ABSTRACT

DEVELOPMENT OF A CLASSIFICATION SCHEME OF PUPIL
QUESTIONS ASKED BY NURSING STUDENTS WITHIN
A SELF-INSTRUCTIONAL LEARNING
ENVIRONMENT

By

Kathleen Joyce Mikan

Many institutions of higher education are incorporating the use of structured, multi-media, self-instructional learning systems into their curriculums as one means of providing more individualized instruction. Monitors have been assigned to be available when these systems are in operation to provide whatever assistance is needed; part of the monitor's responsibility is to handle students' questions as they occur. The purposes of this study were: (1) to develop a classification scheme of questions college pupils asked within the context of a structured, multi-media, self-instructional learning environment as a basis for designing a training program for monitors and (2) to determine what, if any, effects certain situational factors have on the number and types of questions asked.

The study was undertaken in two phases. Phase I was the development of a classification scheme of pupil

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questions and Phase II was an application of the classification scheme to a data-gathering investigation. A classification scheme of pupil questions was developed from a review of the classification schemes proposed in the literature, from questions collected during a preliminary investigation, and from the questions asked during the data-gathering investigation.

During the data-gathering investigation, six hypotheses were tested. Data were collected during sixteen 30-minute observations of each of three different structured, multi-media, self-instructional learning units in the content area of nursing with each unit having different terminal behaviors. Two monitors with different levels of professional expertise were observed during selected observation times; the monitors were asked to circulate or to remain stationary during randomly determined observation times. Data were collected by use of a Variable-Interval Sequence-Action Camera, a continuous two channel audio tape, and student time cards. The number of questions asked by college pupils was analyzed by a three-way analysis of variance. The types of questions were categorized according to the classification scheme developed in Phase I. Comparisons of the frequency counts and proportions of the different types of questions asked were made according to the three different learning units, expertise of the monitor, and movement of the monitor.

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A total of 194 questions was collected and
classified by three judges into eight categories. All
three judges agreed 100 percent on the classification of
117 questions for a percentage of agreement of 60 percent;
at least two of the three judges agreed on the classifica-
tion of 183 questions for a percentage of agreement of
94 percent.

Based on the data collected during the data-
gathering investigation and the analysis of those data,
the number and types of questions asked by college pupils
during the "normal" operation of three structured, multi-
media, self-instructional learning units varied according
to differences in the general type of terminal behaviors.
An instructional unit in the content area of nursing
designed to help students develop psychomotor skills
elicited significantly (at the .05 level) more student
questions than instructional units designed primarily to
develop cognitive skills. No differences were observed
in the number and types of questions asked according to
(1) whether the monitor circulated or remained stationary,
or (2) whether the monitor was a registered nurse or a
nursing student.

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CHAPTER I

STATEMENT OF THE PROBLEM

Background of Problem

Individualized instruction has long been a cherished
but often unrealistic goal of college educators. Colleges
have traditionally been plagued with lectures in which
students are presented instructional material in mass and
at mass rates. Now, with the advent of media and self-
instructional programs, achievement of individualized
instruction in higher education appears more realistic.[1]

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[1]There are various types and degrees of individual-
ized instruction depending on the extent to which decisions
about objectives and means or media to attain them are based
on the characteristics of individual learners. Individual-
ized instruction is a way of managing the learning environ-
ment; not a method of instruction. According to Mager:

> Individualized instruction is not the same thing as
> "teaching students individually." An instructional
> system is individualized when the characteristics of
> each student play a major part in the selection of
> objectives, materials, procedures, and time. It is
> individualized when decisions about objectives and
> how to achieve them are based on the individual stu-
> dent. One does not simply say that a system is or
> is not individualized, however, for it is not a
> black or white matter. Rather, one tries to identify
> the nature and degree of individualization.

R. F. Mager, Forward in Working with Individualized
Instruction, The Duluth Experience, by Thorwald
Esbensen (Belmont, Calif.: Fearon Publishers,
1968), p. vii.

One way institutions of higher education are trying to provide more individualized instruction is through the use of multi-media,[2] self-instructional learning systems. Several universities and colleges have such learning systems in operation.[3] Although the programs in these various

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[2]The concept multi-media as used in this study is that defined by John Haney and Eldon Ullmer:

> The term, multimedia, means a combination of various types of media arranged so as to provide appropriate presentational capability to realize the objectives and content of a lesson through eliciting desired pupil responses. The key factor in a properly designed multimedia arrangement is not simply the use of more than one kind of audiovisual device. It is the interrelationship of the media used in order to capitalize on the distinctive charac- teristics and capabilities of each, making them mutually supportive in the creation of a new learning environment.

John Haney and Eldon Ullmer, Educational Media and The Teacher (Dubuque, Iowa: W. C. Brown Co., 1970), p. 100.

[3]Information pertaining to some of the specific universities and colleges utilizing multi-media learning systems can be found in the following references: S. N. Postlethwait, J. Novak, and H. T. Murray, Jr., The Audio- Tutorial Approach to Learning, 2nd ed. (Minneapolis, Minn.: Burgess Publishing Company, 1969); Benjamin F. Richason, Jr., "Teaching Geography by the Audiovisual Tutorial Method," Audiovisual Instruction, XV (February, 1970), 41-44; Lucius Butler, "Self-Instruction Lab Reaches Communication Skills," Audiovisual Instruction, XV (February, 1970), 55-60; James Brown and James Thornton, New Media in Higher Education (Washington, D.C.: Association for Higher Education and Division of Audiovisual Instructional Service, 1963), pp. 119-168; James Cabeceiras, "Systematizing a Nursing Degree Program = 'ILL'," Audiovisual Instruction, XVI (October, 1971), 12-15; Carol Peterson, "Multi-Sensory Tutorial Instruction in Associate Degree Nursing Education," Audiovisual Instruction, XVI (October, 1971), 16-18; Sarah Short, "Innovations in Nutrition Education," Audiovisual Instruction, XVI (October, 1971), 19-21; and Ronald Sparks, "Medical Media--Validating for Accuracy," Audiovisual Instruction, XVI (October, 1971), 22-26.

institutions differ in nature, sophistication, and effectiveness, they do have some commonalities. In general, each of these programs is developed on the basis of identified objectives, is structured to ensure that the objectives are met, employs a variety of types of media, and is designed for independent, self-paced learning. Beyond merely providing the individual student the opportunity to progress at his own rate of learning, these programs are limited without the aid of a computer in the degree to which they can adapt to each individual's learning needs. The diversity of college students' backgrounds necessitates that some component be available that takes into account individual differences in learning. In some institutions, people, referred to by such titles as "monitors," "laboratory assistants," "graduate students," or "teaching assistants," have been assigned to monitor these types of learning systems to provide whatever assistance is needed.

The Problem

It is likely that when structured, multi-media, self-instructional programs, which have been designed for and validated[4] with college students, are used by a large

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[4]The term, validated, as used in this study refers to the fact that the instructional programs have been previously tested with a small group of students to verify that the students are able to demonstrate the terminal behaviors as a result of completing the instructional program.

group of students, there will be occasions when gaps in

understanding will occur for individual students. These

gaps in understanding occur because the student

> . . . wants to relate what he sees and what he
> observes to what he knows. When his perceptions
> of the world do not match his conceptualization,
> he is conscious of a gap. This gap is essen-
> tially an awareness of lack of sufficient
> meaning.[5]

These gaps in understanding may occur in relation to basic

or to subsidiary concepts or skills being learned, but they

may not necessarily prevent the learner from demonstrating

the learning objectives of the instructional program. How-

ever, these gaps should be filled immediately to prevent

further misunderstanding, misinterpretations, or conflicts.

One way a monitor can help adapt structured, multi-media,

self-instructional learning programs to individual students

is by handling the student's gaps in understanding as they

occur.

It is impossible to determine from merely looking

at a person whether or not he understands something. If a

student makes the monitor aware of his lack of understanding,

it would probably be in the form of a question. Because

each person questions from his own point of view, questions

asked the monitor are cues that the instructional program

needs to be adapted to the individual learner.

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[5]J. R. Suchman, "In Pursuit of Meaning," The
Instructor, LXXV (September, 1965), 32.

As the monitor interacts with those students who ask questions, the monitor needs to make decisions as to how to respond to the pupils' questions. The monitor must decide which questions to answer for the student, which ones to let the pupil solve on his own, which ones to reflect back to him, and which ones to refer to someone else. If certain questions are asked frequently, it might indicate that the program needs to be revised.

If one of the purposes of having a monitor in the structured, multi-media, self-instructional learning environment is to handle the students' questions, then the monitor needs to be prepared. Before such a training program for monitors can be established, there must first be a description of the types of questions that are likely to occur during the "normal" operation of such a learning program. Thus, given a multi-media, self-instructional learning situation, there is a need to identify the types of questions asked by pupils as a basis for designing a training program for monitors.

Importance of Pupil Questions

The question is probably the most frequent tool of communication in the teaching-learning process. Whether the communication is teacher to pupil, pupil to teacher, or pupil to pupil, the question--usually oral, sometimes written--is central to the process of obtaining knowledge.

> The staggering total of human knowledge has
> accumulated because someone--somewhere--asked
> a question and someone else--somewhere else--
> asked another question, and through the ages
> many questions were asked and some were answered.
> The quest for knowledge has resulted in enriching
> and strengthening our civilization. The dynamic
> nature of present day society demands that the
> intellectual search be continued.[6]

Numerous articles and books have been written on the topic

of classroom questions. These have primarily stressed the

qualities of "good" questions and the importance of teacher

questions, their roles, and functions.[7]

Traditionally, the asking of questions has been

viewed as going from the teacher to the learner. This

traditional role, according to Bellack and others, is

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[6]Ruth P. Klebaner, "Questions That Teach," Grade Teacher, LXXXI (March, 1964), 77.

[7]These aspects of teacher questions have been discussed by various authors. The following references serve as examples: Philip Grossier, How to Use the Fine Art of Questioning (Englewood Cliffs, N.J.: Teachers Practical Press, 1964); Ernest Horn, Methods of Instruction in the Social Studies (New York: Charles Scribner's Sons, 1937); Norris Sanders, Classroom Questions: What Kinds? (New York: Harper & Row Publishers, 1966); Wilbert McKeachie, Teaching Tips, A Guidebook for the Beginning College Teacher, 6th ed. (Lexington, Mass.: D. C. Heath and Company, 1969); Stanley Payne, The Art of Asking Questions (Princeton, N.J.: Princeton University Press, 1951); Jack Fraenkel, "Ask The Right Questions!" The Clearing House, XLI (March, 1966), 199-202; Richard Carner, "Levels of Questioning," Education, LXXXIII (May, 1963), 546-550; M. J. Aschner, "Asking Questions to Trigger Thinking," NEA Journal, L (September, 1961), 44-46; Howard T. Batchelder, Maurice McGlasson, and Raleigh Schloring, Student Teaching in Secondary Schools (New York: McGraw-Hill Book Company, 1964); Klebaner, op. cit., p. 10; and Hilda Taba, Teachers' Handbook for Elementary Social Studies (Palo Alto, California: Addison-Wesley Publishing Company, 1967), pp. 119-126.

perpetuated by the ground rules that guide the actions and moves made by the teacher and pupils in the classrooms. Bellack conducted a study which was based on the idea that teaching and learning are governed by certain rules that guide actions and moves made by the participants in the classroom. According to the rules of classroom gaming, it is the teacher who questions and the pupil who answers--not vice versa.[8] Perhaps it is because of these tradition-bound role expectations that the literature and research studies on the pupil as a source of questions are so scarce.[9]

Research findings on the questioning activities within the classroom "consistently show that students have only a very limited opportunity to raise questions."[10] This finding is understandable when one examines the extent to which teachers control classrooms through their verbal discourse.[11] When the teacher begins to talk, the focus for the students' attention is set; and the students' opportunities to ask questions are limited. Although these limited

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[8]Arno Bellack et al., The Language of the Classroom (New York: Teachers College, 1966), p. 53.

[9]Chapter II of this study presents the various research studies that have been conducted on pupil questions.

[10]Meredith D. Gall, "The Use of Questions in Teaching," Review of Educational Research, XL (December, 1970), 715.

[11]In Chapter II of this study, research evidence that teachers' verbal discourse dominates the classroom is presented.

opportunities may outwardly seem undesirable, Austin implies
that it is necessary if any learning is to take place within
the traditional classroom.

> Much as the teacher might like to encourage
> questions the size of classes in most schools
> makes her problem a very difficult one. How-
> ever much she may wish to give children a chance
> to pursue their own curiosities she must discour-
> age questions which do not fit in with her
> schemes. If she does not, either chaos is
> produced or little is learnt.[12]

It is generally accepted that the traditional class-
room is under the control of the teacher, but structured,
multi-media, self-instructional learning programs are pri-
marily under student control. Because the student can
adjust the rate of presentation of information, the oppor-
tunities for pupils to ask questions in this type of learn-
ing environment are unbridled. How free the students feel
in asking questions in this type of learning environment,
which is removed from the traditionally teacher-dominated
classroom, is not known. The identification of the number
and types of questions asked by college pupils during the
operation of structured, multi-media, self-instructional
learning units is the focus of this study.

