounts." So I need to get that [UNINTELLIGIBLE]
 428 because I like that [REACHES FOR MOUSE].
 429 D: Do you know who else that would be a good one for, is Linda Lothamer. Do you
 430 know her?
 431 P: No.
 432 D: She's the other math teacher who's in my study.
 433 P: Is she the blonde?
 434 D: Yeah.
 435 P: Yeah, she came up to me one day.
 436 D: Yeah, because she's sort of doing, except she's doing graphing $y=mx+b$. And, I
 437 guess, but wouldn't that be a good candidate for graphing?

438 P: Um hm.
 439 D: To see the intersection?
 440 P: Yeah, so I should give her, I'll do that.
 441
 442 P: I want to get that [PAUSES]
 443 D: It may not be appropriate. I'm not a math person, so [PAUSES]
 444 P: Well, I don't teach, I am going to teach slope and intersection this year, so we'll
 445 have to learn it. I mean I know how to do it, but as far as I have to teach it and I have
 446 to know why we're doing it. When I went to school we never knew why we did it.
 447 D: Justification. Oh, yeah.
 448 P: That's why I have a hard time teaching it.
 449
 450 P: Okay. "Given, given." [READS MODEL, P.76]: "Ten problem cases, in written form."
 451 Now, why do they make it so hard. When there are authentic materials and written
 452 scenarios.
 453 D: What's hard?
 454 P: Well, it says, "Given ten problem cases in written form." That's easy, but I've got
 455 other things to do. I'm not just doing story problems. I'm doing, "You're out to lunch.
 456 Here's your bill, here's your bill, here's your bill. How much are you going to," like I
 457 picture the kids at their table, figuring tips.
 458 D: Is that what the authentic materials are?
 459 P: Um hm. So I'm going to have to spell that out.
 460
 461 P: That's the "such as." But how many of those [CASES] before you can prove that
 462 [behavior]? Three times. One could be luck, I guess. Two, you might get it right or
 463 wrong. If you get it right, then you better do it right one more time. so it's consistent.
 464 Some form of consistency, plus time. I wouldn't have time to do five role plays. I could
 465 do three, I think.
 466
 467 P: Okay, so, "Given." But then I can put an "and." "Given this and this." I think I can
 468 do that. So [WRITES], "Given three" [READS MODEL, PART 6], this says problem
 469 cases. Role play scenarios, I guess I could use. All those are written form. Nope,
 470 these aren't going to be, well, there'd better be a written test or the kids or aren't
 471 going to know. [WRITES] "With written, three role play situations with written, each
 472 with a written scenario that involves percent, calculating 15% [READS MODEL, P.76]
 473 of a number. Example, tips and sales discounts." I might be able to find, to look in my
 474 books and find more.
 475
 476 P: I think I have a list started. It's back here somewhere [LOOKS IN NOTEBOOK].
 477 This is where I started.[READS NOTEBOOK]: "Actual advertisements, dining receipts,
 478 story problems." Oh! Oh, yeah! It's not just restaurants. That's what I want to make
 479 sure I did. Salons, beauty salons, newspaper delivery persons. So it doesn't just have
 480 to be tips in a restaurant. So, I want these situations to be varied. [READS
 481 NOTEBOOK]: "With a written scenario that involves calculating 15% of a number,
 482 such as tips, restaurant, beauty salon, taxi, sales discount." Just so they can see.
 483
 484 P: "Best yield stocks." I wrote those down. These are notes from class while he was
 485 giving these [reads from her notes: "Need to prepare." [LAUGHS] "Must know. Need
 486 to prepare." [LAUGHS] It's like panic. "Need to be clear!" All right [LAUGHS]. All right.
 487
 488 [READS NOTEBOOK]: "Given three role play situations, each with a written scenario."
 489 I'm picturing that on three-by-five cards. Oh, do I have to say, be that specific?
 490 Because he's saying something about you don't have to say, "Here's the table, here's
 491 the pencil." Only the important facts. [READS NOTEBOOK]: "Given three role play
 492 situations, each with a written scenario," I don't have to say it's on paper. "That
 493 involve calculating 15% of a number." Okay. Givens. I'm looking at 76 in his rubric
 494 checklist [CHECKLIST IN MODEL ON P.76].
 495
 496 P: [READS CHECKLIST]: "Givens." Okay. "Such as." [READS NOTE]: "Problems, of what kind."
 [LOOKS FROM CL TO SCREEN]
 497 Okay. I got the number. Okay. [READS CHECKLIST]: "The way the
 497 situation's presented on the test. The medium. Such as." [READS NOTE]: "A specific example."

[READS CHECKLIST]: "Describes
 499 the test situation." All right.
 500
 501 [WRITES]: "Such as." [READS MODEL, P.76] I mean, does he want me to be creative
 502 with the problem, like "John was on a date with Sally." [LAUGHS]
 503 D: He doesn't care.
 504 P: Because I could do it with kids, and I always say, "You're on a date and you don't
 505 want to pull your calculator out of your pocket."
 506 D: I think that's a good motivator for kids.
 507
 508 P: "Jonathan and Sally are having a romantic dinner before the prom." I should say,
 509 "Sally receives the check." [LAUGHS]
 510 D: There you go. [LAUGHS]
 511 P: "John and Sally [UNINTELLIGIBLE] receive the bill for." What's a nice dinner?
 512 [UNINTELLIGIBLE] They don't drink; they have pop. \$78.96.
 513 D: Boy! It better have been a really great meal somewhere!
 514 P: [LAUGHS]
 515 D: Of course, then there's the limo driver.
 516 P: Lobster. [LAUGHS] Oh, right. That'll be my, we could go right from there. Oh, good
 517 idea. I'm [UNINTELLIGIBLE] scenario. There's your three role play situations right
 518 there.
 519
 520 D: Or it could be your 18-year-old nephew's first anniversary of meeting his girlfriend,
 521 going out with her. Which is what just happened.
 522 P: Ah? That never happened to me, but yeah, that's pretty cool.
 523
 524 [READS NOTEBOOK]: "John and Sally receive a bill for \$78.96." [WRITES]: "They
 525 need to quickly calculate the tip for the very efficient waiter. They decide." No, I
 526 shouldn't say "very efficient." That same story problem's going to be on my project,
 527 only it's going to say "20%."
 528
 529 [WRITES]: "They decide to leave a 15% tip. Role play [UNINTELLIGIBLE]." What are
 530 they role playing? They're role playing reading the bill and leaving a tip. "Leave the
 531 correct amount." Boy, I'd better have a lot of money sitting around if we're going to
 532 have [PAUSES]
 533
 534 D: Get Monopoly.
 535 P: Yeah, okay. [WRITES]: "Leave the correct tip on the table to the next dollar." Is
 536 that good enough? Because that's what I would do.
 537 D: In real life, what's a few pennies?
 538 P: [UNINTELLIGIBLE] Okay. That's good enough. Okay, let's see. Now [POINTS TO
 539 CHECKLIST AND READS]: "Number of cases and situations." [READS
 540 NOTEBOOK]: "Given three role play situations, each with a written scenario that
 541 involves calculating 15% of a number, for example, tips, in a restaurant, beauty salon,
 542 taxi, and sales discounts." I don't even know if I have to be that specific at this time.
 543
 544 P: [READS CHECKLIST]: "Such as." [READS NOTEBOOK] I don't need to say this
 545 right now. That's later.
 546 D: That's the types of scenarios?
 547 P: Yeah. Those are all things that involve tips. "Tips, sales discounts, salary increase."
 548 Which I haven't had in a couple of years.
 549 D: Those are easy to figure because they're so small.
 550 P: I wouldn't be getting a 15% salary increase.
 551 D: That would be really fun!
 552
 553 P: Something else that would involve that [15%]. Anyway, I think that's good enough.
 554 "Tips and sales discounts." Okay.
 555
 556 [READS NOTEBOOK]: "Such as, John and Sally are having a romantic prom dinner.
 557 They received the bill for \$58.96. They need to quickly calculate the tip for the very
 558 efficient waiter. They decide to leave a 15% tip. Leave the correct tip on the table to
 559 the next dollar." Okay! That's a role play.