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[12]Frances Austin, The Art of Questioning in the
Classroom (London: University of London Press, Ltd.,
1961), p. 34.

Situational Factors

It is possible that certain situational factors may influence the number and types of questions that occur during the operation of a structured, multi-media, self-instructional learning program. Three situational factors that may influence the occurrence of questions are: (1) the nature of the learning units being studied by the students, (2) the content expertise of the monitor, and (3) the accessibility of the monitor to respond to questions.

Studies on the types of questions asked by pupils in classrooms reveal that different subject-matter content yields different numbers and types of pupil questions.[13] Whether differences in the number and types of questions asked in a structured, multi-media, self-instructional learning environment can be attributed to differences in types of learning programs is investigated in this study.

Also, it is conceivable that differences in types of monitors with different levels of expertise will elicit different numbers and types of questions. Students might be more willing to express a lack of understanding to another student rather than to a faculty member. Consequently, the effects that two monitors with different levels of professional expertise have on the number and types of questions asked by pupils is investigated in this study.

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[13]These studies are included in the "Review of Related Literature" in Chapter II.

One of Postlethwait's expectations of the instructors in his audio-tutorial learning center is "to circulate within the learning center constantly giving help when needed."[14] What effects the movement of the monitor has on the number and types of questions asked by pupils during the operation of structured, multi-media, self-instructional learning programs is one of the situational factors investigated in this study.

Purposes

The two purposes of this study are: (1) to develop a classification scheme of college pupil questions asked within the context of structured, multi-media, self-instructional learning situations and (2) to determine what, if any, effect certain situational factors have on the number and types of questions asked during the operation of this type of learning situation.

A classification scheme will be developed from and applied to the questions college pupils ask of two monitors during the operation of three multi-media, self-instructional learning units in one content specialty area. A data-gathering investigation will be conducted to determine what, if any, effects certain situational factors have on the number and types of questions asked. Thus, it is hoped that the classification scheme developed and that the findings of the

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[14]Postlethwait, Novak and Murray, op. cit., p. 80.

investigation will have general applications to other similar kinds of self-instructional learning situations.

Hypothetical Base for the Study

This study was designed to develop a classification scheme of pupil questions asked by college students during the operation of structured, multi-media, self-instructional learning situations and to conduct a data-gathering investigation to test the following related hypotheses.

The number and types of questions asked by students during the operation of three structured, multi-media, self-instructional learning units in one content specialty area vary significantly according to:

1. Differences in the three learning units' terminal behaviors;

2. Whether the monitor circulates or remains stationary during the time she is the monitor;

3. Whether a faculty member or undergraduate student is the monitor.[15]

Importance of the Study

Historically, the emphasis on questioning activities in the classroom has been on the teacher's use of questions as an instructional tool; and relatively little attention has been given to the role of pupil questions in the

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[15]These hypotheses are stated in testable form in Chapter III.

instructional process. Today, with the advent of
multi-media, self-instructional learning systems and with
increased emphasis on learning rather than on the mechanics
of teaching, pupil questions assume increased importance.
The emerging increase in the systematic development and
utilization of more individualized instructional programs
in institutions of higher education demands that the overall
effectiveness and efficiency of these learning systems be
evaluated.

Although the effectiveness of multi-media, self-
instructional programs is determined by what the student
learns, ways that the learning environment can be made more
effective and efficient for the individual learner need to
be identified. One way of identifying the effectiveness
and efficiency of a self-instructional learning environment
is to examine the interaction between the monitor and the
individual learner under "normal" operating conditions.
Because pupil questions serve as a source of information
regarding the learning system's effectiveness and efficiency,
the number and types of questions asked are indices of ways
the system may need to become more effective and efficient
for the individual learner.

Thus, the goal of this study is to develop a clas-
sification scheme of questions asked by college pupils
during the operation of structured, multi-media, self-
instructional learning situations. Such a classification

scheme would identify similarities and differences in types of pupil questions and could be used to prepare monitors for the types of questions that they are likely to encounter in such learning situations. Once the types of questions are identified, guidelines could be developed on how to handle each type of question so that the monitors could make the instructional materials more meaningful for individual students. Although it is unlikely that the handling of college pupils' questions can be reduced to an easy formula, the fact that this study focuses on the role of pupil questions in the instructional process seems appropriate and worth-while.

An additional investigative goal is to assess what, if any, relationship exists between certain situational factors and the number and types of questions asked. The findings from this part of the study might be of interest to administrators of institutions where structured, multi-media, self-instructional programs are being used or are being developed.

Since part of the monitor's role is dependent upon the students' needs for assistance, an investigation of student questions will help to acquire a greater understanding of the monitor's role. Frequently with the advent of new technology, a system is prematurely introduced before an adequate and reliable evaluation has been done of the system in operation. New instructional methods are often

rejected on false grounds before their potential has been adequately tested. Such rejections are not necessarily the fault of the instructional program itself but may be due to failure to identify and prepare personnel to function properly within the system. Thus, if higher education is to make the best possible use of structured, multi-media, self-instructional learning programs, then the need to identify the monitor's role in such a learning environment is important.

Since the self-instructional materials utilized in this study were developed under federal funds, the funded agency, as part of the conditions for the project grant, is obligated to make these instructional materials available to others. If the types of questions the monitor is likely to encounter are identified, then other institutions which purchase these instructional units may benefit from the information. This information may help administrators in other institutions make appropriate decisions about staffing and operating such a learning situation.

Thus, by developing and applying a classification scheme of pupil questions in one content specialty area, it is hoped that such a classification scheme and findings will have general applications to other similar kinds of self-instructional learning situations. The classification scheme and findings may also serve as a relevant index for future research.

Plan of Study

The study is to be undertaken in two phases. Phase I will be the development of a classification scheme of pupil questions while Phase II will be the application of the classification scheme during a data-gathering investigation.

The number and types of questions collected in Phase II will be categorized according to the classification scheme developed in Phase I. The data will be examined to determine what, if any, effects certain situational factors have on the number and types of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units.

Basic Assumptions

Three basic assumptions underlie the study rationale. These assumptions are:

1. That college pupils accurately express gaps in understanding that occur during the operation of structured, multi-media, self-instructional programs to the monitor in the form of questions;

2. That questions asked during the data-collection process are a representative sample of all questions asked of the monitors;

3. That college pupils who were using the structured, multi-media, self-instructional units during the data-collection process are a representative sample of the total pupil population.

Limitations

The study is designed and undertaken within the limitations stated below:

1. The study is limited to the number and types of oral questions asked by college students during the "normal" operation of structured, multi-media, self-instructional learning programs. No attempt was made to control the activities or number of students present during any of the observation times nor to control the activities of the monitors beyond requesting them to circulate or to remain stationary during randomly selected observation times.

2. The study is limited to pupil questions asked of two different monitors during the operation of three multi-media, self-instructional units having different terminal behaviors in one content specialty area.

3. The study is limited to two monitors and to the amount of time each monitor was available for observation.

4. The study is limited by the accuracy of the audio and visual recording devices used to collect data.

5. The study is limited to the number and types of questions asked by students enrolled in the beginning nursing course at Michigan State University in Fall term, 1970 and Winter term, 1971, who were present in the structured, multi-media, self-instructional learning environment when the data were collected.

6. The study is limited to the definition of a pupil question as an utterance by a pupil in which the pupil's voice is raised or sustained at the end of the utterance and to which the monitor makes a verbal response. No attempt was made to collect statements in which questions were implied or to analyze questions students asked of each other.

7. The study is limited primarily to the cognitive aspect of pupil questions with little reference to the affective domain.

8. The study is neither an evaluation nor an experimental investigation of monitoring effectiveness; rather, it is an attempt to develop a classification scheme of pupil questions asked within the context of a structured, multi-media, self-instructional learning environment under "normal" operating conditions. No attempt was made to determine what generated the pupil question, the quality of the questions asked, or the responses made by the monitor.

9. The study is limited to the degree that the climate of the structured, multi-media, self-instructional

learning environment is conducive to pupils asking questions without fear of ridicule or embarrassment from peers or monitors.

10. The study is limited to the extent that the monitors' behaviors, verbal and nonverbal, do not adversely affect the student's willingness to express a question or to ask additional questions.

Definitions

For purposes of clarification, certain terms which are used in the report of this investigation are defined.

Structured: the sequencing of information to assure that terminal behaviors are achieved.

Multi-media: a combination of various types of media used together in order to capitalize on the distinctive characteristics and capabilities of each toward achievement of objectives and presentation of content. Student responses are elicited throughout the program to assure attainment of the objectives.

Independent study: a form of self-instruction in which a student learns on an individual basis using structured multi-media materials for an appreciable length of time, without the intervention of a teacher, toward goals he has in common with other students in the group. This learning takes place outside the regularly scheduled classes but in facilities provided by the educational institution. Study is independent in that the student can progress at his own rate of learning.

Independent study unit or learning unit: a structured multi-media, self-instructional learning program presented in a study carrel. The objectives, content, and sequence of the program are the same for all students. Students are responsible for the information

presented in the units. The information is not covered elsewhere in the course.

Learning
Unit I:
an independent study unit designed to teach the identification of communication goals.

Learning
Unit II:
an independent study unit designed to teach a criteria for judging successful and unsuccessful communication.

Learning
Unit III:
an independent study unit designed to teach how to measure blood pressure accurately.[16]

Independent
study labora-
tory (ISL)
a room in which ten study carrels are located for use by students.

Study carrel
or carrel:
a study space designed to facilitate learning through the use of instructional media. Each carrel is equipped with an audio tape playback unit, an 8mm (Super) projector, remote control cords, headsets, a projection surface, and instructional materials related to a unit of study.

Monitor:
a person available in the independent study laboratory to provide whatever assistance students need. This person has no assigned tutorial functions to perform while monitoring the laboratory. She may or may not contact students as they come and go.

Student or
pupil:
a person enrolled in the beginning nursing course at Michigan State University during Fall term, 1970, and Winter term, 1971.

Student set:
refers to either one or two students working in a carrel.

Question:
an utterance by a pupil in which the pupil's voice is raised or sustained at the end of the utterance and to which the monitor makes a verbal response.

Observation
time:
a 30 minute block of time during which data were collected

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[16] The specific terminal behaviors for Learning Units I, II, and III are given in Chapter III.

Circulate: planned movement of the monitor to within three feet of every student working on Learning Units I, II, or III at least twice during an observation time.

Stationary: restriction of the monitor's movement to sitting at the desk unless a student indicates a need for assistance or unless performing routine monitoring functions, such as changing audio tapes and slide drums.

Terminal behaviors or objectives: the observable, measurable actions that each student is expected to be able to demonstrate at the completion of each unit of study.

Organization of the Study

In this chapter the topics of background of the problem, the problem, importance of pupil questions, situational factors, purposes, hypothetical base for the study, importance of the study, plan of study, basic assumptions, limitations, and definitions were discussed. Chapter II includes a review of the literature related to the development of a classification scheme of pupil questions. Chapter III contains a description of the methods and procedures used to develop the final classification scheme and to conduct a data-gathering investigation. Chapter IV presents the analysis of the data collected; and Chapter V contains the summary, conclusions, implications, and recommendations of the study.

CHAPTER II

REVIEW OF RELATED LITERATURE

The importance of questions in the teaching-learning process has long been emphasized in the literature. In this chapter, the literature relating to the development of a classification scheme of pupil questions is presented. In reviewing the literature, particular attention is given to studies which include classification of questions. The review includes studies of classifications of teacher questions as well as classifications of pupil questions. Classification schemes of teachers' questions are reviewed briefly as a possible source of a classification of pupil questions. The chapter is organized under the following headings: Prevalence of Pupil Questions, Classifications of Teacher Questions, Classifications of Pupil Questions, and Summary of Related Literature.

Prevalence of Pupil Questions

Statements concerning the need to ask questions as a means for obtaining knowledge and to continue to ask questions throughout life have appeared in the literature. Examples of such statements are:

There is nothing stronger than the curiosity of
children. They are eager to learn about every-
thing, and they routinely ask the embarrassingly
fundamental questions that adults are never able
to answer, questions such as: What is God like,
how far does space extend, what is time, why am
I here? If metaphysics has any native home, it
is in the questions of children. Their state
of innocence is not after all so innocent. They
do know what questions to ask![1]

Children should be aware that the beginning of
insight into many things comes by asking ques-
tions, but that discriminating questions about
a subject result from knowledge of it. Children
need to realize also that it is easy to ask
thoughtless questions, but quite a trick to
frame inquiries which convey precise meaning
and elicit the kind of information desired.
As a corollary to building respect for good
questions, pupil interest and pride in framing
better ones should develop.[2]

*The student's freedom to question perpetuates
and intensifies his desire to go on learning.*[3]

Perhaps in this changing world of expanding
knowledge, it is more important to learn how
to formulate significant questions than it is
to memorize all the answers.[4]

Children come to school seeking knowledge.
. . . When children begin to use questioning
as a way of finding out, as a way of embarking
on intellectual voyages of discovery, they

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[1]James K. Feibleman, "The Uses of Thinking,"
Saturday Review, XLVI (March 2, 1963), 18.