560
561 Now, and! [WRITES] I want written story problems. "And given." Now here, that's
562 where you're going to have your paper [UNINTELLIGIBLE] and story problems.
563 Because I just want to, I just want to see if they can do it mentally, without a paper
564 and pencil around. But I do want to see if they can on paper describe and [READS
565 ASSIGNMENT #1].
566
567 P: Oh, what did I say! They have to, and now they're going to have to explain -- I've
568 got to go back here to this [ASSIGNMENT #1] -- they're going to have to explain to
569 the evaluator, whoever it is. It could be a parent, or the aid. "Explaining to the
570 [UNINTELLIGIBLE]."
571
572 Orally. Orally, you've got to have the verb [READS CHECKLIST], the medium. That's
573 the medium. Out loud, right? Out loud? Orally? [WRITES]: "Orally explain to the
574 evaluator the mental process." The kids aren't going to know what that means. I'll
575 have to say it in class when I teach. Say how you arrived at your [WRITES], "Explain
576 to the evaluator how you arrived at the, how you found the percent."
577 D: Um hm.
578 P: I mean, really. [LAUGHS]
579
580 P: There, I think, boy, you better keep going back to this [ASSIGNMENT #1] because
581 you don't know what you need to [PAUSES]
582 D: You mean to make it consistent?
583 P: Yeah! You better make them consistent, or [PAUSES] All right. [READS
584 NOTEBOOK]: "John and Sally are having a romantic prom dinner. They receive the
585 bill for \$58.96. They need to quickly calculate the tip for the very efficient waiter. They
586 decide to leave a 15% tip. Leave the correct tip on the table to the nearest dollar.
587 Orally explain to the evaluator" [PAUSES] Do I have to say there's an evaluator?
588 D: No.
589 P: [WRITES]: "How you found the percent."
590
591 P: Okay. I like it! All right, now. [WRITES]: "And given." How many time would you
592 have to write it out to prove [PAUSES]? What if some involved rounding to the
593 nearest dollar and some had to be more exact, see? But I have, and I'm not really
594 checking for rounding. I'm checking [READS ASSIGNMENT #1] [UNINTELLIGIBLE].
595 "Calculate 10% of a number and round it off." Well, I might put a variety in there
596 where you could, I like to give kids options, if they can explain like they rounded it off
597 first and then found it, why they are justified in doing that.
598
599 P: And then, because it might fit the story problem better than find the actual 15% to
600 the nearest, see what I'm saying? To me that's two separate skills, all right, so.
601 "Given." What's a good test. I hate this. [LAUGHS]
602 D: [LAUGHS] and you're a teacher.
603 P: I do, I really do. "How many of these do you put up?" Because I've started writing
604 my own tests. "And how many Bs?"
605 D: Testing is its own art form.
606 P: So, given five, you know, this is just a part of the whole course. This is going to be
607 like a 100-point exam if you do this with every [PAUSES]
608
609 P: Well, it's four. [READS ASSIGNMENT #1] That would be ten [UNINTELLIGIBLE]
610 on a piece, that would be 40 questions. That's like two days. Forty questions, that's a
611 lot of questions! Explaining and writing up. So [PAUSES]
612 D: Then you have to grade them.
613 P: Then you have to grade them. So, "Given three [LAUGHS], given two [LAUGHS],
614 role plays." Maybe I would, but see, the thing is, given, you've got to have three
615 because if you have one they might have guessed. If they had two and they got the
616 first one wrong and the second one right, then how are you going to know they didn't
617 make a lucky guess? So at least at some point you have to have two out of three.
618
619 D: What if they get the first one right and the second one wrong and the third one
620 right?
621 P: Well, I figure at least you could do two out of three. Chances are that you're not

622 going to guess right twice. The odds aren't with you there. I think. So I'm going to
 623 keep three. And then I'm going to do the same with the story problems because six
 624 times four is twenty four, and that would make a nice little test there. We'll see what
 625 he says. This is practice.

626

627 P: I'm not so frightful today as I was last time because he's going to tell you what he
 628 wants, and then you're just going to go and fix it or think about it. so if he doesn't
 629 think three's enough, he'll write "Do you really think that this would be enough to
 630 evaluate?" Right?

631

632 P: So [WRITES] "Given three written story problems, problem cases?" I'll just try
 633 problems—they're called story problems—"that involve, that reflect real world situations."
 634 Ah, I'll just write it, but I think we'd better come back to that. [LAUGHS] Where am I?
 635 [P.76]

636 D: Are you looking at the left column or [PAUSES]

637 P: Page 76. I'm looking at his example.

638 D: His example or his notes?

639 P: I'm looking at everything! [LAUGHS] I'm trying to figure out where I am. Uh, I just
 640 blanked out. Um, I'm [P.76] under Conditions, I just did the oral, the role play [READS
 641 NOTEBOOK] and now [READS ASSIGNMENT #1]

642 D: The "such as"?

643 P: The "such as." And now I'm going back [P.76] and doing the same thing again.

644

645 P: "Given three written story problems" [PAUSES]

646 D: Now, why are you adding the givens again?

647 P: I'm adding that because in my behavior for my course terminal objective [READS
 648 ASSIGNMENT #1] Oh, wait a minute! Oh, because I said, "In case of solving percent
 649 mentally," and that's my unit goal: "Students will." Oh! I'm not writing this for the whole
 650 thing. I'm writing it for just my unit goal, so I'm not really, might not really even have to
 651 do [READS ASSIGNMENT #1AGAIN] Oh, but I said, I did want them,

652

653 "In case of solving percents mentally, students will provide an oral solution during role
 654 play without writing out steps, as well as provide written steps that describe the
 655 mental process used to arrive at the solution."

656

657 P: Oh! [READS NOTEBOOK] I said [IN ASSIGNMENT #1PARTS 1-3] they were
 658 going to do a variety [READS ASSIGNMENT #1 PARTS 1-3], and here [NOTEBOOK]
 659 I said they were going to explain it, orally, to the evaluator. But I really would like them
 660 to write something. I would like them to be able to take it. [READS ASSIGNMENT #1
 661 PARTS 1-3] But this is, the unit is mental math. [READS ASSIGNMENT #1 PARTS 1-
 662 3] And the others would maybe come under these, but I would like them to be able to
 663 [UNINTELLIGIBLE]. So, I'm going to stick with this. But I'd better go back [READS
 664 ASSIGNMENT #1 PARTS 1-3] Well, that can mean [UNINTELLIGIBLE] to do it that
 665 way, too. They have to write out the steps to the solution, and also, if this is mental,
 666 they must do this also. Okay. I don't know. I'll have to think about that.

667

668 P: [READS NOTEBOOK]: "Given three written story problems, given three consumer
 669 situations." I'm going back to this example here. [READS EXAMPLE THEN WRITES]: "In written form."
 670 That's how he's doing it. [WRITES]: "In written form, that involve finding [GLANCES
 671 BACK AND FORTH BETWEEN EXAMPLE AND NOTEBOOK], "calculating" [POINTS TO TEXT
 672 AT TOP OF NOTEBOOK]. Do they have to be worded the same all the way through?
 673 [READS EXAMPLE] This not [PAUSES] Well, yeah.

674 D: Are they worded the same?

675 P: No, they're not exactly the same. They vary some, a little bit. They involve equal
 676 division of resources, and here he had problems with whole numbers involving
 677 division of small resources into equal parts. He's a little more general, er, he has
 678 shortened it up quite a bit as he moved to the conditions for the terminal, for the
 679 exam part.

680

681 P: And so did I. [READS HER WORK, PARTS 1-3] Oh, no I didn't. [LAUGHS]

682 D: Did it make it shorter or more specific?

683 P: Maybe it's more specific. [READS EXAMPLE] It's definitely getting more specific, but, that

684 involve, but I was wondering if I could put "finding 15% or calculating," but my course
685 goal is "finding the percent" and I just noticed that I changed it to "calculate." I don't
686 know if it matters. [UNINTELLIGIBLE]
687
688 [Reads unit goal in notebook]: "Given three consumer situations in written form that
689 involve finding 15% of a number." [READS ASSIGNMENT #1]: "such as." Well, I've
690 got to get another story problem. I could just do the same. [POINTS TO NOTEBOOK
691 AND LAUGHS.]
692 D: What are the two "such ases" for?
693 P: Well, one, I don't know why it would need one, both, but I'm trying to say, like them
694 to actually do it orally, out loud. Take a situation, and do it mentally. But I also want to
695 be able to see, for them to explain the process they went through, but I don't really
696 need that.
697
698 P: [READS SCREEN]: "In case of solving percents mentally." That's this case
699 [GESTURES TO NOTEBOOK]. "Students will provide an oral solution during the role
700 play without writing out steps." That's this [gestures to notebook]. And here's where
701 my second one is. "As well as provide written steps that describe mental steps used
702 to arrive at the solution." Is that the solution of this problem [gestures at notebook]?
703 Because I'm asking them to explain it orally, and in written.
704
705 D: It sounded like you had that in the first "such as." That you had it all.
706 P: That's the story problem. Get [PAUSES] Can I put in one thing: "Given three role
707 play situations each, with a written scenario that involve [sic] calculating 15% of a
708 number and given three written story," Well, they're all written. [UNINTELLIGIBLE]
709 Written scenario. But one's role play and one's a story problem. A story problem's not
710 mental math, though.
711 P: Whenever they do it, they're going to sit there and work it out, on a piece of paper,
712 and then they're going to erase it [PAUSES]
713 D: Yeah.
714 P: Looking like they did it.
715 P: Yeah. So now you have to think about the logistics of the classroom.
716 P: [LAUGHS] I don't want to do this one. All right. [LAUGHS] [sound of ice cream
717 truck from window]
718
719 D: We could run out to the ice cream truck. [LAUGHS]
720 P: I think that I have done it, I think that I have the written scenario. They're going to
721 role play it out, they can explain it to somebody, then they're going to go back to their
722 seat and they're going to write down what they did. And that's what they're going to
723 do. [CROSSES OUT TEXT IN NOTEBOOK] Enough of that. Now go back to your
724 seat [READS ASSIGNMENT #1]. And they're going to write down what they did.
725
726 P: So I need to say that they're going to do that. [READS EXAMPLE] Boy, that's going to be hard
727 to do. I'd better get some help. [WRITES]: "The student." [READS EXAMPLE] Oh, that's
728 the terminal behavior. Oh!
729 D: What is?
730 P: What they're going to do. They're going to write it out [PAUSES]. Oh! I'm on 76
731 again. I have a "such as," but I think I've included in the "such as " the terminal
732 behavior, which is what I'm working on now. [CROSSES OUT TEXT IN NOTEBOOK.]
733 Yes, that's what I'm doing.
734 D: What is the terminal behavior?
735 P: The terminal behavior is [READS CHECKLIST] where you have what is observed: the object, the
736 verb, what the learner is going to do. [READS EXAMPLE]: "The learner will write out the problem
737 mathematically, they will write out the answer to the problem." Mine is [READS
738 NOTEBOOK]: "The learner will orally explain to the evaluator how they found the
739 percent, they will leave the correct tip on the table, and they will write the process out
740 on a piece of paper so the teacher can then look at it when they're gone. Have time
741 to reflect on it.
742
743 P: There's three things, three things, that's the terminal behavior. So I did the
744 conditions. [READS NOTEBOOK]. The conditions are the "givens" and the story
745 problems. They are going to be given. Oh, now do I have to spell out no calculator,

746 because a "given" is assumed that nothing else is allowed. [READS NOTEBOOK]:
747 "Given three role play situations with a written scenario involving calculating 15% of a
748 number." [READS EXAMPLE] There was something about givens and not givens in here, I
749 thought [UNINTELLIGIBLE]. [FLIPS BACKWARD IN COURSE PACK.] [READS
750 MODEL ON 77] Criteria. No. [FLIPS BACKWARD SOME MORE IN COURSE PACK.] I
751 thought we said in class, he talked in class about if somebody asked a question, if
752 you don't state it as a given. But that is a given, "without paper." I think I'd better
753 state that. [WRITES]
754
755 P: To make sure. So without [SIGHS]. It's Friday. [LAUGHS] All right. [WRITES]:
756 "Calculator, paper and pencil." Now that's somewhere in here. I don't know where we
757 talked about it. [LOOKS IN COURSE PACK] But it says that, it was, it was a
758 condition, without the. Oh! Here it is! We missed one. [P.125, PRACTICE TEST]
759 D: What page is that?
760 P: Practice, 125. [READS EXAMPLES]: "Given this, given ten situations of economic
761 change concerning a business firm, such as." What am I writing? An objective. Okay.
762 This is an objective. [GESTURES TO EXAMPLE ON P.125.] and they list several
763 things: "Without the use of." It specifically states "without the use of." I like, so
764 [WRITES]: "Without the use of calculator and paper, pencil." I'll put that as one. That's
765 got to go in there. [GLANCES BACK AND FORTH BETWEEN PAGE 125 AND
766 NOTEBOOK.] "Such as." All right.
767
768 P: Now, but these aren't always great examples, either, because this is practice for
769 the test, and there are things wrong with some of them. [LOOKS BACKWARD IN
770 COURSE PACK]. But, okay, now I'm going to. [READS P.123]: "How do you state the
771 conditions of an objective? Ask: What will be the test situation or conditions? You
772 should state what the students will be given, including the number of situations,
773 description, medium." [VISUALLY CHECKS OFF EACH "GIVEN."] Yes. "An example."
774 Yes. "You should state which materials, books or pieces of equipment the student
775 may use on the test. You should state which materials, books or pieces of equipment
776 the student may not use on the test." Those are the restrictions. [READS HER
777 NOTES ON P.123]: "Set it up so someone else could do it, like a sub."
778
779 P: [READS P.123] Okay. "An attempt to reduce the creation of trivial or overly specific
780 objectives [LAUGHS]. "Instead of saying." [P.123] All right.
781 D: So what page is that? That's the practice?
782 P: Yeah, page 123. This was under a practice that we did in class, and I had
783 remembered that somebody had brought up something about, you see here, they
784 have it again. "Givens, not givens. Are restrictions."
785
786 P: But restrictions aren't conditions, are they? [READS P.123] Oh, yes, it is. It's under
787 the conditions. "How do you state the conditions of an objective?" This is when I
788 started panicking in class, when I realized [PAUSES]
789 D: When you realized what you actually had to do?
790 P: What you actually had to do and had to remember. Yeah, and I [shakes head].
791 And so did somebody else, because somebody else came up to me after class and
792 said, "Do we have to have," and it was dawning on that person too that we had to do
793 a lot.
794
795 P: But I can still use this [indicates notebook] for my project, too. I'm just going to
796 change the [PAUSES]
797 Change the "such as"?
798 P: Um hm. All right. [READS SCREEN] So. Oh, I can't believe I just deleted the whole
799 page! [STUDIES SCREEN]
800 D: Or are you down too far?
801 P: [MOVES SCROLL BAR] There it is! All right. [TYPES] I'm going to worry about the
802 format after you leave, so we can get through more of his stuff. So, I just need to
803 check back, I'm going back to, I need another sticker on that page because that'll be
804 helpful. [PUTS POST-IT NOTE ON P.123]
805 D: That was 123?
806 P: Yeah. that was a helpful page, even though it was in the practice. Um.
807 D: How do you like the practice test?

808
809 P: I love it. I like how he, I've done that in my little kids [UNINTELLIGIBLE] workshop,
810 how I'm thinking about a problem, and he did that. "This is how I'm going through this,
811 thinking about that."
812 D: Yeah, isn't that cool? I like that, too.
813 P: So he uses a lot of the techniques that, as a teacher, I've been, he is a teacher
814 [PAUSES]
815 D: He teaches a lot of workshops.
816 P: Yeah, so I appreciate that, because that's what I thought I would get when I went
817 back [TO SCHOOL FOR AN M.A. DEGREE].
818 D: Well, you get it from one, anyway. [LAUGHS]
819
820 P: [LAUGHS] Yep. So I'm going to put "6." in here. [TYPES] And I'm not going to
821 worry about the actual [UNINTELLIGIBLE] "objective." Plus, this is painful for me, just
822 learning the computer. All right. and this is the conditions. Whoops!
823 [UNINTELLIGIBLE] For the unit terminal objective. and I'm going to say, "Given
824 three," [READS CHECKLIST ON P.77] Here's my number, number of situations,
825 [READS NOTEBOOK THEN TYPES]: "Given three role play situations, each with."
826 Oh, are they [STUDENTS] going to know what role play situations are? "Each with a."
827 Am I going to have to say how I'm going to set up the role play situations, with a table
828 and a? [PAUSES]
829
830 D: I don't think so. I think that's his overly detailed thing.
831 P: "Each with a written scenario." You know what? I do have to. "Involving authentic
832 materials." I do need to say that because that's [UNINTELLIGIBLE], example, actual
833 restaurant. How do you call those?
834 D: I think they're bills or checks.
835 P: Checks.
836 D: "Check please, garcon!"
837 P: "Advertising [UNINTELLIGIBLE]" [READS SCREEN] "Each with a written scenario
838 that involves finding 15% of a number." Now, I don't know if I'm putting it too
839 [UNINTELLIGIBLE].
840
841 P: Tips. Tips. [LAUGHS] "Sales discounts, such." I'm using this page 76 [EXAMPLE] as a way to
842 set it up. I'm just taking it as a model. And now I'm going to put in
843 my story problem. [TYPES] You know what?
844 D: Is that [TEXT ON SCREEN] all underlined?
845 P: No. Should it be?
846 D: It looks all different now. Maybe just from this distance.
847 P: Okay.
848 D: No, you don't want to underline it all.
849
850 P: I'm just being very picky here, but if they are deciding to leave the tip, that means
851 the kids need to order together, but I don't really want them to work together. So I'd
852 better put "person" [THINKS]. John can, we'll pick John. [UNINTELLIGIBLE]
853 D: How about "one of them"?
854 P: "One of them." Thank you.
855 D: I'll have to throw out my whole research assignment. [LAUGHS]
856 P: [LAUGHS] [TYPES]: "You need to quickly calculate the tip for the very efficient
857 waiter. Needs to leave a 15% tip. Leave the tip on the table." Okay, so that gives the
858 rounding off and finding, and it gives the scenario.
859
860 D: Okay, so it [UNINTELLIGIBLE]
861 P: Wait a minute. I left part of it out. They received the bill. One second. I need to put
862 that they received the bill. [TYPES] I thought I, I must have [TYPES]
863 [UNINTELLIGIBLE] [LAUGHS] [READS P.74] It [AMOUNT ON BILL] does seem kind
864 of expensive. Okay. 48 [DOLLARS]. We're going down now. [REFERS TO AMOUNT
865 OF RESTAURANT BILL]
866 P: [READS FORM]: "Conditions." [READS CHECKLIST]: "Number of cases." [READS
867 SCREEN] Yes. "Given three role play situations." [READS CHECKLIST]: "Complete
868 description of the conditions. The medium." In written form, so. Did I say? [READS
869 SCREEN]: "Given three role play situations involving." Yes. "Each with a written

870 scenario that involve [UNINTELLIGIBLE]."
871
872 P: [READS SCREEN]: "Using. That use." [TYPES] Okay. "Given." Okay. I've got the
873 number of cases [READS CHECKLIST THEN SCREEN] each with a written scenario."
874 That would be my medium. [READS CHECKLIST THEN SCREEN AGAIN] And I have
875 a specific example, that describe [sic] the test. This [unit terminal objective] is the test.
876
877 [READS CHECKLIST]: "Close representation of the real conditions: time and place in
878 unit goal." What does that mean? Okay. [READS SCREEN, THEN NOTE ON 76
879 NEXT TO "CLOSE REPRESENTATION" IN CHECKLIST IN CONDITIONS]: "Like
880 conditions in unit goal, as real as possible, similar to times, places, purposes, roles
881 intended." He explained it in his written words.
882
883 D: Oh, the notes?
884 P: Yeah, but I didn't know what close representation of real conditions means. and
885 that's just similar to time, place, purpose and role that you're intending to be, and I
886 think mine does.
887 D: Okay. So that was his note, further explaining [PAUSES]
888 P: Um hm, on page 76, that further explained the left column [CHECKLIST], and I
889 think that's helped me.
890
891 P: All right. [READS SCREEN]: "Each of the written scenario that involve finding 15%
892 of a number." That means the scenario has to have that in it. Such as: "Jonathan
893 and Sally are having a romantic prom dinner. They received the check for \$48.96.
894 They need to quickly calculate the tip for the very efficient waiter. One of them needs
895 to leave a 15% tip. Leave the correct tip on the table to the nearest dollar." I don't
896 know about three [SCENARIOS]. As a teacher, we'd do it once, because you're
897 going to write it out anyway, but [PAUSES]
898 D: Do what once?
899 P: One role play.
900 D: One role play.
901
902 P: And, because you're going to explain it, you're going to explain it, but what if, but,
903 and with no error. They have to be able to do one with no error. Because they have
904 to be able to explain it to the evaluator and they have to go write it. And they have to
905 do it orally. Because [Looks At Preliminary Assignment], look at all these mental
906 [POINTS TO SUBUNITS ON MODEL].
907 D: Does that mean they have just one chance to pass the test?
908 P: No. No. What they've got to do, they've got to do at least one of them with no
909 error.
910 D: So how many chances do they get, though? If you give them one [PAUSES]
911 P: Well, I always give a retest, though. So I guess I always do two times, but three
912 seems [PAUSES]. I'm going to leave three, but it just seems like a lot
913 [UNINTELLIGIBLE]. That's the number of chances, and I guess I get more specific
914 later, when we talk about lower limits.
915
916 P: Okay. [READS SCREEN] And that's going to tell, "Leave the correct tip on the
917 table to the nearest dollar." So they're going to have money. Oh! I've got to have play
918 money.
919 D: Authentic material is play money? [LAUGHS]
920 P: [CRADLES FOREHEAD IN HAND]
921 D: I think that's fine. It just hit me. "Authentic and semi-authentic."
922 P: [LAUGHS] That's right! It's not going to be [PAUSES]. Play money. I wonder if he'll
923 say anything. [TYPES] I'd better put in "semi." [UNINTELLIGIBLE] That's a
924 representation. Do I have to say that? Okay. "Use money." Because they'll steal the
925 money, I'm going to tell you that right now, real money.
926 D: Really?
927
928 D: Nobody steals? [PAUSES]
929 P: [UNINTELLIGIBLE] Well, they're middle school. [UNINTELLIGIBLE] [TYPES, THEN
930 LAUGHS] Let's see if [UNINTELLIGIBLE]. All right. [READS FORM]: "Terminal
931 Behaviors." I'm on a roll. [LAUGHS] Yeah, right. [TYPES] But, as I've already been