[2]Helen M. Carpenter, "Study Skills: Asking Good
Questions," The Instructor, LXXIV (November, 1964), 28.

[3]Norman Hill, "The Key to Effective Teaching,"
The Clearing House, XL (November, 1965), 134.

[4]Amelia Melnik, "Questions: An Instructional-
Diagnostic Tool," Journal of Reading, XI (April, 1968),
581.

take an important step in the direction of
becoming self-motivated, self-directed
learners.[5]

The questioning mind at four should continue
to be one which questions--uninhibited,
unrestricted, and free through the elementary,
junior high and senior high schools. For that
matter, this attitude and quest for knowledge
should be a dominant characteristic of an
individual's thought processes throughout
his life.[6]

We often crowd the nursery or elementary
program with sessions devoted to rigid, formal
programs whether it be in reading, mathematics
or science. When children have little or no
time to ask those questions of most importance
to them, they may find it difficult to concep-
tualize and to build up generalizations to
carry from one situation to another in more and
more mature patterns of living. In too many
programs being promulgated today, it appears
that we are bent on developing a generation
of children crammed with facts yet devoid of
interest and zest in living and too listless
to ask the right questions. Once we have lost
the facility to ask the right questions we are
well on the way to asking the wrong questions
which cannot help but rather will lead each one
of us toward individual bankruptcy in his daily
living.[7]

The importance of questions as a basic tool for obtaining

knowledge and the need for schools to nurture the asking of

questions are advocated by many writers. However, direct

observations of the questioning activities in the classroom

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[5]Klebaner, op. cit., p. 76.

[6]Hill, loc. cit.

[7]Arthur Hamalainen, "Questions Guide the Elementary
School Principal," Childhood Education, XL (September,
1963), 17.

by such researchers as Stevens, Yamada, Corey, Fahey, and Floyd reveal that in reality little opportunity is provided for students to ask questions.

The pioneer studies of classroom questioning activities done by Stevens in 1912 and Yamada in 1913, although not specifically designed to identify the number or types of pupil questions, did demonstrate that the rapid rate at which teachers asked questions in the classroom left little time for students to ask questions. Stevens estimated that eight-tenths of the school time was occupied with questions and answers and that teachers asked questions at the rate of one question every 30 seconds.[8] Her response to this teacher behavior was:

> The large number of questions suggests that there is little thought given to the needs of individuals. The teacher sets the pace in his questioning: the pupils follow as a body, or drop by the wayside. When pupils become interested in their work and begin to think for themselves, it is very natural for them to ask questions, and they will do it invariably if allowed to do so.[9]

One year later (1913) Yamada observed a similar type of questioning behavior on the part of teachers and also expressed concern over the effect of such rapid questioning on students' thinking.

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[8]Romiett Stevens, "The Question as a Measure of Efficiency in Instruction" (unpublished Ed.D. dissertation, Teacher's College, Columbia University, 1912), p. 23.

[9]Ibid., p. 25.

> But in the schoolroom the number of [teacher]
> questions, whether good or bad are apt to be
> so large that there is no time left for
> complete expression of thought. The pupils
> are allowed merely to punctuate the questions
> with mono-syllabic answers, or with a few
> words.[10]

and

> Any demand for speedy reactions deprives a
> child of time for suspension of judgment and
> weighing the evidence pro and con; it prevents
> him from appealing to concrete experience
> latent in his mind, but encourages him to
> accept any suggestion from within as well as
> without and to react at random.[11]

Subsequent to Stevens' and Yamada's expressed concerns over the effects of the rapid rate at which teachers asked questions in the classroom, other researchers conducted studies which specifically focused on the number of questions pupils asked. Some of these investigators were Corey, Fahey and Floyd.

Corey conducted several studies in the area of pupil questions. During the academic year 1937-1938 Corey had verbatim records made of all oral questions asked by teachers and pupils in grades 7 through 12 in a laboratory high school in the subjects of science, history, and English. Analysis of the records revealed that of the approximately 39,000 inquiries made by pupils and teachers, fewer than

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[10]Soshichi Yamada, "A Study of Questioning," The Pedagogical Seminary, XX (June, 1913), p. 173.

[11]Ibid., p. 177.

4,000 were asked by pupils. Corey found that a ratio of more than eight teacher questions to every pupil question was fairly constant from class to class.[12]

In another study, Corey planned to analyze the number of questions asked by both teachers and pupils during one week of the 1937-1938 academic year. After examining the data, he concluded that he could not adequately study pupil questions because teachers talked two-thirds of the time. Six teachers asked a total of 1,260 questions while 169 pupils asked 114 questions during 30 hours of class time over a period of 5 days. The ratio was approximately 11 teacher inquiries to 1 pupil inquiry. When Corey compared the number of teacher questions asked to the number of teacher questions answered by pupils, he found that:

> Almost 500--or, more exactly, 38 percent--of the teachers' questions were not answered by the pupils at all. Some of the teachers had formed the habit of answering their own questions before the pupils had a chance.[13]

Corey concluded that:

> The frequency with which the teachers asked questions . . . is probably proof sufficient that no great number of "thoughtful" answers are expected.[14]

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[12]Stephen M. Corey, "Teachers' Questioning Activity," Research on the Foundations of American Education (Washington, D.C.: American Educational Research Association, 1939), p. 44.

[13]Stephen Corey, "The Teachers Out-Talk the Pupils," School Review, XLVIII (December, 1940), 747.

[14]Ibid., p. 750.

Using the same data that Corey had collected during the academic year 1937-1938, Fahey found that 169 pupils averaged only about one question per week, or an average of 22.12 questions during the entire school year. The standard deviation for the total group was 31.36.[15]

> One pupil asked as many as 233 questions during the year, another asked 162, but fifty asked less than five, approximately one-half of the group asked less than ten, seven pupils asked no questions at all.[16]

Two of Fahey's conclusions were:

1. Pupils ask relatively few questions in high school classrooms, averaging less than one per week.

2. Very few pupils ask a relatively large number of questions as compared with their classmates and these individuals appear to deviate little from normal in interests, intelligence, or measures of thinking.[17]

Although the studies done by Stevens, Yamada, Corey, and Fahey were conducted over thirty years ago, more recent studies by Floyd in 1960 and Bellack in 1964 reveal that teachers' rapid rates of questioning persist in today's educational system.

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[15]George Fahey, "A Study of the Classroom Questions of High School Pupils and the Relation Between Questioning Activity and Various Other Factors of Educational Significance" (unpublished Ph.D. dissertation, University of Wisconsin, 1939), p. 144.

[16]Ibid.

[17]Ibid., p. 149.

In 1960, Floyd studied the questioning activity in 40 classrooms of primary grade teachers identified by their principals as being among the "best." Floyd visited 30 classrooms and tape recorded each classroom discussion for one hour. He then visited 10 classrooms and recorded each of their discussions for one entire day. Floyd found that during the hour-long visits, 30 teachers asked a total of 6,259 questions while their pupils (N = 802) asked a total of 232 questions during the 30 hours of tape recorded class time.[18] On the average, the teacher asked approximately 27 questions for every question asked by a pupil. (This ratio of teacher questions to pupil questions is three times as high as that found by Corey in 1937-1938.) During the 10 all-day visits, 165 questions were asked by 269 pupils in contrast to 3,481 questions asked by 10 teachers. During a day, Floyd found that teachers asked an average of 348 questions compared to pupils who averaged 16-1/2 per day.[19] Floyd observed that the ratio of 95 teacher questions to 5 pupil questions actually discouraged pupils from asking questions. Teachers tended to use the question as a tool for evaluating learning rather than for stimulating think-ing. Because their questioning skills were not highly

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[18]William D. Floyd, "An Analysis of the Oral Questioning Activity in Selected Colorado Primary Classrooms" (unpublished Ed.D. dissertation, Colorado State College, 1960), p. 72.

[19]Ibid., p. 76.

developed, Floyd observed that teachers misused, overused, and abused the oral question technique and, in general, lacked an understanding of the psychology of questioning.[20]

In 1964, Bellack and others reported a study in which tape recordings were made of 4 class lessons for each of 15 different classes on the topic of international trade. The sample included 345 tenth- and twelfth-grade students. The researchers viewed the verbal discourse of the classroom as a language game which was governed by certain ground rules. The classroom discourse was then categorized into four pedagogical functions--structuring, soliciting, responding, and reacting. The category of "soliciting" included all questions asked in the classroom along with commands, imperatives and requests. The researchers found that teachers spoke three times more frequently than students and that teachers initiated about 85 percent of all teaching cycles (i.e., solicitation, response, and reacting).[21] Pupils infrequently asked questions. The pupils responded to the teacher's discourse approximately seven times more frequently than the pupils solicited. It was evident from the study that according to the rules of classroom gaming, it is the teacher who questions and the pupil who answers--not vice versa.[22]

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[20]Ibid., p. 139.

[21]Bellack et al., op. cit., p. 207.

[22]Ibid., p. 53.

If questioning is to be a characteristic of a person's thinking throughout his life, then college students should also be encouraged to use questioning in their pursuit of learning. Studies of the questioning practices of college teachers and students have been totally neglected, and only a few references have been made in the literature to the question-asking behaviors of college students. Thompson has stated that college graduates do not know how to ask questions.

> . . . the bulk of college graduates do little questioning. Even those who profess unusual acquaintance with the methods of science--where questioning is of the essence--are often afflicted with deficits in their ability to ask pertinent questions. Too frequently their inquiry is dulled from having learned the canned questions posed for them by others or from having become victims of a system of questions beyond which they cannot proceed. Indeed, college graduates generally have not learned how to learn insofar as questioning is the essence of that process.[23]

The fact that traditional learning opportunities in colleges have not been conducive to students asking questions is implied in a statement by McKeachie.

> The lecture section is sometimes not regarded as the place for questions and discussions from the floor. Instructors often try to have the questions handled by an assistant in a quiz or discussion section. Potentially this solution is a good one; actually, it often leaves much to be desired for two reasons:

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[23]Ralph Thompson, "Learning to Question," _Journal of Higher Education_, XL (June, 1969), 467.

a. Handling a discussion section is sometimes
    more difficult than giving a lecture. A
    more reasonable arrangement than the one
    that is commonly used might be to have the
    assistant give the lecture and the instruc-
    tor handle the quiz section. The difficul-
    ties in discussion sections are apt to be
    that the assistant is not well enough
    acquainted with the materials the lecturer
    has covered and that it is difficult to
    keep the discussion going. This can be
    surmounted if the assistants attend the
    lectures and participate in lecture plan-
    ning and receive help and supervision in
    planning the discussion period.

b. Whatever its potential usefulness, the
    discussion section does not provide for
    the prompt answering of questions which
    arise in connection with specific lecture
    materials.[24]

Thus, it would appear that the traditional methods of

teaching have denied students the opportunities to ask

questions at all levels of education.

Classification of Teacher Questions

Historically, the literature has produced an abun-

dance of theory on the importance of questions in the

teaching-learning process. Classroom questioning has long

been considered a major teaching methodology. Horn stated

in 1937 that

There has probably never been a time during the
last seventy-five years when some form of the
question-and-answer recitation has not been the
most prevalent method of teaching.[25]

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[24]McKeachie, op. cit., p. 154.

[25]Horn, op. cit., p. 336.

Despite the frequent recognition of the importance of teacher questions in the teaching-learning process, relatively few studies have focused specifically on the types of questions teachers ask. These studies are listed chronologically in Table 2.1.

Although the focus, population, subject matter area, data gathering procedures, and classification schemes used by investigators of teacher questioning practices are diverse, all of the investigators have included categories in their classification scheme which are based on the type of thinking the teacher wants the student to use in answering the question. The two types of thinking that have been common to all teacher question classification schemes are factual-recall and thought-provoking.[26] However, the task of deciding from a research standpoint whether a teacher question is "factual-recall" or "thought-provoking" is difficult because "what constitutes a thought question for one pupil may be merely a memory question for another student,"[27] or even for the same student the next day.

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[26] In general, factual-recall questions are those which require the recall of information gained from direct observation, listening and reading; while thought-provoking requires the respondent to do something with the information recalled.

[27] Walter Monroe and Ralph Carter, The Use of Different Types of Thought Questions in Secondary Schools and Their Relative Difficulty for Students, Bulletin No. 14 (Urbana, Ill.: Bureau of Educational Research, University of Illinois, 1923), p. 6.

TABLE 2.1

INVESTIGATIONS OF TEACHER QUESTIONS WHICH INCLUDED A CLASSIFICATION SCHEME

Principal Investigator	Date	Focus	Teacher Population	Subject Matter	Procedures	Classification Scheme
Stevens[a]	1912	Number of questions as measure of efficiency of instruction	N = ?[†] 7-12th grade teachers	History Mathematics English Latin Science Modern Language	Observation Stenographic records	Stimulate reflection Association Memory
Monroe[b]	1923	Types of thought questions	N = 199 7-12th grade teachers	English Geography History Science Commercial subjects Agriculture Mathematics Foreign Language	Questionnaire	20 categories: 2 recall categories 18 thought categories
Haynes[c]	1935	Teacher intelligence, Teaching experience, Type of school to type of questions	N = 56 6th grade teachers	History	Stenographic records	Fact Thought Alternate Leading Current
Corey[d]	1940	Frequency of questions asked, answered, and information volunteered	N = 6 7-11th grade teachers	Science History English	Stenographic records	Thought Fact

[†]Number of teachers observed not reported.

[a]Stevens, op. cit.

[b]Walter Monroe and Ralph Carter, The Use of Different Types of Thought Questions in Secondary Schools and Their Relative Difficulty for Students, Bulletin No. 14 (Urbana, Ill.: Bureau of Educational Research, University of Illinois, 1923).

[c]Herbert Haynes, "The Relation of Teacher Intelligence, Teaching Experience, and Type of School to Types of Questions" (unpublished Ph.D. dissertation, George Peabody College for Teachers, 1935).

[d]Corey (1940), op. cit., pp. 745-752.

TABLE 2.1--Continued

Principal Investigator	Date	Focus	Subject Matter	Teacher Population	Procedures	Classification Scheme
Adams[e]	1964	Types of questions to content area, grade, school, and ability level of teacher	English Social Studies	N = 32 17 English 15 Social Studies teachers	Tape recordings Observation	Memory Evaluative Ratiocinative Associative Clarifying Neutral Rhetorical
Kleinman[f]	1964	Types of questions, Teacher and pupil behaviors, and Student's understanding of science	Science	N = 23 7 and 8th grade General Science teachers	Observation Questionnaire	Neutral Rhetorical Factual Clarifying Associative Critical Thinking Values
Moyer[g]	1965	Question types; Structure, function, and utilization of questions	Science	N = 12 Elementary Science teachers	Tape recordings Interviews	What Why How Who Where Which When Unclassified
Screiber[h]	1967	Types of questions, Training to improve teacher's question	Social Studies	N = 14 5th grade teachers	Tape recordings	Factual information Assimilating information Seeking locations Formulating opinions Evaluation information

[e]Thomas Adams, "The Development of a Method for the Analysis of Questions Asked by Teachers in Classroom Discussion" (unpublished Ed.D. dissertation, Rutgers-The State University, 1964).

[f]Gladys Kleinman, "General Science Teachers' Questions, Pupil and Teacher Behaviors, and Pupils' Understanding of Science" (unpublished Ed.D. dissertation, University of Virginia, 1964).

[g]John Moyer, "An Exploratory Study of Questioning in the Instructional Processes in Selected Elementary Schools" (unpublished Ed.D. dissertation, Columbia University, 1965).

[h]Joan Schreiber, "Teachers' Question-Asking Techniques in Social Studies" (unpublished Ph.D. dissertation, University of Iowa, 1967).

In addition to the classification schemes of teacher questions that have been developed as part of research investigations, other types of teacher question classification schemes have been reported in the literature. Five such classification schemes are those proposed by Pate and Bremer, Aschner, Carner, Fraenkel, and Sanders.

Pate and Bremer developed a classification system of teacher questions consisting of nine categories.[28] Their question classification scheme was based on a continuum from convergent to divergent questions in which convergent questions had only one possible answer while divergent questions had more than one possible answer. Aschner identified four basic types of questions: remembering, reasoning, evaluating or judging, and creative thinking;[29] and Carner identified three levels of questions: concrete, abstract, and creative.[30] Fraenkel developed a taxonomy of teacher questions which was based on the teacher's purpose in asking the question.[31] The four teacher purposes were: knowledge acquisition, knowledge synthesis, knowledge analysis, and

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[28]Robert Pate and Neville Bremer, "Guiding Learning Through Skillful Questioning," Elementary School Journal, LXVIII (May, 1967), 417-422.

[29]Aschner, op. cit., p. 44.

[30]Carner, op. cit., pp. 548-550.

[31]Fraenkel, op. cit., p. 200.

creative thought, and the types of questions teachers asked were, respectively: factual, descriptive, explanatory and heuristic.

Sanders used Bloom's <u>Taxonomy of Educational Objectives</u> to develop a taxonomy of classroom questions.[32] Sanders' taxonomy consisted of seven sequential categories, each requiring the student to engage in a specific kind of thinking. Briefly, his categories were:

1. Memory: The student recalls or recognizes information.
2. Translation: The student changes information into a different symbolic form or language.
3. Interpretation: The student discovers relationships among facts, generalizations, definitions, values, and skills.
4. Application: The student solves a lifelike problem that requires the identification of the issue and the selection and use of appropriate generalizations and skills.
5. Analysis: The student solves a problem in the light of conscious knowledge of the parts and forms of thinking.
6. Synthesis: The student solves a problem that requires original, creative thinking.
7. Evaluation: The student makes a judgment of good or bad, right or wrong, according to standards he designates.[33]

Sanders' question classification scheme varies slightly from Bloom's taxonomy in that Sanders uses the word "memory" in

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[32]Sanders, <u>op. cit.</u>, p. 2; and Benjamin S. Bloom, ed., <u>Taxonomy of Educational Objectives Handbook 1: Cognitive Domain</u> (New York: David McKay Company, Inc., 1956).

[33]Sanders, <u>op. cit.</u>, p. 3.

place of Bloom's category "knowledge," and Sanders describes

separately the category for "translation" and "interpreta-

tion" rather than leaving them combined with "extrapolation"

under Bloom's heading of "comprehension."

Recently, other researchers such as Davis and

Tinsley, and Hunkins have used Bloom's taxonomy as a basis

for studying and improving the questioning activities of

teachers in the classroom.[34] However, a complete review of

these studies is beyond the purpose of this study.

Classification of Pupil Questions

Historically, the questioning activities of pupils

in the classroom have received less attention than those of

the teacher. One of the first studies done on the types of

questions pupils ask in the classroom was conducted by

Finley in 1920. Finley attempted to discover children's

interests in plants, animals, and physical phenomena by

bringing into the classroom of elementary school children

some unfamiliar object such as a salamander and then asking

the children to write as many questions as they could about

what they had seen. Using this technique, Finley collected

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[34]O. L. Davis, Jr., and Drew Tinsley, "Cognitive
Objectives Revealed by Classroom Questions Asked by Social
Studies Student Teachers," Peabody Journal of Education, XLV
(July, 1967), 22; and Frances Hunkins, "The Influence of
Analysis and Evaluation Questions on Achievement in Sixth
Grade Social Studies," Educational Leadership Research
Supplement, XXV (January, 1968), 327.

8,299 questions from 1,716 pupils in grades one through eight.[35] The questions were classified into 19 different categories according to the interest implied in the pupil's questions relative to specific characteristics of the object such as name, movements, habits, function of parts, and evolution. The request for the name of the object was the question most frequently asked.[36]

The first classification of children's questions which utilized categories that were non-subject matter oriented was one published by Piaget in 1926. Piaget studied the language of two six-year-old boys during school activities over a period of one month and developed a clas-sification scheme based on observations of their questions. Piaget found that questions comprised 13 to 17 percent of the language of each of these two boys.[37] He collected 397 questions and classified them into the following six categories: (1) Questions of Causality, (2) Questions of Reality, (3) Questions of Human Actions and Intentions, (4) Questions of Rules, (5) Questions of Classification, and (6) Questions of Calculations or Numbers.[38] The

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[35]Charles Finley, "Some Studies of Children's Inter-ests in Science Materials," School Science and Mathematics, XXI (January, 1921), 7.

[36]Ibid., p. 8.

[37]Jean Piaget, The Language and Thought of the Child (New York: Harcourt, Brace & Company, 1926), p. 30.

[38]Ibid., p. 33.

majority of the questions (219 out of 397) were questions
of human actions and intentions. The importance of Piaget's
study was not the number of different types of questions
observed or the observation technique employed to collect
the data, but rather the fact that his classification of
questions was functional and was reported in such detail
that it was usable by other investigators such as Davis
and Fahey.

In 1932, Davis used Piaget's system of classifica-
tion to discriminate question types among boys, girls, and
adults. Davis collected 3,650 spontaneous questions asked
consecutively by 73 children ranging in age from 3 to 12
years old as recorded by their mothers.[39] The sample of
adult questions was taken from written fictional characters
and legal testimony. When tabulating the data, Davis
excluded single-word questions because their obscurity in
meaning would make classification impossible. She added the
categories of social relation and theoretical questions to
Piaget's classification scheme because of the diversity and
complexity of the locations, sources, and situations (home,
school, play, books, newspapers) under which the questions
were collected. An analysis was made of the different types
of questions asked by boys, girls, and adults; but no
combined distribution of questions according to Piaget's

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[39] Edith Davis, "The Form and Function of Children's
Questions," Child Development, III (March, 1932), 60.

classification system was published. Although the validity and reliability of Davis's data collection procedures (i.e., mothers recording fifty consecutive inquiries for each child) are questionable, Davis did determine that Piaget's classification scheme produced a coefficiency of reliability of .88.[40]

Fahey also used Piaget's classification system to analyze 2,047 questions asked by 160 pupils in 6 high schools during one academic year and found that different types of questions were asked in classes of different content. For example, in English classes there were many questions about rules; in history classes there were many questions about human actions and intentions while these same types of questions were rare in science classes.[41]

McWilliams used a two category classification scheme to analyze the pupil questions asked in her own eighth-grade mathematics classes over a four-week period of time. The classification system consisted of "simple" and "thought" questions. "Simple" questions were defined as questions calling for a "yes" or "no" answer or an elaboration of an explanation already given while "thought" questions were those questions which revealed the pupil was doing some thinking on his own in terms of seeking more information

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[40] Ibid., p. 65.

[41] Fahey (1939), op. cit., p. 147.

or raising an unexplored problem. A total of 189 simple
and 153 thought questions was collected.[42]

Lou Thompson in 1924 compiled 1,355 questions asked
by children in the classroom, on the playground, and in the
home as reported by teachers and parents. He categorized
these questions into subject-matter categories such as
geography, music, and vocation. The number of different
types of questions ranged from 242 in geography to 7 in
music.[43]

Dale collected over 2,700 questions asked by stu-
dents in 16 different high schools relating to health. The
questions were used as one source of curriculum material for
developing a course on health. Dale pointed out that
although pupil questions provide functional curriculum
material, the completeness of student interest as reflected
in the types of questions asked is difficult to determine
since students cannot ask questions (except of a vague sort)
in areas where they have had no experience.[44]

In 1929, Gatto collected 4,190 questions asked by
pupils of the third, fourth, and sixth grades in history,

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[42]Lulu E. McWilliams, "A Study of Pupil Reactions,"
Mathematics Teacher, XXII (May, 1929), 285.

[43]Lou H. Thompson, "Children's Questions," Educa-
tional Research Bulletin, III (November, 1924), 351.

[44]Edgar Dale, "Children's Questions as a Source of
Curriculum Material," Educational Research Bulletin, XVI
(March 17, 1937), 66.

geography, arithmetic, nature study, and literature (prose)
by using three data collecting methods: (1) Question lists
furnished by teachers collected during a total of 100
lessons in the various subject areas; (2) Questions obtained
through direct observation by author in 40 lessons; and (3)
Questions obtained from 20 pupils for each of five grades
after reading selected case studies. The number of ques-
tions collected by each of these three methods was, respec-
tively: 2,198, 767, and 1,225. Gatto classified these
questions into 22 categories and found that 87 percent of
all questions fell into the first five categories of the
classification system which were all memorization in nature.[45]

Snyder, in 1966, studied the relationships of
teachers' and students' questioning behaviors to identify
similarities and differences and to see if these behaviors
were subjected to change. He studied five classes of gifted
junior high school students and their teachers over one and
a half semesters and attempted to control the subject matter
content by having the five teachers use the same curriculum
materials. Data were collected during the teaching of three
specific content units at different times during the semes-
ters. The types of data collected were written questions by
students and tape recordings of classroom verbal discourse.

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[45]Frank Gatto, "Pupils' Questions: Their Nature and
Their Relationship to the Study Process" (unpublished Ph.D.
dissertation, University of Pittsburgh, 1929), p. 54.

Snyder eliminated questions of procedural nature and rhetorical questions from his data and classified questions according to a three-dimensional classification scheme. The dimensions of the scheme were content, product, and operation; and each of these dimensions had related subcategories for a total of twenty-four categories. He found that the question-asking behavior of both students and teachers changed from content unit to unit[46] and that similarities existed between question asking behaviors of students and question asking behaviors of their teachers.[47]

In 1966, Shaffer analyzed types of verbal interactions in seventy-eight different class sessions in the subject areas of science, social studies, English, and biology. She classified the questions asked by intellectually gifted students of Junior and Senior high levels into "non-content" related categories of Rhetorical and Routine and into "content" related categories of Clarification, Added Specifics, Extension, Explanation, Evaluation, and Prediction. She found differences in students' questioning behavior among and between classes of students relative to the distribution of content and non-content related

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[46]William Snyder, "The Question-Asking Behavior of Gifted Junior High School Science Students and Their Teachers" (unpublished Ph.D. dissertation, University of Illinois, 1966), p. 93.