932 thinking about this. [READS P.76 AGAIN]: "Terminal behaviors." I have to have
 933 [READS CHECKLIST]: "behavioral terms." [READS NOTE]: "Write out what can be
 934 observed." That's your object, your action verb has to be clear. [READS
 935 CHECKLIST]: "More than one behavior, list them with numbers. Close representation
 936 of real performance. [READS NOTE]: "Writing out shows how the student solves the
 937 problem."
 938
 939 P: [READS P.76]: "The learner will." [READS SCREEN] Look how he uses the word
 940 "learner." I've used "the student" and "the graduate." [UNINTELLIGIBLE] [READS
 941 P.76] I'll use "the student." [TYPES]
 942 D: I don't think he cares about that.
 943 P: I think he clarified for me why he underlines [POINTS TO ASSIGNMENT #1]. I was
 944 wondering if there was anything still [UNINTELLIGIBLE], so I was just checking for
 945 pieces, not really how to save time. Well, it does.
 946 D: He would explain all his marks. The things he doesn't explain you don't have to
 947 worry about.
 948 P: Okay.
 949
 950 P: [READS P.76]: "Student will." [READS SCREEN, THEN TYPES]: "Orally. Will leave
 951 the correct tip on the table." Well, it's not always going to be a tip. It might be going
 952 shopping. All right. "The student will orally." [READS NOTEBOOK] Leaving the tip on
 953 the table means you [UNINTELLIGIBLE], you know what 15% is, but you also need
 954 to orally say [TYPES]: "Orally state 15% of a number." But it might already be
 955 rounded off, and that's okay. [PAUSES] That's why I don't like that rounding off thing.
 956 D: So the number can be already rounded off or not, and they're also going to round
 957 off the percent?
 958
 959 P: Well, yes, because I'm more interested in if, but [PAUSES], it fits in the context of
 960 the story. That's another skill. That's another skill, knowing when to pick what. Well,
 961 [READS SCREEN], I just think they'll have to orally state 15% of a number and round
 962 up, exactly what I said. [TYPES, THEN LOOKS AT SCREEN]: "To the nearest dollar."
 963 So, whatever I asked them, and they would do that. I would, they would [PAUSES].
 964 It's quick, too, so I'm going to have to figure out a time, how much time they have to
 965 do it in.
 966
 967 D: You sit at the table in a restaurant for an hour, calculating the tip. [LAUGHS]
 968 P: [LAUGHS] Hey, I mean, you know. [READS EXAMPLE ON SCREEN]: "One of
 969 them leaves a 15% tip. Leave a correct tip on the table to the nearest dollar."
 970 [READS TERMINAL BEHAVIOR ON SCREEN]: "Orally state 15% of a number and
 971 round off." Yes, they have to do that. That's what I said. And they have to. [PAUSES]
 972 You know what? [READS SCREEN] What was I thinking about? When you leave the
 973 money on the table, that would be a prerequisite that you know, we're going to
 974 assume that you know how to leave correct change. And, okay.
 975
 976 P: [READS NOTEBOOK] Hah. "Orally." And then [PAUSES] "Orally explain
 977 [UNINTELLIGIBLE] how you found the percent." Boy, I'll tell you, I don't know how
 978 people write these things.
 979 D: It takes a lot of thought, for sure.
 980 P: Because I'm really testing [PAUSES]
 981 D: Think if you were doing this on the fly in your classroom, how messed up you could
 982 get.
 983 P: [UNINTELLIGIBLE]
 984 D: I'm sure it's happened to every teacher.
 985 P: Okay.
 986
 987 P: Then they need to be able to write out, [LOOKS AT ASSIGNMENT] I'm going back
 988 to my original, write out steps [PAUSES] they need to be able to write out [TYPES],
 989 or they need to go back to their desk! [LAUGHS] See, here I'm saying you can't
 990 [READS HER WORK] Oh, I haven't gotten there yet. [READS FORM] I haven't gotten
 991 to the Criteria yet. "Write out the steps that describe the mental process used to arrive
 992 at the solution." All right. [PAUSES] Okay. [READS MODEL AND CHECKLIST] And
 993 does it have an object? "Orally, orally, write out." I mean verb. And the object: "Orally

994 state 15% of a number, orally explain how you found it, write out." So that answered
 995 the "what," right? [IN NOTE: "write out what?"]
 996
 997 P: "Orally state what?" "Orally explain what?" "Write out what?" Okay. [READS NOTE
 998 ON MODEL]: "Writing out shows how the student solves the problem."
 999 D: What was that you just read?
 1000 P: That was his notes [ON P.76]. He has these little "Write out what?"
 1001 [INSTRUCTOR'S NOTES], then he has "Writing out shows how the student solves the
 1002 problem." Plus he has, "If more than one behavior is listed and numbered." Yep. And
 1003 then he has "Close representation of real world performance in unit goal." And that,
 1004 then he explained what that meant.
 1005 D: Um hm. And that's what you just read.
 1006 P: Yeah. I think I've done that.
 1007
 1008 P: Okay, now I'm on the Criteria. [LOOKS AT MODEL, P.77] Holy Moly! Jeez oh
 1009 Petes!
 1010 D: Well, at least you didn't skip a whole page like somebody or other that I know.
 1011 [LAUGHS]
 1012 P: [TYPES AND SIGHS] Criteria. I shouldn't be complaining because writing a
 1013 research proposal and research articles and what you have is a lot of work, too.
 1014 D: Well yeah, but [PAUSES]
 1015 P: This is a different kind of thinking. All right.
 1016 D: Oh, I was going to say I chose to do that, but you chose to do this, so [LAUGHS]
 1017 P: [READS CHECKLIST]: "According to." [TYPES THEN READS CHECKLIST]:
 1018 "One, two, three." What does that mean? "One, two, three, four. According
 1019 to,." Okay. "The work shown will."
 1020 D: Now you're on page 77? The criteria?
 1021 P: Um hm. [TURNS TO EXAMPLES ON 88-91] I'm just going back to some of his
 1022 examples.
 1023 D: Um hm. Those are on pages? [PAUSES]
 1024 P: 88 through 91, because I'm in the middle of writing my terminal objective?
 1025
 1026 P: And [PAUSES] I'm reading what he has.
 1027 D: About criteria.
 1028 P: [READS EXAMPLE 2 ON 89, ABOUT UNIT TERMINAL OBJECTIVE]: "The
 1029 student's oral response will be without hesitation. Correct usage." These are the
 1030 criteria. Okay. "Given this, this, this, and this, do this." [READS EXAMPLES ON
 1031 88-91, THEN TURNS TO 92]: "According to. What makes a good
 1032 objective?" [READS 95]: "Criteria. Of acceptable performance. How well the learner
 1033 must perform." This is 95. "According to. So well that and time." We covered that
 1034 yesterday in practice, so I thought I took some notes on this. [FLIPS FORWARD IN
 1035 COURSE PACK]
 1036
 1037 D: What page is that?
 1038 P: Well, this is on page 112, and the reason I stopped there is justification and, that's
 1039 coming up. So I know where it is. I'm just going to put a little this [STICKY NOTE]. I'm
 1040 going to be definitely turning back to it. 111 and 112. And now we're at the practice
 1041 [PAGE 113]. And I'm just going to where he has some things about criteria. Okay.
 1042 116. [READS PAGE 116]: "For the objectives criteria, I included what makes the
 1043 student's strategy and answer correct." What makes the student's answer and
 1044 strategy correct?
 1045
 1046 P: Well, guess I'll have to write them out. What will make them correct? [TYPES]: "The
 1047 oral response will." Will what? It will be correct. [LAUGHS]
 1048 D: [LAUGHS] That would be funny to put that on there.
 1049 P: [READS HER WORK]: "The oral response will."
 1050 D: Are you looking at his model now?
 1051 P: Yep. Page 77. Criteria.
 1052 D: The left column or the? [PAUSES]
 1053 P: Right now I'm looking at his example. [READS MODEL OF CRITERIA ON 77]: "The
 1054 work shown will follow the sense of the information, follow the pattern shown in the
 1055 task, follow the division principles." So [READS CHECKLIST]: "according to." He has one, two, three