[47]Ibid., p. 129.

questions and differences between classes of students and the same teacher.[48]

Dodl, in 1965, developed an instrument for assessing the classroom context in which pupil questions occur and the teacher's role as it effects pupil-questioning behavior. Observation data were collected by trained observers from a limited sample of elementary social studies classrooms, and hypotheses were generated. Dodl attempted to identify what the teaching behaviors were prior to a pupil's question and immediately after the question. He identified five pre-question behaviors and seven post-questioning behaviors of teachers[49] and classified pupil questions into the following types: Information Seeking, Clarification, Routine, Hypothetical, and Role Reversal. The majority of the students' questions were Information-Seeking and Clarification. Students most frequently asked questions during content type discussions rather than during procedural or evaluative type discussions. The most typical post-questioning behavior pattern of teachers was responding to pupil questions with some type of information. Rarely were pupils' questions reinforced by the teacher, redirected back to students, or

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[48]Virginia Shaffer, "The Categorization of Student Inquiries and The Responses Made Within the Context of Classroom Interaction" (unpublished Ed.D. dissertation, University of Illinois, 1966), p. 82.

[49]Norman Dodl, "Pupil Questioning Behavior in Context of Classroom Interaction" (unpublished Ed.D. dissertation, Stanford University, 1965), p. 25.

used as a springboard for class discussions. Dodl
recommended that teachers' attitudes and insecurities
about pupil questions needed to be explored.[50]

In 1968, Scovel developed an instructional program
to improve the student's ability to ask questions. Using
a pre- and post-test, control, and experimental research
paradigm, he asked students to write questions based on
selected items of historical information. He collected
44,512 pupil questions in the pre- and post-test situations
and had judges classify them according to a classification
scheme based on Bloom's Taxonomy of Educational Objectives
Handbook 1: Cognitive Domain.[51] The specific categoriza-
tions used were Memory, Translation, Comprehension, Appli-
cation, and Evaluation. In comparing the types of questions
students asked before the instructional program to those
questions asked after the instructional program, Scovel
observed that although the majority of the questions con-
tinued to be the memory type, there was a change in the
proportion of memory questions. The experimental group
had proportionally fewer memory type questions on the post-
test than they had on the pre-test while there was no change
in the proportion of types of questions asked by the control
group. Scovel concluded that it is possible to change

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[50] Ibid., p. 110.

[51] Bloom et al., op. cit.

student questioning behavior through use of an instructional program.[52]

Summary of Related Literature

Historically, investigations in the use of questions in the classroom have focused primarily on teacher questions rather than on pupil questions. Early studies in the area of teacher questions revealed that the rapid rate at which teachers asked questions precluded much opportunity for students to ask questions. More recent studies indicate, unfortunately, that teacher talk continues to dominate today's classrooms.

Although teacher-questioning behavior is frequently included in studies of classroom teaching, relatively few studies have focused specifically on the types of questions teachers ask. The classification schemes of teacher questions proposed in the literature and research studies have been diverse and have primarily emphasized the types of thinking the teacher expects the learner to use to answer the question. The major difficulty in classifying teachers' questions has been in determining the type of thinking a teacher's question actually stimulates in a student. A

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[52]Donald Scovel, "A Study Analyzing High School Student Questioning Behavior in American History Classes" (unpublished Ph.D. dissertation, University of Iowa, 1968), p. 114.

thought-provoking question for one pupil may be a memory
question for another pupil.

The importance of pupil questions has been recog-
nized since the first study of classroom questioning activ-
ities conducted by Stevens in 1912. Despite the early
recognition of the importance of pupil questions in the
teaching learning process, research in the area of pupil
questioning has been relatively neglected.

Most studies of pupil questioning activities have
included a classification scheme. These pupil classifica-
tion systems vary in number and types of categories that
are included and range from a simple 2-category system to
a complex 24-category system. Despite variation in number
of question categories, most pupil classification systems
included a category of information seeking and clarification.
A few systems included a category for procedural questions.
The majority of the type of questions pupils ask are infor-
mation seeking; questions of a procedural nature are rare.

Although several pupil classification systems have
been developed, they are limited in application to the
purposes of this study. All of the studies of pupil-
questioning activity previously conducted have been done
in elementary and secondary education classrooms; none have
been done at the college level. Also, most of the existing
pupil classification schemes, while adequate for the

research purposes for which they were designed, include
only a few of the types of questions that are likely to be
asked in a learning environment where machines are pro-
grammed to carry the major share of the teaching load. A
new classification scheme of pupil questions is needed that
takes into account the complexity and diversity of college
student activities in a structured, multi-media, self-
instructional learning environment.

CHAPTER III

METHODS AND PROCEDURES

The purpose of this chapter is to describe the methods and procedures used to develop a classification scheme of pupil questions and to conduct a data-gathering investigation. The chapter presents the two major phases in which the study was undertaken--Phase I: Development of a Classification Scheme of Pupil Questions, and Phase II: The Data-Gathering Investigation.

This chapter is organized under three sections-- Phase I: Development of Classification Scheme of Pupil Questions; Phase II: The Data-Gathering Investigation; and Analysis. The section on Phase I is presented under three topics of Basic Classification Criteria, Initial Classification, and Final Classification. Phase II is presented under the topics of Statistical Hypotheses, Procedures, Conditions, Instrumentation, Collection of Data, Transformation of Data, and Adjustment and Tabulation of Data. The section on Analysis describes the methods used to evaluate the classification scheme developed in Phase I and the data gathered in Phase II. The chapter is concluded with a summary of the chapter and a statement about the organization of Chapters IV and V.

Phase I:
Development of a Classification Scheme

Given a set of pupil questions, a variety of question classification schemes is possible depending upon the purpose the scheme is designed to serve. Inasmuch as the ultimate purpose of developing a classification of pupil questions in this study was to identify the types of questions a monitor needs to be prepared to handle during the operation of structured, multi-media, self-instructional learning programs, a classification scheme which had this as its focus was developed. Classifying information according to some identified purpose complies with Wallen and Travers' statement that:

> Classification systems survive or are abandoned according to their usefulness. A classification is retained if it shows promise of having utility. It is discarded if it lacks that promise.[1]

Basic Classification Criteria

Before a classification scheme of pupil questions was developed, criteria were established by which the final classification scheme would be evaluated. These criteria were:

1. The categories should include all possible events.

2. A single event must be recorded in one and only one category.

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[1]Norman E. Wallen and Robert Travers, "Analysis and Investigation of Teaching Methods," Handbook of Research on Teaching, ed. by N. L. Gage (Chicago: Rand McNally and Company, 1963), p. 448.

3. **The categories** should be objectively defined and free from bias.

4. The categories should be sufficient in number to discriminate between categories but simple enough to provide statistically reliable data.

These criteria served as the basis for evaluation of the classification schemes cited in the literature and for the design of the classification scheme used in this study.

Initial Classification

In order to determine if any classification scheme discussed in the literature could be applied to the types of pupil questions asked within the context of a structured, multi-media, self-instructional learning environment, it was necessary to collect some questions asked by pupils in this type of learning environment and to compare these questions to the classification schemes cited in the literature. A preliminary investigation was conducted in which all questions asked by pupils were collected and classified according to the general type of information being solicited.[2] Comparisons were then made between the types of questions asked by pupils during the preliminary investigation and the types of questions included in various classification schemes proposed in the literature. The results of the comparison revealed that all of the proposed classification schemes, while adequate for the research purposes for which

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[2]The details of the preliminary investigation are presented later in this chapter.

they were designed, were inadequate for the purposes of this study in that they did not meet the Basic Classification Criteria presented earlier in this chapter. For example, some of the pupil question classification schemes proposed in the literature were so limited that they did not include all of the types of questions pupils had asked during the preliminary investigation. Other systems contained so many categories that they were unwieldy. All of the teacher classification schemes were disqualified because the definitions of their categories tended to emphasize levels of thinking the responder was to use to answer the question rather than emphasizing the gaps in understanding that were in the mind of the person asking the question. Because of the inadequacies of existing classification schemes, an initial classification scheme was developed on the basis of concepts obtained from the classification schemes proposed in the literature and from pupil questions obtained during the preliminary investigation. This initial classification scheme was later refined after the data gathering investigation to form the final classification scheme.

Final Classification

The final classification scheme developed and used in this study was:

1. Factual Questions: Questions asking for new or additional facts or information relative to the information presented in the instructional unit itself or to achievement of the terminal behaviors.

2. Validation Questions: Questions which elicit judgments and opinions from authority figures relative to verification of correctness of a concept, decision, observation, or skill. This type includes questions of clarification, reinforcement, and confirmation.

3. Relevancy Questions: Questions asking for identification of relationship between concepts, attitudes, and skills being learned in the ISL to the real world; implicitly these questions ask: Why is this important? Why am I doing this? Is the real world like this?

4. Operational Procedure Questions: Questions relating to the logistics, environment, and functioning of the ISL. This type includes questions about what the learner is expected to do before, during, or after each learning unit; questions about what the monitor is expected to do; questions about location of things; questions about completing the learning unit, tests of unit's effectiveness, and time cards.

5. Equipment Operation Questions: Questions relating to proper functioning and utilization of all non-nursing equipment in the ISL.

6. Requests for Assistance: Simple requests for general assistance.

7. Personal Questions: Questions about own social, mental, and physical well-being or professional goals and achievements.

8. Social Questions: Questions about another person's
                           social, mental, and physical
                           well-being or professional goals
                           and achievements.

Phase II:
The Data-Gathering Investigation

A data-gathering investigation was conducted to
assess what, if any, effects certain situational factors
had on the number and types of questions asked by college
students during the operation of three structured, multi-
media, self-instructional learning programs having different
terminal behaviors. Three situational factors were investi-
gated. They were: (1) differences in the general type of
terminal behaviors for each of three learning units, (2)
whether the monitor circulated or remained stationary during
the time she was the monitor, and (3) whether the monitor
was a registered nurse or a nursing student. To determine
what, if any, effects each of these situational factors had
on either the number or the types of pupil questions asked,
six statistical hypotheses were generated and tested.

Statistical Hypotheses

The hypothetical bases for the data-gathering
investigation phase of this study were broadly stated in
Chapter I. A more specific formulation of these hypotheses
as they relate to the design of the investigation are re-
stated here in testable forms:

Null Hypothesis$_1$

>*There will be no difference in the number of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units in the content area of nursing attributable to the differences in the general type of terminal behaviors identified for each of the three learning units.*

Alternate Hypothesis$_1$

>*There will be a difference in the number of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units in the content area of nursing attributable to the differences in the general types of terminal behaviors identified for each of the three learning units.*

Null Hypothesis$_2$

>*There will be no difference in the number of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units in the content area of nursing attributable to whether the monitor circulates or remains stationary during the time she is a monitor.*

Alternate Hypothesis$_2$

>*There will be a difference in the number of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units in the content area of nursing attributable to whether the monitor circulates or remains stationary during the time she is a monitor.*

Null Hypothesis$_3$

>*There will be no difference in the number of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units in the content area of nursing attributable to whether the monitor is a registered nurse or a nursing student.*

Alternate Hypothesis$_3$

There will be a difference in the number of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units in the content area of nursing attributable to whether the monitor is a registered nurse or a nursing student.

Null Hypothesis$_4$

There will be no difference in the types of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units in the content area of nursing attributable to the differences in the general types of terminal behaviors identified for each of the three learning units.

Alternate Hypothesis$_4$

There will be a difference in the types of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units in the content area of nursing attributable to the differences in the general types of terminal behaviors identified for each of the three learning units.

Null Hypothesis$_5$

There will be no difference in the types of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units in the content area of nursing attributable to whether the monitor circulates or remains stationary during the time she is a monitor.

Alternate Hypothesis$_5$

There will be a difference in the types of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units in the content area of nursing attributable to whether the monitor circulates or remains stationary during the time she is a monitor.

Null Hypothesis$_6$

> *There will be no difference in the types of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units in the content area of nursing attributable to whether the monitor is a registered nurse or a nursing student.*

Alternate Hypothesis$_6$

> *There will be a difference in the types of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units in the content area of nursing attributable to whether the monitor is a registered nurse or a nursing student.*

Procedures

The following data-gathering procedures were tested during a preliminary investigation and utilized during the data-gathering investigation.

<u>Selection of self-instructional units</u>. The specific instructional units included in this study were selected on the basis of the following criteria:

1. Units had to be in a content area in which the investigator was qualified to classify pupil questions.

2. Units had to be designed specifically for use in a structured, multi-media, self-instructional learning environment.

3. Units had to be developed on the basis of pre-determined terminal behaviors (objectives) that were measurable.

4. The objectives of the units had to represent different types of behaviors which the learner was expected to demonstrate at the completion of the unit of study.

5. Units had to utilize a variety of media.

6. Units had to be specifically designed and developed for a specific level of college student.

7. Units had to have been tested previously with a limited number of students, revised on the basis of the feedback received from the students, and had to be ready for large-scale use with students.

Based on these criteria, the decision was made to collect data during the operation of only three self-instructional units in the School of Nursing at Michigan State University. It was assumed that three different instructional units would provide an adequate range of different types of pupil questions. Of all the self-instructional units available for possible inclusion in the study, the following three units with their respective terminal behaviors appeared to best meet the selection criteria:

Learning Unit I: Communication--goals

Given a paper-pencil test, the student can describe four nurse-patient situations in which the nurse's desire for information and/or observations of the patient lead her to formulate different general communication goals.

Given an audio situation, the student can identify those parts of the patient's conversation that might direct the nurse's attention to the probable communication goal(s).

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Learning Unit II: Communication--successful and
                   unsuccessful

    Given the audio portions of two nurse-patient
interactions, the student can identify successful
and unsuccessful communication and can explain
answers in terms of the general and specific
criteria for successful communication.

Learning Unit III: Blood Pressure--measurement

    Given a paper and pencil test, the student can
explain why no sounds are heard above the systolic
pressure nor below the diastolic pressure.

    Given a paper and pencil test, the student can
state the normal ranges for systolic and diastolic
blood pressure.

    Given two slides of nurses taking blood pressure
incorrectly, the student can identify four out of
five errors in measuring blood pressure demonstrated
in the two slides.

    On a real person, the student can take and record
accurately and safely the person's blood pressure
according to the method presented in the unit.

Although it is not possible to isolate one type of
cognitive thinking from other types of cognitive thinking
or to isolate cognitive thinking from psychomotor skills,
it was felt that these three units did in general represent
different types of expected learner behaviors. Basically
Learning Unit I was designed to develop the skill of recog-
nition; Learning Unit II, the skill of evaluation; and
Learning Unit III, a psychomotor skill. A brief description
of these Learning Units can be found in Appendix A. An
overview of the multi-media project including a schematic
of the methodology followed in designing, producing, and

testing these Learning Units prior to utilization in this study can be found in Appendix B.

Selection of monitors. To determine if any differences exist in the types and number of questions asked of monitors with different levels of expertise in the content area, two different monitors were selected for the study. One monitor was a faculty member who was a registered nurse (RN) while the other was a student nurse (SN).[3]

The RN monitor was a part-time faculty member whose primary responsibility was monitoring the Independent Study Laboratory (ISL). She had no other teaching responsibilities and, therefore, had no other contact with the students enrolled in the beginning nursing sequence. The RN monitor familiarized herself with the units used in this study prior to their use by students.

The SN monitor held the status of a Junior within the University and was a second year nursing student.[4] She volunteered to participate as a monitor in this study, and she was financially compensated for her participation. She was familiar with the units as a result of having completed the units the previous year as a beginning nursing student.

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[3]The School of Nursing at Michigan State University does not have a graduate program in nursing. Consequently, it was decided to select an undergraduate student as a monitor.

[4]A Junior level nursing student was selected because the class commitments at the Senior level prevented any senior nursing students from being available to monitor the ISL during both terms in which the data were to be collected.

Pupil population. The pupils in this study were students enrolled in the beginning sequence of nursing courses at Michigan State University during the academic year 1970-1971. The beginning nursing sequence at Michigan State University consists of three separate consecutive courses which are offered only once a year. Each course in the sequence is a prerequisite for all subsequent courses, and the entire beginning nursing sequence is a prerequisite for all upper division nursing courses. Students are only admitted to the beginning sequence in nursing during the Fall term of an academic year. Thus, the student population during the third academic term (Spring) was the same as that of the first academic term (Fall), except for attrition losses. The number of students enrolled in the sequence Fall and Spring terms was 87 and 78, respectively.

Because students were allowed to come to the Independent Study Laboratory at their convenience, the students included were those who happened to be in the ISL when data were collected. They were all verbally informed by the course coordinator during the first class hour of the course, Fall term, 1970, about the availability of the ISL for learning experiences, and were given written information about the nature of the ISL (Appendix C) and the various units available for student use (Appendix D). The students were also verbally informed by the course coordinator that a graduate student would be collecting research data during selected instructional units.

<u>Selection of observation times</u>. This study was designed to collect data relative to the number and types of questions asked by pupils during the operation of three different types of multi-media, self-instructional units with each unit having different types of terminal behaviors. Consequently, the selection of observation times was dependent upon when the specific learning units selected for inclusion in the study were scheduled for actual use within beginning nursing courses.[5] Learning Units I and II were optional learning units and were available for student use one week each during Fall term, 1970; while Unit III was a required learning unit and was available for two weeks during Spring term, 1971. Even though the data were collected over a time lapse of five months, the student population, except for attrition losses, was the <u>same</u> throughout the data collection period due to the nature of the nursing curriculum. The <u>same</u> monitors were used both terms.

The observation times were thirty minutes in duration. The specific observation times in which data were collected were based on: (1) the hours the ISL was open for students to complete the three self-instructional units being investigated and (2) the times the two monitors selected for this study were available to monitor the

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[5]The complete schedule of learning units for the beginning nursing courses (NE 205, NE 206, and NE 207) can be found in Appendix D.

laboratory. It was assumed that there would be an even distribution of numbers of students working on each learning unit during the hours that the laboratory was available.

During Fall term, the ISL was scheduled to be open for 27-1/2 hours a week; while during Spring term, it was open approximately 18 hours a week.[6] Although the specific hours the ISL was opened for student use varied slightly between the Fall and Spring terms, it was basically open from 9 a.m. to 5 p.m. five days a week, less the times when the majority of the students enrolled in the beginning nursing course had other class commitments.[7]

Because of class commitments, the amount of time the SN monitor was available to be a monitor was limited. Thus, it was decided to observe her during all the time she was in the ISL, but to randomly select observation times when the RN monitor was assigned to cover the ISL. The random selection of the RN monitor's time was done by listing in 30-minute time blocks all of the time the RN

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[6] The exact hours per week varied slightly during Spring term due to closing of the laboratory the Friday afternoon before Easter.

[7] The nursing curriculum is so designed that the majority of the students who are enrolled in the beginning nursing course are concurrently enrolled in the same non-nursing courses offered by other departments in the University such as Anatomy, Physiology, Microbiology, and Nutrition. Thus, the ISL was not scheduled to be open during any of the class hours when the majority of the nursing students were scheduled to attend either nursing or non-nursing courses.

monitor was assigned to be the monitor. These 30-minute time blocks were numbered consecutively. Using a random table of numbers, ten observation times of the RN monitor were selected for each learning unit (N = 10). All of the SN monitor's time in the ISL was recorded for a total of six observations per learning unit (N = 6).

The monitors were asked to "circulate" about the room or to remain "stationary" at the monitor's desk during each of the observation times. The times in which the monitors were to circulate or to remain stationary were randomly assigned according to the following procedure:

1. All observation times for each monitor were listed chronologically.

2. Using a random table of numbers, the even-numbered observation times were assigned to be "stationary" observation times while the odd-numbered times were "circulating" observation times.

3. This procedure was continued until half of the sample hours of each monitor was assigned as either stationary or circulating.

4. Then the remaining time blocks were assigned the other half so that equal observation times of stationary and circulating resulted for each monitor.

Prior training of monitors. Both monitors had been given verbal orientation to their responsibilities by the full-time faculty member who was the ISL coordinator. In general, this verbal orientation included the administrative, security, and operational aspects of the monitor's job; but it did not include any training on how to handle pupil

questions. Written operational procedures were available to the monitors for each unit. These written materials identified the specific types of audiovisual equipment and materials that were needed for the unit and identified any special instructions the monitor might need for the particular unit. For example, the operational procedures for the Learning Unit III (blood pressure) included the fact that a stethoscope with two sets of ear pieces was needed for the monitor to simultaneously check the accuracy of the pupil's blood pressures.

The only instructions given the monitors by the investigator were explanations as to what the monitor was to do when she circulated around the room or remained stationary. During the observation times that were designated "stationary," the monitors were asked to remain at the monitor's desk unless performing routine monitoring functions such as changing tapes and slide drums, or unless a student asked for assistance. During the observation times designated "circulating," the monitor was asked to purposefully walk within three feet of every student working on Learning Units I, II, and III at least twice during an observation period. Each monitor was informed by the investigator at the beginning of each observation time whether she was to circulate or remain stationary during that particular observation time.

Conditions

Physical learning environment. The self-
instructional units in the School of Nursing were located
in a room called the Independent Study Laboratory (ISL).
This windowless room was approximately 26 feet long by
16 feet wide. Ten study carrels, five feet by three feet,
were located around the perimeter of the room and numbered
consecutively as indicated in Figure 1. Each carrel had a
rear projection surface and was designed to facilitate the
use of a slide projector, super 8mm silent movie projector,
a tape playback unit, and headsets. Each carrel was
electronically wired to accommodate two students listening
simultaneously to the same audio tape. In the center of
the room was a master or center table containing equipment
and instructional materials to be used by all students at
intervals throughout the units of study. This table con-
tained such things as reference books, sound movie projec-
tors, projection screens, displays, and demonstration models.
Headsets were available for students to wear when listening
to the sound film located on the master table so as not to
disturb other students in the room.

The overhead lights had dimming capabilities.
Because the bright overhead lights caused a glare on the
rear projection surface in each of the carrels, the overhead
lights were dimmed when the ISL was being utilized by stu-
dents. The room was air conditioned, and the thermostat was

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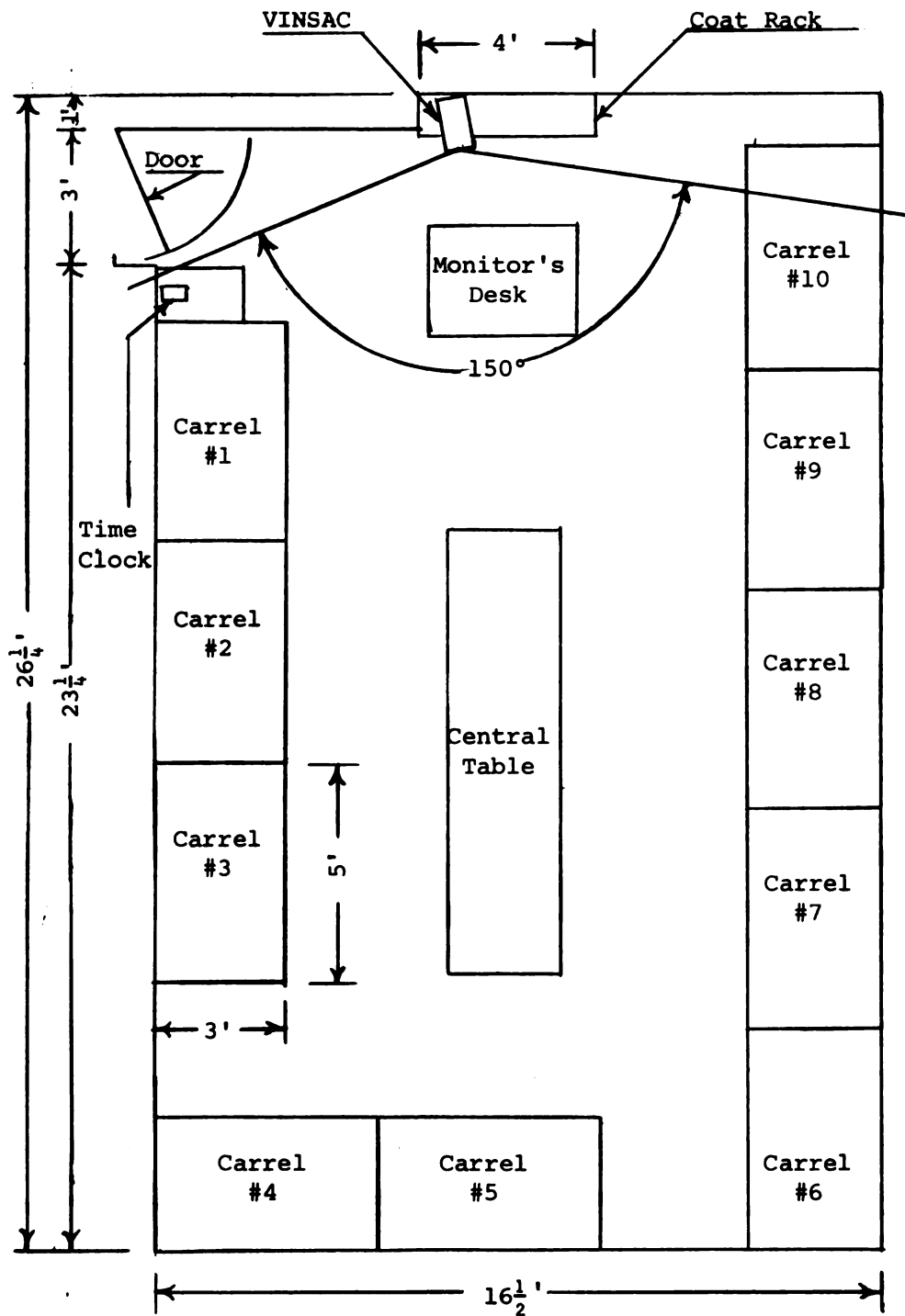
Figure 1. Floor plan of Independent Study Laboratory
showing relative location of furniture and
equipment (1/4 scale).

set at 65 degrees to help compensate for the heat being dissipated from the various projectors operating over a long period of time.