on the
1056 left [IN CHECKLIST], or "so well that" or "time." So the oral result is
1057 mathematically correct. [TYPES]
1058
1059 P: What's bothering me here is I'm using this [READS SCREEN]: "Leaving the tip on
1060 the table." That's not an oral response, but you have to explain to the evaluator how
1061 you found percent. I know what I'll do. [TYPES]: "Orally tell your partner how much
1062 money should be left on the table for a tip." Really, leaving a correct tip on the table is
1063 not testing you. That's testing if you can. [PAUSES] "
1064
1065 P: I liked it, but it's really not what I'm testing. It's a nice touch. It makes it real. I
1066 wonder if you can leave it in there if it makes it real? Like I have up here. See, I don't
1067 really need the money, but it would be a cool touch.
1068 D: I don't see any reason not to.
1069 P: I'm going to leave it in. Hopefully he won't cross it out. But "Orally tell your partner."
1070 That's why I don't like things, in a way, like this because you don't want it to be not,
1071 you like to put things in there, even that's not what you're testing. It's just fun.
1072
1073 P: So I'm going to leave it in there and I will, maybe I can explain to him, if he doesn't
1074 like it, why it's there. Because I'm not really testing that? [READS P.77]: "The oral
1075 response will be mathematically correct to the nearest, whatever." I'm not testing the
1076 rounding either. I don't want to test the rounding. "The oral response will be
1077 mathematically correct." They're always going to do it to the nearest dollar. I hated
1078 when he added that [ROUNDING], and I knew it was going to be a problem.
1079
1080 P: Well, I don't know if I'm going to get in trouble for this, but [TYPES]: "will be
1081 mathematically correct, will [PAUSES] be rounded the answer to the context, to fit the
1082 context of the problem." Well, it has to be more involved than two steps, so got to talk
1083 about. [PAUSES] "The oral response will be mathematically correct and be rounded
1084 to fit the context of the problem." In other words, they ask for [UNINTELLIGIBLE],
1085 they're out at a restaurant and they both [UNINTELLIGIBLE].
1086
1087 P: [READS EXAMPLE] Oh, well, he has: "Follow the sense of the information given."
1088 [READS SCREEN THEN P.77] Same thing! "Follow the sense, rounded to fit the
1089 context of the problem. Follow the sense of the information given." Okay. [READS
1090 P.77???]: "According to." I might have to rearrange these [TYPES OF CRITERIA],
1091 because it's going to take a lot of them. [PAUSES THEN TYPES]: "Follow." [PAUSES]
1092 D: Why?
1093 P: I think so. I think "So the result is mathematically correct" should be the end. So I'm
1094 thinking of the steps, like [READS SCREEN THEN TYPES]: "As practiced, as
1095 practiced in class." [LAUGHS] Yes. This is a little harder than I thought, right here.
1096 D: It is. This part is hard.
1097
1098 P: [ON P.77] How are you going to know that they're doing it right?
1099 D: Especially if you have evaluators.
1100 P: They're going to have to know. They're going to have to know. It can't just be me.
1101 What if I'm dead that day? [LAUGHS]
1102 D: [LAUGHS] That day! The next day you come back in. "Here I am!"
1103 P: What, and I've got to do something here.
1104
1105 P: This is really, how do you decide what to do in the context? [TURNS TO NEW
1106 PAGE IN NOTEBOOK] [UNINTELLIGIBLE] So, I need to have a darn checklist. I
1107 didn't want to make one, but now I have to make one. [READS P.77]: "Follow the
1108 pattern shown in the task description." We haven't done any of that [TASK
1109 DESCRIPTION]. How do you tell if you're going to do what if you haven't done it
1110 before? I know we have to do task analysis. [PAUSES] Don't answer if it's going to
1111 harm your research.
1112 D: I'm trying to hang on to my words.
1113 P: [WRITES IN NOTEBOOK]: "The oral response will." [READS P.77]: "so that the
1114 result is mathematically correct." That's going to be at the end. And labeled with a
1115 percent. I can't seem to write anything [UNINTELLIGIBLE].
1116

1117 P: How are you going to know it's mathematically correct? The evaluator would have
 1118 to decide if they did the right process. [TYPES]: "Follow the process shown on the
 1119 checklist." Oh no! That's not so hard. And the fitting the context, you'd better have
 1120 that on the checklist.
 1121 D: So now you're teaching another skill.
 1122 P: Well, it's on my thing [COURSE MODEL IN PRELIMINARY ASSIGNMENT], I mean
 1123 [PAUSES]
 1124 D: That's your preliminary?
 1125 P: I need to talk to him because when it says "Calculate multiples of 10% or a number
 1126 mentally and round it off," when we talked about it I basically said, "I don't want them
 1127 to" [PAUSES]
 1128
 1129 P: This comment, remember, on my first thing [PRELIMINARY ASSIGNMENT] was "Is
 1130 this 6 to 12 steps?" And no, but it could be if I included rounding it off. But I wouldn't
 1131 really be teaching them to round it off, but they'd need to know in what context, to
 1132 the nearest, when you would round to the nearest penny or the nearest dollar. But I
 1133 don't know anybody in a restaurant, except for one man [PAUSES]
 1134 D: My brother-in-law.
 1135 P: that would go exactly to the penny.
 1136
 1137 D: Um, why don't you just make that a prerequisite?
 1138 P: That they will know? [PAUSES]
 1139 D: That they will know the context and when to round?
 1140 P: Okay, but still, it needs to do that, right? It's not, okay. I see what you're saying.
 1141 D: Well, I was thinking of that, or only provide situations in which they do round
 1142 [PAUSES]
 1143 P: To the nearest dollar.
 1144 D: [UNINTELLIGIBLE] want to teach the skill.
 1145 P: Well, it's supposed to be one skill. And I can't be doing two here.
 1146 D: Well, yeah, now there are subskills, but that seems like a separate one.
 1147 P: Well, I think [PAUSES] This is practice. This isn't the final. I've got to remember
 1148 that. As you can see, my [UNINTELLIGIBLE]
 1149
 1150 P: [READS SCREEN]: "The oral response will be mathematically correct and will follow
 1151 the process shown on the checklist." [READS CL] I'm looking at page 77 again. It
 1152 says, "according," and his, I'm looking at his words. [READS NOTE]: "according to this role, this
 1153 source." [PAUSES]
 1154 D: That's his notes?
 1155 P: See, he's doing a very similar thing in division. This is very similar to what I'm doing,
 1156 so when it says, "Follow the sense of the information given"? That is the context of
 1157 the problem, I feel. That is going to be, has to be part of it, if it's the real world
 1158 performance of finding 15%. So maybe it is a subskill. So maybe I'll just borrow his – I
 1159 hate to do that but – borrow his words, and I'm going to put that in here. [TYPES]
 1160
 1161 P: Because he's doing story problems with, I can't remember, remainders or
 1162 something, that you divide them. So I don't know if that, that to me does not seem
 1163 very clear.
 1164 D: What, "follow the sense of the information"?
 1165 P: [READS SCREEN]: "Follow the context of the problem." [TYPES] Okay. "The oral
 1166 response will." Now the oral response is not going to follow the response shown on
 1167 the checklist because that's going to be the evaluating, so that's not the oral
 1168 response. I have three things I've asked them to do. [TAPE ENDS]

DANA'S FINISHED ASSIGNMENT WITH FEEDBACK - PAGE 1

good *Thacks*

ASSIGNMENT FORM

NAME: [redacted] (Name of classmate checking assignment)

PROJECT ☒ have read the assignment ☒ have read the model

PRACTICE ☒ have read the annotations on the model

☒ have a physical or mental skill whose steps and decisions I know well enough to describe step by step in assignment 2

School subject 1. COURSE/SUBJECT NAME

OK Mathematics *OK*

Course = whole 2. DIAGRAM OR OUTLINE SHOWING COURSE GOAL & UNIT GOALS

Unit = parts *OK*

Each unit is a skill *OK*

Star unit developed *OK*

Goal has real life *OK*

Setting time &/or place &/or purpose after course *OK*

(Use back of page if needed)

See back of page for diagram 

3. COURSE GOAL - REAL WORLD PERFORMANCE

Condition

As a consumer, for personal business at home or in the community, when situations arise requiring quick answers and interpretation of percent so that he /she is able to make wise consumer decisions

Real Grad. behavior Generally stated Related to subject

Behavior the graduate will be able to find the percent of a number *OK*

4. COURSE TERMINAL OBJECTIVE (Course Final Exam)

Close representation of real conditions & real behavior for all skills *OK*

Condition Given authentic materials and a variety of written scenarios involving percent problems requiring quick answers and interpretation of percent in the real world, using

1. ratios and proportions
2. mental math of selected percents
3. estimation involving easily recognized fractions
4. calculators