A desk was provided for the monitor. It was located at one end of the room near the entrance to the room. A time clock and time cards which had been prepunched with student name, identification number and instructional unit number were located on a file cabinet near the entrance into the room.

Operational conditions. To accurately evaluate the number and types of questions pupils asked when the three different learning units were in operation, the study was conducted under as realistic conditions as possible. No attempt was made to control either the pupils' or monitors' activities during the ISL except that the monitors were requested to remain stationary or to circulate at randomly selected times. To prevent contamination of the data, students and monitors were not informed of the actual focus of the study but were told that the investigator was interested in recording the activities in the laboratory.

Whenever the ISL was open for the beginning nursing students to complete Learning Units I, II, or III, other nursing students could also use the ISL. Students could come to the ISL at their convenience and stay as long as they wanted until it closed. Students were permitted to work in pairs if they so desired during Learning Units I

and II and were requested to come to the ISL with a partner when doing Learning Unit III (measurement of blood pressure) so that they could practice taking blood pressures on each other.

Upon entering and leaving the ISL, the students punched in and out on a time card which had been prepunched with each student's name, student number, and instructional unit number. Students were requested to write on the time card the date and number of the carrel in which they were working. The students had been informed previously that the purpose of the time card was not to evaluate how quickly they completed the unit but rather was to aid the program developers in evaluating the utilization of the ISL.

When the students entered the ISL, they were each given a response booklet. The response booklet contained the terminal behaviors of the unit, places for students to periodically make responses, and a self-evaluation test. At the completion of each instructional unit, each student was asked to demonstrate his/her ability to do the terminal behaviors by taking the test. The students had been informed that the test was not designed to be used for grading purposes but rather was a means of evaluating the effectiveness of the instructional unit. A test answer key was available on the monitor's desk if the student wanted to check the answers. Students were asked to turn in their response

booklets and test answer sheets before leaving the ISL to
help the monitor evaluate the effectiveness of the
instructional units.

Separate name cards containing the monitor's proper
name and title, i.e., Registered Nurse or Student Nurse,
were printed and displayed on the monitor's desk so that
the pupils using the laboratory were knowledgeable about
the level of expertise of the monitor.

The investigator was in the laboratory periodically
to check the functioning of the recording equipment and to
wind the camera between observation times. By visiting the
laboratory periodically, the investigator had an opportunity
to observe the activities, and these casual observations
proved to be of great value during subsequent transcriptions
of the audio tapes.

Instrumentation

Three different types of data collection instruments
were used in this study. They were: a Variable-Internal
Sequenced-Action Camera (VINSAC), a two channel audio tape
recorder, and time cards.

VINSAC. A Variable-Internal Sequenced-Action Camera[8]
was used in this study because it provided photographic

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[8]Ted Ward, "Variable-Internal Sequenced-Action
Camera (VINSAC)" (East Lansing, Mich.: Michigan State
University, Learning Systems Institute, College of Education,
Papers of the Institute #40, November, 1966), p. 1.
(Mimeographed.)

recordings of the activities in the ISL and because it could be left unattended for periods in excess of one hour. This visual recording device assisted in the collection and differentiation of the following types of data:

1. Identified, according to the carrel in which they were working, which students asked which questions so that questions asked by students working on learning units other than Learning Units I, II, or III could be eliminated.

2. Identified the location of the monitor and pupil in the room when a question was asked.

3. Checked the reliability of the monitor's movement relative to remaining stationary or circulating during randomly determined observation times.

4. Differentiated questions asked by pupils and questions asked by faculty members who periodically came to the ISL to talk to the monitor.

5. Identified the item to which students were referring in questions containing pronouns such as "it" or "one."

The VINSAC was a 16mm camera which had the capacity to photograph in single-frame mode. The shutter was controlled by a solenoid which in turn was controlled by a variable frequency electronic timer. The timer could be externally set to trigger the shutter at intervals as short

as 0.5 seconds or as long as 20 seconds. The same timing device that controlled the solenoid also produced a signal which, when recorded on the continuous two channel audio tape, became the synchronization cue. A "through-the-door" observer-scope was attached to the front of the camera lens to produce a fish-eye effect and to record a 150° observation as indicated in Figure 1.[9]

The camera had to be hand wound. To facilitate periodic winding and to obtain the best possible viewing angle, the VINSAC unit was located on a shelf of a coat rack at one end of the room behind the monitor's desk. From this camera position and with the observer-scope attachment, it was possible to actually photograph on film the activities in all ten carrels in the ISL as well as the area around the time clock.

The activities in the independent study room were recorded under available light on high speed, double per-forated, black and white film (4X Reversal ASA 400). This specific film was selected because of its capacity to photograph under low light intensities. Double perforated film was used in order to be compatible with the single-frame mechanism within the camera.

The VINSAC produced a series of still photographs spaced at the pre-selected time intervals. The still

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[9] The normal wide angle lens did not provide adequate observation of all the carrels in the room, especially those closest to the camera.

photographs resulting from the use of the observer-scope
in front of the lens were circular in nature and had the
appearance of having been taken through a fish-eye lens.

Two channel audio tape. To objectively record
the verbal interactions between monitors and pupils, a
continuous audio tape was used. A two channel audio tape
was used so that the conversations between the pupils and
the monitor could be recorded on one channel, and the syn-
chronizing signal from the VINSAC unit could be recorded
simultaneously on the other channel. The tape recorder was
located on a stand underneath the shelf of the coat rack
containing the VINSAC unit. A wireless microphone was worn
by the monitor to provide freedom of movement and to pick
up all verbal conversations between pupils and monitors
regardless of their location in the room. A receiver was
also available in the room to pick up the audio signal from
the microphone and to relay it to the tape recorder. The
monitor's conversations were recorded continuously on one-
quarter inch, magnetic, reel-to-reel audio tape at a speed
of 1-7/8 IPS.

Time cards. The students' time cards were used to
determine which students were working on which instructional
unit in which carrels during each observation time. Because
different students were working simultaneously on different
instructional units, this information was necessary so that

questions asked by students who were not working on Learning Units I, II, or III could be eliminated.

Collection of Data

The data-gathering procedures were tested during a preliminary study and utilized during the data-gathering investigation.

Primary investigation. A preliminary investigation was conducted during the operation of one learning unit (a different learning unit than those included in the data-gathering investigation) one week prior to beginning the data-gathering investigation. The general purposes of the preliminary investigation were to:

1. Evaluate the feasibility of collecting data while the ISL was in operation using the recording instruments selected;

2. Accustom students and monitors to the recording instruments;

3. Evaluate the clarity and preciseness of the audio and visual recordings;

4. Obtain a sample of questions asked by students.

The preliminary investigation demonstrated that it was possible to record on a continuous audio tape the questions pupils asked the monitor regardless of where in the room the monitor-pupil interaction took place. This investigation also showed that a signal on the audio tape could

be used to display the 16mm film in synchronization with the verbal questions. It was determined that a time interval of approximately five seconds was adequate for recording on film the change in movement of monitors and students within the room. A few technical problems were encountered during the preliminary investigation but steps were taken to prevent them from occurring during the final data-gathering investigation.

The presence of the camera in its disguise-box and the wireless microphone did not appear to be disturbing to either the pupils or the monitors. The wireless microphone allowed the monitors to move freely around the room and gave the visual impression that it was not connected to a recording device.

Both the VINSAC unit with the observer-scope and the two channel audio tape provided clear precise data. When the VINSAC unit was synchronized with the tape, the photographs of the activities in the room provided adequate identification of: (1) the location of the students in the different carrels in the room, (2) the item which students referred to when using pronouns such as "it," "here," or "one," and (3) whether a faculty member or student was talking to the monitor. The synchronization of the film and audio tape was aided by holding a card, with the time written on it, in front of the camera lens while simultaneously stating the time on the audio tape.

Samples of the types of questions asked by students were collected during the preliminary investigation. No attempt was made to classify these questions into precise categories or to determine the final classification scheme on the basis of these questions only. To have determined the final classification scheme of pupil questions only on the basis of the types of questions asked during the preliminary investigation would have assumed that the types of questions asked during the preliminary investigation were representative of all possible questions that could occur during various structured, multi-media, self-instructional learning units. This assumption would have been in violation of the hypothesis being tested in this study that the types of questions asked differ according to different learning units. Because of the nature of this hypothesis, it was apparent that the final classification scheme had to be generated in part from the very questions upon which it was to be used.

Data-gathering investigation. During the data-gathering investigation, all questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units having different terminal behaviors were collected according to the procedures described in this chapter. Before the data could be analyzed, the data had to be transformed from the tape and film recorded states.

Transformation of Data

Audio data. In order that each question could be
interpreted in light of what happened in the ISL that day,
all questions recorded on audio tapes were transcribed by
the investigator the same day that they were recorded.
Contextual cues helped to interpret what the person
referred to when pronouns such as "this," "that," "these,"
"one," or "it" were used.

In transcribing the audio tapes, an utterance was
counted as a question if the voice intonation at the end of
the utterance was raised or sustained and if the monitor
made a verbal response to the utterance. Utterances such
as, "I can't hear," "The tape came off the reel," "I don't
think the slides are in the right place," or "Something's
wrong with the tape," which implied a possible question but
which were not expressed with a raised or sustained voice
intonation at the end of the utterance, were not considered
as questions but as statements of factual data.

If a student were asked to repeat a question because
the monitor could not hear it, the question was only counted
once. If a pupil asked a question and immediately thereafter
asked another question which was a rephrasing of the first
question, it was counted as only one question.

Occasionally, utterances were inaudible because of
background noise and/or the fact that the person making the
utterance was too far away from the microphone. When this

happened, no attempt was made to guess what was said or
to judge whether or not the utterance was a question.
All audio tapes were listened to at least twice to improve
the accuracy of the transcription of the questions asked.

Visual data. The 16mm pictures produced by the
VINSAC recording unit were displayed by the use of a 16mm
projector which was equipped for single-frame advance.
When the film was displayed in synchronization with the
tape, the following notations were made about the ques-
tioning activities in the ISL:

1. Which students, according to the carrel number in
   which they were working, asked which questions.

2. Which questions were asked by faculty members who
   had come to the ISL to talk with the monitor.

3. Which questions pupils asked of each other.

4. Where the monitor was when a question was asked.

5. Whether the monitor remained stationary or circu-
   lated around the room as requested to do by the
   investigator.

6. Which item the student was referring to when
   pronouns such as "this," "these," and "it" were
   used.

Time card data. The identification of which
students were working in which carrels was determined by
the carrel number each student wrote on her time card.

All students working together in the same carrel at the same time were grouped together and considered as one student set for purposes of analysis.

Adjustments and Tabulation of Data

After the data had been transformed, it was dis-covered that certain adjustments had to be made to make the data consistent. When the time card data were examined, it was discovered that during some observation times there were no students working on Learning Units I, II, or III. These observation times were usually those recorded at the end of a day; and unfortunately, all of these observation times were those when the SN had been the monitor. Consequently, several of the observation times of the SN monitor had to be dropped from the data.

Based on the observations of the monitor's movement in the ISL as recorded on film, it was discovered that although the monitors had been asked either to remain stationary or to circulate at randomly assigned times, this type of desired control of monitor's movement was not always possible. Under the "normal" operation condi-tions of the ISL, students' requests for assistance pre-vented the monitors from remaining stationary or circulating as had been requested by the investigator. This variation in monitor's movement from that requested by the investi-gator never occurred during Learning Units I and II, but

it did occur during Learning Unit III. The reason it

occurred during Learning Unit III was because the monitor

was almost continually involved in helping students prac-

tice taking a blood pressure or in testing their ability

to actually take a blood pressure on a person. When the

monitor was involved in helping one pair of students with

measurement of blood pressure, she was not free to circulate

around the room; and, thus, this observational period was

classified as being stationary. However, in those cases

where the monitor was assisting the only students in the

laboratory, this observation time was classified as circu-

lating because in essence the monitor was available during

that time to all students working on the blood pressure

unit. Using these additional criteria to determine whether

the monitor circulated or remained stationary during an

observation time, adjustments were made in classifying the

observation times relative to circulating and remaining

stationary. After these adjustments had been made, the

total number of circulating versus stationary times for

Learning Unit III remained the same.

When data from the VINSAC, audio tape, and time

cards were examined in relation to each other, the following

adjustments were made in the transcriptions of the audio

tapes:

1. All questions asked by pupils who were not working
   on Learning Units I, II, and III were eliminated.
2. All questions asked by faculty members were
   eliminated.
3. All questions pupils asked of each other were
   eliminated.