Behavior

Specifically stated version of course goal *OK*

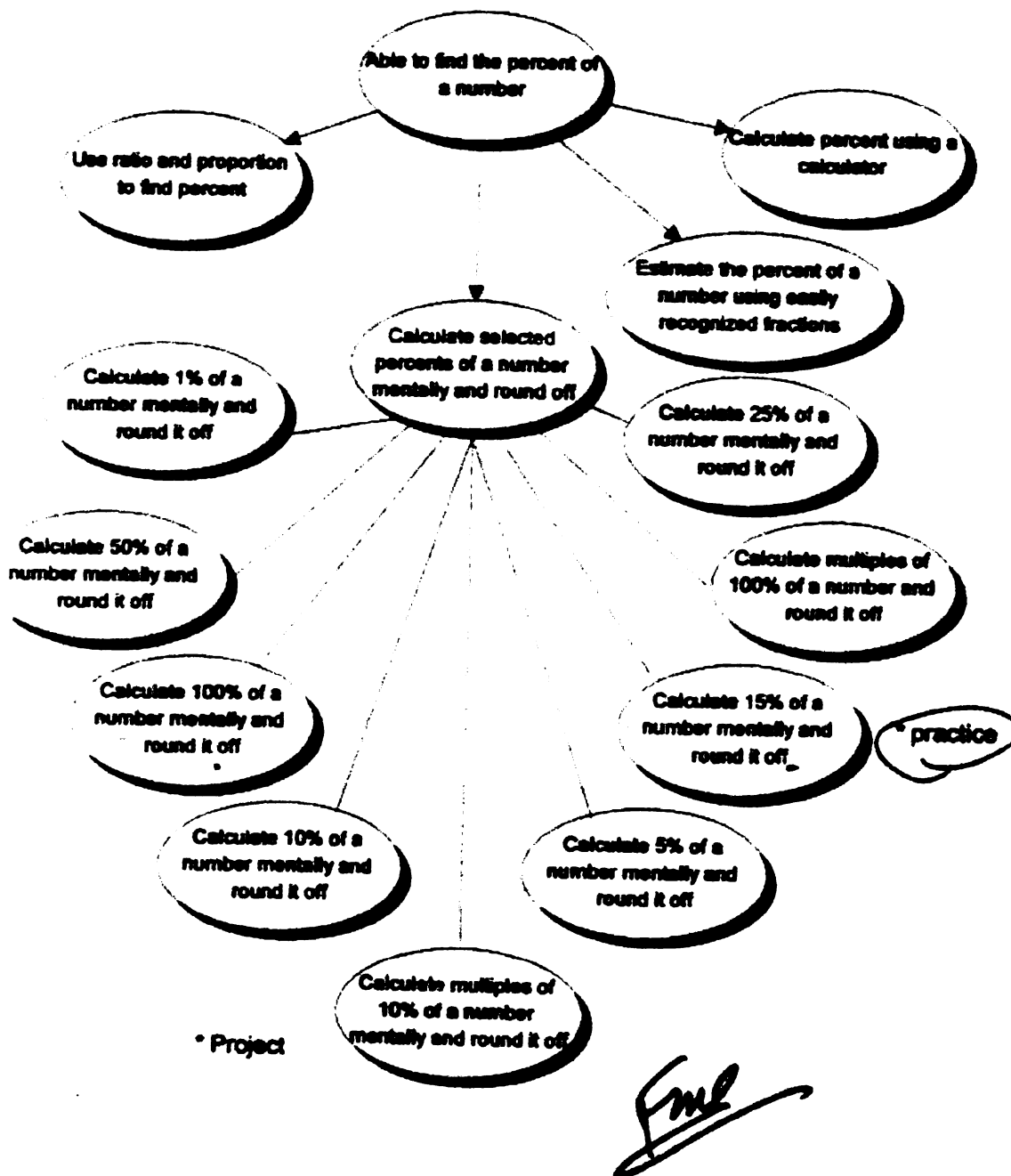
the student will

1. write out all steps
2. write out a solution
3. in case of solving percents mentally, students will
 - a. provide an oral solution during role-play without writing out steps
 - b. provide written steps that describe the mental process used to arrive at the solution

OK Test of students at end of course

DANA'S FINISHED ASSIGNMENT WITH FEEDBACK – PAGE 2

Subject: Mathematics



5. UNIT GOAL - REAL WORLD PERFORMANCE

Unit goal is one whole piece of the real world course

Real role & setting

Generally stated goal performance
Real Grad. behavior

Condition

As a consumer, for personal business at home or in the community, for problems requiring quick answers and interpretation of percent (e.g. leaving a tip, sales discount)

Behavior

the graduate will calculate 15% of a number mentally and round it off

6. UNIT TERMINAL OBJECTIVE (Unit Final Exam)

Conditions

of cases/ situations

Complete descriptions of "givens"

The way situation is presented on the "test"
"Medium"

"Such as"

describes "test" situation

Close representation of real conditions: time and place in unit goal

Gives 3 role-play situations that use authentic materials and/or representations of authentic materials (e.g. actual restaurant checks, advertisements from newspapers and fliers, representation of real money), each with a written scenario that involve finding 15% of a number (e.g. tips and sales discounts) such as

Jonathan and Sally are having a romantic prom dinner. They received the check for \$49.24. They need to quickly calculate the tip for the very efficient waiter. One of them needs to leave a 15% tip. Orally tell your partner how much money should be left on the table for a tip. Leave the tip on the table.

without the use of calculator and paper/pencil

After the oral role-plays, the student will be given paper/pencil, and the same 3 written scenarios that involve finding 15% of a number.

Terminal behaviors:

Behavioral terms

Object of the action verb

If more than one behavior then listed and numbered

Close representation of real performance in unit goal

the student will

1. orally state 15% of a number that has been rounded to fit the context of the story

2. orally explain to the evaluator how he/she found the percent

3. write out a summary of written steps that describe the mental process used to arrive at the solution.

includes Unit goal
2. 15% - part of
written summary
mental process

DANA'S FINISHED ASSIGNMENT WITH FEEDBACK - PAGE 4

Criterion: *Add*

According to *a*
or
so well that *a*
or
time

Built in checklist *a*

Criterion for each behavior *a*

If more than one criterion then listed and numbered *a*

A The oral response will follow the process shown on the evaluator checklist and answer key

1. oral solution *a*
2. include justification by the student for rounding a number to a certain place *a* ... (label add what makes a good justification; + learn to round)
3. state 10% of the number *-*
4. state half of that 10% *-*
5. state the sum of 10% and half of 10% *-*
6. use dollars and cents in the oral solution *-*

B The written summary will follow the process shown on the checklist and answer key

1. show what rounded number was used *-*
2. show correct mathematical process for finding
 - a. 10% *-*
 - b. half of 10% *-*
 - c. sum of 10% and half of 10% *-*

C so that the result is

- a. mathematically correct *-*
- b. labeled correctly with dollars and cents *-*

Lower limits:

of repetitions: *with (no error)*

Quality: Two out of three oral solutions (correct) within 1 minute from start of determining 15% will be passing.

Quality cutoff: # of errors within a situation/item *see note.*

All written summaries must include all mathematical processes shown (correctly) according to the evaluator checklist with one computational error allowed *no more error*

7. JUSTIFICATION/MOTIVATION OF UNIT

Use of the unit skill:

The skill in the unit objective is used under these circumstances:

Use outside of school/training *a*

Where and when skill is used *Fail*

Logical relation of use to objective *a*

When consumers do personal business either at home or in the community, they will encounter situations that will require quick solutions or interpretations of 15% percent (e.g. leaving tips in a restaurant, tipping newspaper carriers, hair dressers, taxi drivers, etc., determining sales savings, determining savings by using coupons, interpreting new articles using 15%, estimating 15% of a given amount on graphs and charts encountered when reading magazines and newspapers such as USA TODAY.)

APPENDIX E

PRELIMINARY ASSIGNMENT FORM AND CHECKLIST

Preliminary Choice of course and unit goals for Assignment 1

Name _____

Classmate checking assignment _____

- ☐ I have read the assignment.
- ☐ I have looked at the total assignment 1 to see where this part fits in.
- ☐ I know that the list of criteria below must be placed next to my diagrams if they are drawn on another page. (I can past the diagram on here, paste the criteria on the diagram, or type them on the diagram myself.)
- ☐ These are topics that I know well. I know how to do the tasks stated in the goals.

Practice

Course goals =
whole skill after
the course

Units = parts
of the whole skill

Each unit is a skill
after the course
"How to ..."

Each entry has a
verb and object

One practice noted

One project noted

Project

Course goals =
whole skill after
the course

Units = parts
of the whole skill

Each unit is a skill
after the course
"How to ..."

Each entry has a
verb and object

One practice noted

One project noted

PRELIMINARY ASSIGNMENT EXAMPLE AND ANNOTATIONS

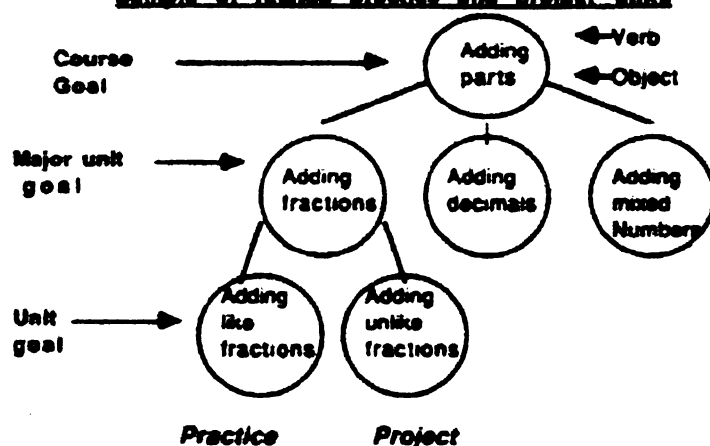
Preliminary Choice of Course and Unit Goals

Check the due date on the calendar

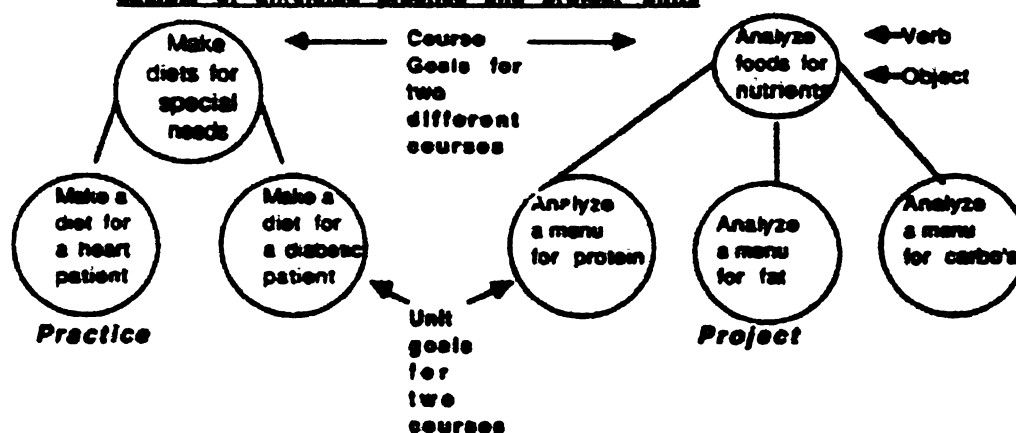
One of the common errors on the first assignment is inappropriate expression of the relations between the course goal and the unit goal. Therefore, you will have a chance to avoid that error by making a decision about your course and unit goals and having them checked before the first assignment.

1. Pick your course and unit goals for the practice and project draft assignment series.
2. Make a little drawing to show the relation between the course and unit goals just as you were shown in the very first class and in the article about visible models of course organization.
3. Be sure the unit goal is a whole skill by itself and that it is a part of larger skill in the course goal.
4. Label the unit that will be practice and the unit that will be the project draft.

Sample of related practice and project units



Sample of unrelated practice and project units



ASSIGNMENT #1 FORM AND CHECKLIST – PAGE 1

NAME _____ Name of classmate checking assign. _____
__PROJECT __I have read the assignment __I have read the model
__PRACTICE __I have read the annotations on the model
__I have a physical or mental skill whose steps and decisions I know well
enough to describe step by step in assignment 2

School subject **1. COURSE/SUBJECT NAME**

Course = whole **2. DIAGRAM or OUTLINE SHOWING
COURSE GOAL & UNIT GOALS**

Unit = parts (Use back of page if needed)

Each unit is a skill

Star unit developed

Goal has real role, setting (time & place & purpose after course) **3. COURSE GOAL - REAL WORLD PERFORMANCE**
Condition

Real Grad. behavior Behavior
Generally stated
Related to subject

4. COURSE TERMINAL OBJECTIVE (Course Final Exam)

Close representation of real conditions & real behavior for all skills Condition
Behavior

Specifically stated version of course goal

"Test" of students at end of course

5. UNIT GOAL - REAL WORLD PERFORMANCE

Unit goal is one whole piece of the real world course Condition

Real role & setting

Generally stated goal performance Behavior
Real Grad. behavior

ASSIGNMENT #1 FORM AND CHECKLIST – PAGE 2

6. UNIT TERMINAL OBJECTIVE (Unit Final Exam)

Conditions:

of cases/ situations

Complete descriptions of
"givens"

The way situation is
presented on the "test"
"Medium"

"Such as"

describes "test" situation

Close representation
of real conditions: time
and place in unit goal

Terminal behaviors:

Behavioral terms

Object of the
action verb clear

If more than one behavior
then listed and numbered

Close representation of
real performance in unit goal

Criterion:

According to
or
so well that
or
time

Built in checklist

Criterion for each behavior

If more than one criterion
then listed and numbered

Lower limits:

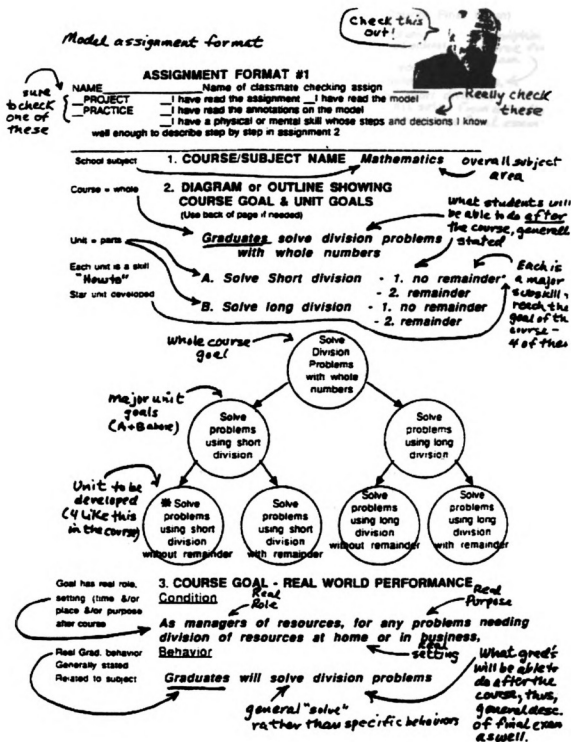
of repetitions:

of times done on the test

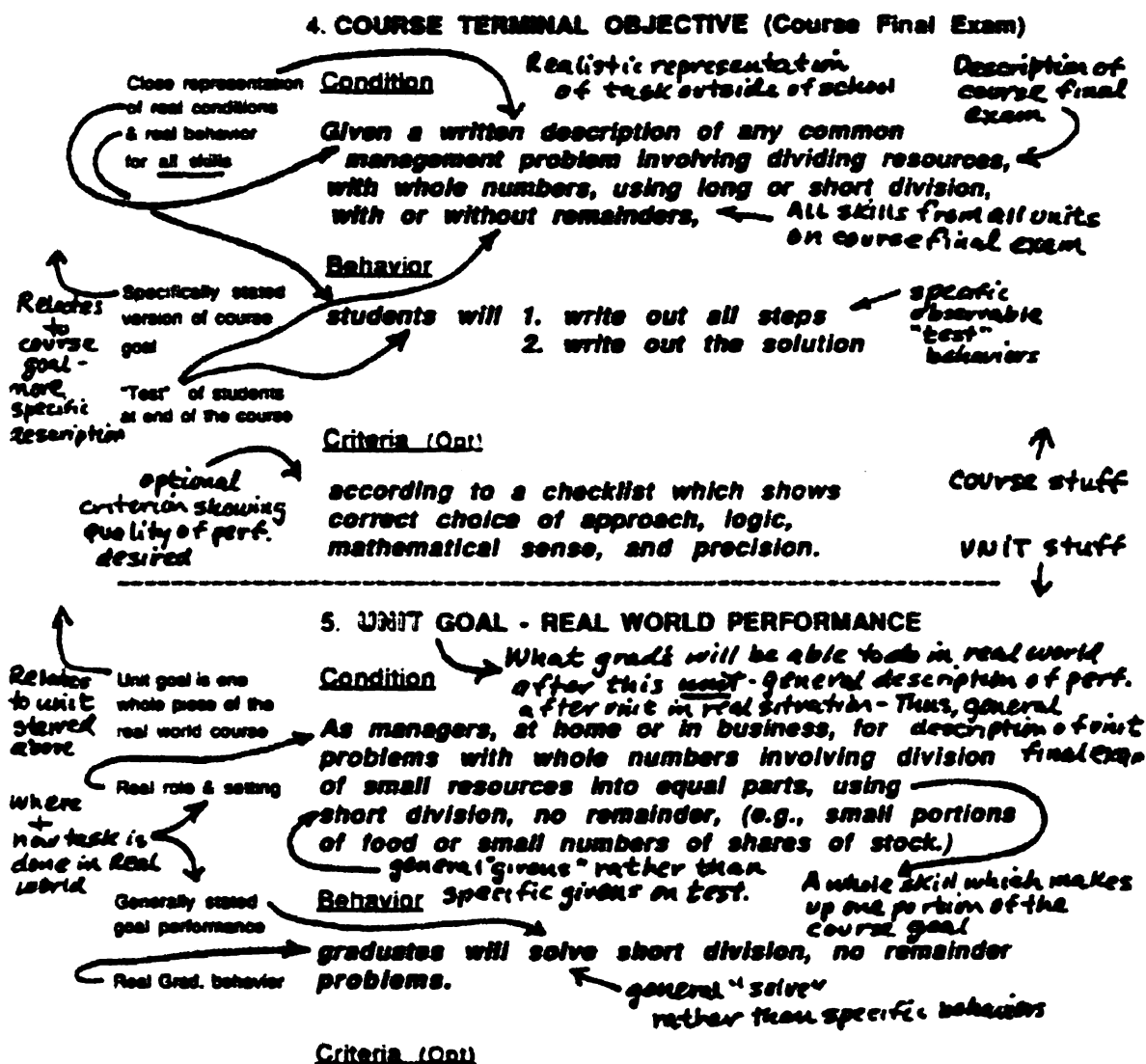
Quality:

Quality cutoff: # of errors
within a situation/item

ASSIGNMENT #1 EXAMPLE AND ANNOTATIONS - PAGE 1

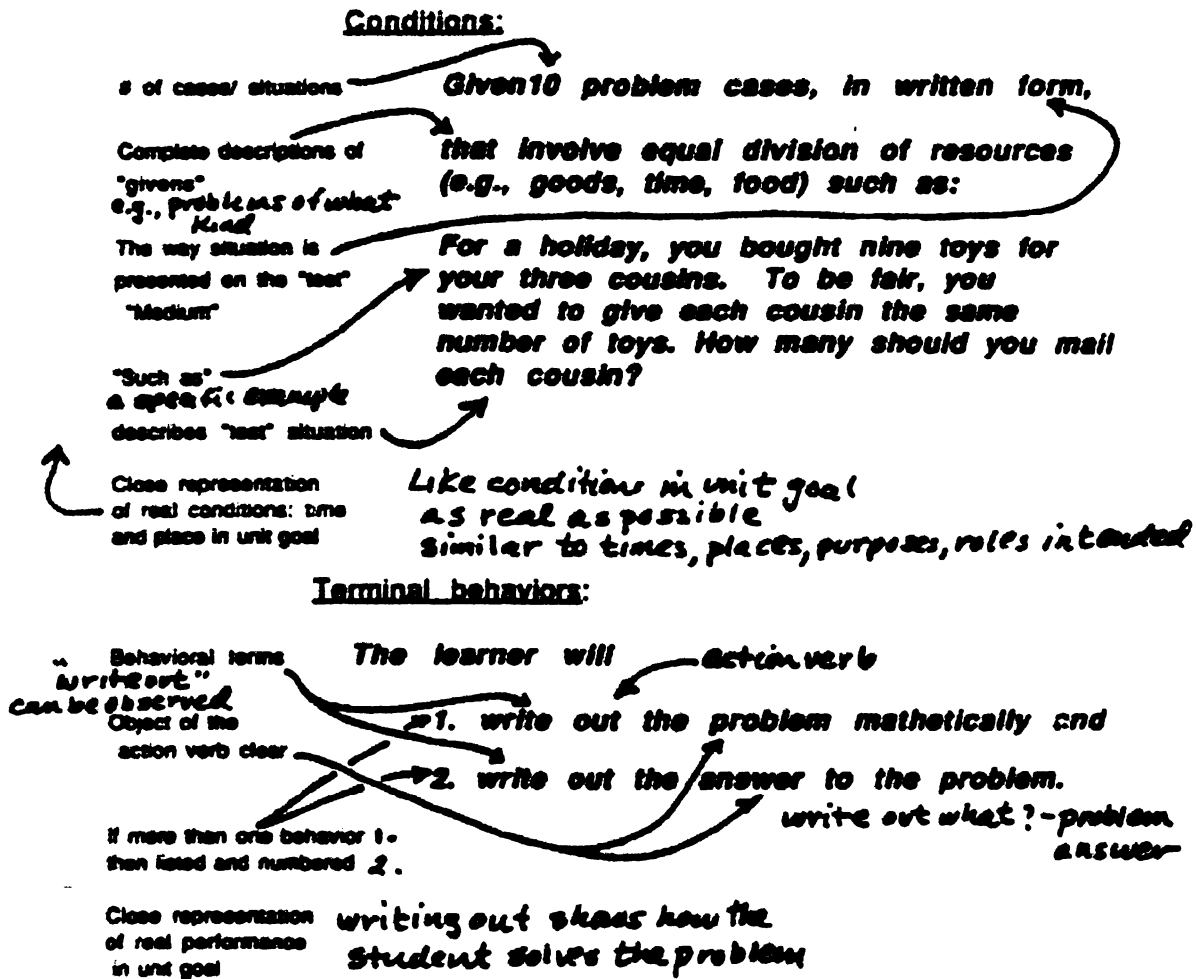


ASSIGNMENT #1 EXAMPLE AND ANNOTATIONS – PAGE 2



ASSIGNMENT #1 EXAMPLE AND ANNOTATIONS – PAGE 3

6. UNIT TERMINAL OBJECTIVE (Unit Final Exam)



CEP 808 SURVEY – PAGE 1

How do you use the assignment learning aids?

Please complete each statement, checking all that apply.

When doing assignment #1 I referred to the following assignment aids:

- ☐ the model assignment that contains the instructor's notes
- ☐ the format headings on the blank assignment form (e.g., Course Goal, Unit Goal)
- ☐ the checklist at the left of both the blank assignment form and the model assignment

I used the assignment aids listed above in this order:

- ☐ together, going back and forth among them as needed
- ☐ first the model assignment, then the headings on the blank assignment form, and finally the checklist
- ☐ first the headings on the blank assignment form, then the checklist, and finally the model assignment
- ☐ other (please describe):

HEADINGS IN BLANK ASSIGNMENT FORM (Check all that apply)

I used the headings in the blank assignment form to:

- ☐ help me do the assignment quickly
- ☐ help me do the assignment correctly
- ☐ check that it was correct
- ☐ check that the assignment contained all its parts
- ☐ other (please describe):

I used the headings to help me with:

- ☐ all the parts of the assignment
- ☐ only the hard parts
- ☐ only the long parts
- ☐ only the unclear parts
- ☐ other (please describe):

I used the headings in the blank assignment form to:

- ☐ help me do the assignment in the correct order
- ☐ help me determine what to do
- ☐ check my work as I proceeded
- ☐ check my work when I was finished
- ☐ other (please describe):

I referred to the headings in the blank assignment form:

- ☐ before doing the assignment
- ☐ as I did the assignment
- ☐ after I did the assignment
- ☐ not at all

I used the headings in the blank assignment form:

- ☐ very carefully ☐ somewhat carefully
- ☐ carefully ☐ superficially

I knew I needed to refer to the headings when:

- ☐ I was unsure what to do next
- ☐ I thought I had made a mistake
- ☐ I needed reassurance that I was correct
- ☐ I had made a change
- ☐ other (please describe):

MODEL ASSIGNMENT (check all that apply)

I used the model assignment to:

- ☐ help me do the assignment quickly
- ☐ help me do the assignment correctly
- ☐ check that it was correct
- ☐ check that the assignment contained all its parts

I used the model assignment to help me with:

- ☐ all the parts of the assignment
- ☐ only the hard parts
- ☐ only the long parts
- ☐ only the unclear parts

I used the model assignment:

- ☐ as suggestions for wording
- ☐ to help me determine what to do
- ☐ to determine how detailed my work should be
- ☐ to see what a correct example of the assignment looks like
- ☐ to identify and correct my errors
- ☐ to check my work as I proceeded
- ☐ to check my work when I was finished
- ☐ other (please describe):

I read the instructor's notes on the model assignment:

- ☐ to understand the parts of the assignment about which I was uncertain
- ☐ to understand what the instructor was expecting from me
- ☐ because they were there
- ☐ other (please describe):

I referred to the model assignment:

- ☐ before doing the assignment
- ☐ as I did the assignment
- ☐ after I did the assignment
- ☐ not at all

I used the model assignment:

- ☐ very carefully ☐ somewhat carefully
- ☐ carefully ☐ superficially

I knew I should refer to the model assignment when:

- ☐ I was unsure what to do next
- ☐ I was unsure how to do something
- ☐ I thought I had made a mistake
- ☐ I needed reassurance that I was correct
- ☐ I had made a change
- ☐ other (please describe):

CEP 808 SURVEY – PAGE 2

CHECKLIST on Left of Form and Model (check all that apply)

I used the checklist on the side of the assignment form to:

- ☐ help me do the assignment quickly
- ☐ help me do the assignment correctly
- ☐ check that it was correct
- ☐ check that the assignment contained all its parts
- ☐ other (please describe):

I used the checklist on the side of the assignment form to help me with:

- ☐ all the parts of the assignment
- ☐ only the hard parts
- ☐ only the long parts
- ☐ only the unclear parts
- ☐ other (please describe):

I used the checklist on the side of the assignment form to:

- ☐ help me do the assignment in the correct order
- ☐ help me determine what to do
- ☐ check my work as I proceeded
- ☐ check my work when I was finished
- ☐ other (please describe):

I referred to the checklist on the side of the assignment form:

- ☐ before doing the assignment
- ☐ as I did the assignment
- ☐ after I did the assignment
- ☐ not at all

I used checklist on the side of the assignment form:

- ☐ very carefully ☐ somewhat carefully
- ☐ carefully ☐ superficially

I knew I needed to refer to the checklist on the side of the assignment form when:

- ☐ I was unsure what to do next
- ☐ I thought I had made a mistake
- ☐ I needed reassurance that I was correct
- ☐ I had made a change
- ☐ other (please describe):

CEP 808 PRETEST

Name _____

Please do this part of the information form before the next class session.

Don't check ahead in the notes. Just respond with what you know now.

I just want to know what you know about goals and objectives so I can adjust my teaching appropriately. (If you wish you can send your answers via Email.)

- What is a goal?
 - What are the parts of a goal?
 - What are the qualities of a good goal?
 - Please write a goal here:
-
- What is an objective?
 - What are the parts of an objective?
 - What are the qualities of a good objective?
 - Please write an objective here:

CEP 808 TEST 1: PRODUCTION PORTION – PAGE 1

ANSWER SHEET TEST 1

Here is a course goal:

Plan travel and implement travel plans to other cultures for work or recreation.

40. Write a unit goal: (2 pts.)
41. Write an objective: (10 pts.)
42. Write a justification: (8 pts.)

40. UNIT GOAL(2 pts.)

Goal is one whole Condition
piece of the real
world course goal

Real world role,
setting and purpose Behavior

Generally stated goal
performance

Real grad. behavior

41. UNIT TERMINAL OBJECTIVE (10 pts)

Conditions:

of cases
Complete descriptions
of given
Medium included
Such as
Describes test
situation
Close representation
of real conditions:
time and place in unit goal

Terminal behaviors:

Behavioral terms
Object of the action
verb clear
If more than one beh.
then listed and numbered
Close representation
of real performance
in unit goal

Criterion:

"According to"
OR
"so well that"
OR
Time
Built in checklist
Criterion for each
behavior
If more than one crit,
then listed and numbered

Lower limits:

# of times done <u>on test</u>	# of repetitions:
Qual. cutoff: # errors within an "item"	Quality:

Final Exam CEP808

1. Write a unit goal for one unit of the course described by this course goal. (5)

Course goal

When graduates of this course are in their role as researchers,
in an academic or business setting,
where they must conduct research on a given topic, that is,
collect and report information in written form,
they will

1. focus on a specific topic
2. choose appropriate sources of information
3. get the information from the source
4. organize the information
5. write a report

UNIT GOAL - REAL WORLD PERFORMANCE

Unit goal is one
whole piece of the
real world course
goal performance

Condition

Real world role,
setting and purpose

Behavior

Generally stated
goal performance

Real Grad behavior

CEP 808 FINAL EXAM: PRODUCTION PORTION – PAGE 2

2. For this unit goal write one unit objective (15)

As an invited speaker in a business or an educational situation,
when given a choice of any topic from a broad subject domain,
the graduate will give a short prepared speech to inform the audience.

UNIT TERMINAL OBJECTIVE (Unit Final Exam)

Conditions:

of cases/ situations

Complete descriptions of
"givens"

The way situation is
presented on the "test"
"Medium"

"Such as"

describes "test" situation

Close representation
of real conditions: time
and place in unit goal

Terminal behaviors:

Behavioral terms

Object of the
action verb clear

If more than one behavior
then listed and numbered

Close representation
of real performance
in unit goal

Criterion:

According to
or
so well that
or
time

Built in checklist
Criterion for each behavior
If more than one criterion
then listed and numbered

Lower limits:

of repetitions:

of times done on the test

Quality:

Quality cutoff: # of errors
within a situation/item

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