Because students were allowed to work in pairs, it
was impossible to distinguish on the basis of voice charac-
teristics alone which of the two students asked a question
or to determine whether the student who asked the question
was asking because she wanted the information or because she
was acting as the spokesman for both herself and her partner.
Thus, all questions asked by either one or two students
working together in a carrel were counted as having been
asked by one student set.

At the beginning of each observation time, the num-
ber of student sets was counted. If a student set remained
in the ISL throughout more than one consecutive observation
time, the student set was recounted at the beginning of each
observation time. All student sets present during any part
of an observation time were counted as if they had been in
the ISL the entire observation period.

Reliability of Classification Scheme

All pupil questions collected during the data-gathering investigation were classified by the investigator according to the initial classification scheme. The initial classification scheme had to be expanded and refined to include all the questions. This revised classification scheme was submitted, along with the list of the questions, to another nurse educator who was asked to classify the questions. All differences in classifying the questions were discussed, and the categories were further revised and refined to form the final classification scheme.

To determine the reliability of the classification scheme, all questions collected (N = 194) were submitted along with a description of each category to three judges. All three judges were registered nurses who had had previous teaching experience and were familiar with a structured, multi-media, self-instructional learning environment. None of the judges was employed in the institution where the data had been collected. Each of the judges independently classified the questions and then the results were compared.

The reliability estimate was based on the percentage of agreement among the independent judges. The percentage of agreement among all three judges was calculated for each of the 194 questions collected in the investigation. All three judges agreed on the classification of 117 questions for a percentage of agreement of 60 percent; at least two of

the three judges agreed on the classification of 183 of the 194 questions for a percentage of agreement of 94 percent. These percentages of agreement give confidence that the classification scheme provided consistent reliability from one judge to another.

Analysis

To determine what, if any, effects certain situational factors had on the number and types of questions asked during the operation of three structured, multi-media, self-instructional programs, six hypotheses were generated. Three of these hypotheses were concerned about the number of questions asked, and three were concerned about the types of questions asked. The statistical procedure used to test the first three hypotheses was a three-way analysis of variance. This statistical procedure was determined to be appropriate because of its ability to measure differences among variables and to attribute the difference to the source.[10] A .05 level of confidence was chosen for accepting or rejecting the null hypotheses.

The classification scheme developed in Phase I of this study was used to categorize the questions collected during the data-gathering investigation. The types of

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[10] Fred N. Kerlinger, Foundations of Behavioral Research (New York: Holt, Rinehart and Winston, Inc., 1964), p. 187.

questions were analyzed on the basis of the frequency of their occurrence and on the proportion of each type of question to the total number of questions asked during each type of observation.

Summary

In Chapter III, a description of the methods and procedures used to develop a classification scheme of pupil questions and to conduct a data-gathering investigation was presented. The classification scheme was developed from a review of the classification schemes proposed in the literature, from the types of questions collected during a preliminary investigation, and from the questions asked during the data-gathering investigation.

During the data-gathering investigation, six hypotheses were tested. Data were collected during sixteen 30-minute observations of each of three different structured, multi-media, self-instructional learning units with each unit having different terminal behaviors. The units were selected on a basis of a criteria which required, among other things, that the units had been previously tested with a small group of students and that revisions had been made on the basis of the feedback received from these students.

Two different individuals with different levels of professional expertise were observed monitoring the structured, multi-media, self-instructional learning units during

selected observation times. The monitors were asked to circulate or to remain stationary during randomly determined observation times.

Data were collected by use of a Variable-Interval Sequence-Action Camera, a continuous two channel audio tape, and student time cards. The data were transformed from their original forms into a written format, and adjustments were made in the data to provide consistency.

The number of questions collected was statistically analyzed by a three-way analysis of variance, and the differences accepted at the .05 level of confidence. The types of questions were categorized according to the classification scheme developed in this study and were analyzed on the basis of the frequency of their occurrence and on the proportion of each type of question asked during each type of observation.

In Chapter IV, the results of the data-gathering investigation will be reported. Chapter V will present the Summary, Conclusions, Implications, and Recommendations of the study.

CHAPTER IV

ANALYSIS OF DATA

Chapter IV is a report of the results of the data-
gathering investigation. The questions analyzed in this
chapter are those asked by college students of two monitors
during selected observation times of three structured,
multi-media, self-instructional learning units each having
different terminal behaviors. The results of the data
collected are presented in this chapter in five sections.
The sections are: Observation Times, Number of Pupil Ques-
tions, Types of Pupil Questions, Discussion of Findings,
and Additional Observations. The number and types of ques-
tions are analyzed according to the hypotheses stated in
Chapter III.

Observation Times

Forty-eight observation times (thirty minutes each
in duration) were recorded by means of a VINSAC unit and a
two channel audio tape during the normal operation of three
structured, multi-media, self-instructional units. Of the
48 observation times recorded, only 42 produced usable data.
Six observation times had to be eliminated from the analysis
because the data from the students' time cards indicated

that there were no students working on Learning Units I, II, or III during these times. The distribution of the six observations that were eliminated were three from Unit I, two from Unit II, and one from Unit III.

The elimination of observation times from these Learning Units resulted in unequal cell sizes as indicated in Table 4.1. Table 4.1 illustrates the final distribution of observation times according to Learning Units, expertise of monitor, and movement of monitor. The number and types of observation times presented in Table 4.1 served as the basis for the analysis of data reported in this chapter.

TABLE 4.1

NUMBER AND TYPE OF OBSERVATION TIMES[a]

Monitor	Movement	Learning Unit I	Learning Unit II	Learning Unit III	Totals
SN	Circulate	N = 1	N = 2	N = 2	N = 5
	Stationary	N = 1	N = 3	N = 3	N = 7
RN	Circulate	N = 5	N = 5	N = 5	N=15
	Stationary	N = 5	N = 5	N = 5	N=15
	Totals	N=12	N=15	N=15	N=42

[a]N = Number of Observation Times; SN = Student Nurse Monitor; RN = Registered Nurse Monitor.

Number of Pupil Questions

Each of the first three hypotheses of this investigation pertained to the number of pupil questions asked within the context of a structured, multi-media, self-instructional learning environment.

Hypotheses One, Two, and Three

Hypotheses One, Two and Three stated in null form are:

1. *There will be no difference in the number of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units in the content area of nursing attributable to the differences in the general type of terminal behaviors identified for each of the three learning units.*

2. *There will be no difference in the number of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units in the content area of nursing attributable to whether the monitor circulates or remains stationary during the time she is a monitor.*

3. *There will be no difference in the number of questions asked by college pupils during the operation of three structured, multi-media,*

self-instructional learning units in the content area of nursing attributable to whether the monitor is a registered nurse or a nursing student.

The number of questions asked and the number of student sets present in the ISL during each observation time were counted.[1]   Tables 4.2, 4.3, and 4.4 present the number of questions asked and the number of student sets present during each of the observation times of Learning Units I, II, and III.   Table 4.5 presents a summary of Tables 4.2, 4.3, and 4.4.

Table 4.5 shows that an average of 4.6 questions was asked per observation time and that the average number of student sets working on a Learning Unit during each observation time was three.   (The reader is reminded that the defintion of a "student set" is either one or two students working in a carrel.)   Based on the totals given in Table 4.5, the average number of questions asked per student set per observation time was 1.5.

Because of unequal cell sizes, the number of questions asked and the number of student sets present during each observation time were transformed into a ratio score of number of questions to number of student sets.   The transformed ratio scores were used as the basis for analysis of variance.   The transformed mean ratio scores for each type of observation times are given in Table 4.6.

[1]A complete list of all pupil questions collected *can* be found in Appendix D.

TABLE 4.2

NUMBER OF PUPIL QUESTIONS ASKED AND STUDENT SETS PRESENT
DURING OBSERVATION TIMES OF LEARNING UNIT I

	Observation Times	Pupil Questions	Student Sets
	1	1	5
	2	2	5
	3	8	2
	4	4	7
	5	7	6
	6	6	3
Learning Unit I	7	1	1
	8	1	1
	9	4	6
	10	4	6
	11	7	4
	12	6	4
Totals	N = 12	51	50

TABLE 4.3

NUMBER OF PUPIL QUESTIONS ASKED AND STUDENT SETS PRESENT
DURING OBSERVATION TIMES OF LEARNING UNIT II

	Observation Times	Pupil Questions	Student Sets
	1	3	5
	2	2	5
	3	2	3
	4	1	2
	5	5	3
	6	2	2
	7	3	5
Learning Unit II	8	2	3
	9	1	2
	10	1	3
	11	4	2
	12	2	1
	13	3	1
	14	0	1
	15	1	1
Totals	N = 15	32	39

TABLE 4.4

NUMBER OF PUPIL QUESTIONS ASKED AND STUDENT SETS PRESENT
DURING OBSERVATION TIMES OF LEARNING UNIT III

	Observation Times	Pupil Questions	Student Sets
Learning Unit III	1	5	3
	2	12	4
	3	21	6
	4	6	1
	5	7	1
	6	17	8
	7	11	3
	8	11	2
	9	1	1
	10	8	1
	11	3	1
	12	1	1
	13	3	1
	14	5	4
	15	0	2
Totals	N = 15	111	39

TABLE 4.5

SUMMARY OF PUPIL QUESTIONS ASKED AND STUDENT SETS
PRESENT ACCORDING TO LEARNING UNITS

	Observation Times	Pupil Questions	Student Sets
Learning Unit I	12	51	50
Learning Unit II	15	32	39
Learning Unit III	15	111	39
Total	42	194	128
Average per observation time		4.6	3

TABLE 4.6

TRANSFORMED MEAN RATIO SCORES FOR EACH
TYPE OF OBSERVATION TIME[a]

Monitor	Movement	Learning Unit I	Learning Unit II	Learning Unit III
SN	Circulate	(N = 1) 1.500	(N = 2) 0.80	(N = 2) 6.50
	Stationary	(N = 1) 1.75	(N = 3) 0.80	(N = 3) 2.50
RN	Circulate	(N = 5) 0.78	(N = 5) 1.30	(N = 5) 2.233
	Stationary	(N = 5) 1.554	(N = 5) 0.8866	(N = 5) 3.608

[a]N = Number of Observation Times; SN = Student Nurse Monitor;
RN = Registered Nurse Monitor.

A univariate, three way analysis of variance was used on the transformed mean ratio scores to determine the degree of variance in number of questions asked. The specific analysis of variance procedure used was a Finn procedure.[2] The Finn procedure was used because of its ability to do an analysis of variance with unequal cell sizes and because it permits the data to be re-ordered to isolate the major sources of variance. Only the major effects of the three way interaction were tested. The two way interactions were not tested because subsequent re-ordering of the data increased the Alpha level. The results of the Finn analysis of variance after two re-orderings are given in Table 4.7.

Inspection of Table 4.7 shows, with two degrees of freedom, the variation between learning units is significant beyond the .05 level and the probability is less than .0002. Thus, the null Hypothesis One (*that there is no difference in the number of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units in the content area of nursing attributable to the differences in the general type of terminal behaviors identified for each of the three learning units*) is rejected.

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[2]Jeremy D. Finn, "Multi-Variance Univariate and Multivariate Analysis of Variance and Covariance: A Fortran IV Program" (State University of New York at Buffalo, April, 1967). (Mimeographed.)

TABLE 4.7

ANALYSIS OF VARIANCE ON TRANSFORMED MEAN RATIO SCORES

Source of Variation	Sum of Squares	d.f.	Mean Squares	F	Probability Less Than	Hypotheses Tested	Results
Between units	56.8980	2	28.4490	12.5985	.0002*	H_1	Reject null
Between circulation and stationary	.06506	1	.06506	.2881	.5954 (NS)[a]	H_2	Accept null
Between nurses	2.4990	1	2.4990	1.1067	.3013 (NS)	H_3	Accept null
Interactions: circulation x unit		2		Not tested			
Interaction: unit x SN – RN		2		Not tested			
Interaction: SN – RN x cir.		1		Not tested			
Three-way interaction	14.8520	2	7.4260	3.2886	.0512 (NS)		

*Significant beyond the .001 level.

[a]NS = not significant.

Examination of Table 4.7 reveals, with one degree of freedom, the variation between whether the nurse circulates or remains stationary is non-significant. Thus, the null Hypothesis Two (*that there will be no difference in the number of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units in the content area of nursing attributable to whether the monitor circulates or remains stationary during the time she is a monitor*) could not be rejected.

As can be seen by Table 4.7, with one degree of freedom, the variation between nurses is non-significant. Thus, the null Hypothesis Three (*that there will be no difference in the number of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units in the content area of nursing attributable to whether the monitor is a registered nurse or a nursing student*) could not be rejected.

Types of Pupil Questions

The remaining three hypotheses of the study were concerned about the types of questions asked.

Hypotheses Four, Five, and Six

Hypotheses Four, Five, and Six stated in null form are:

4. *There will be no difference in the types of*
   questions asked by college pupils during the
   operation of three structured, multi-media, self-
   instructional learning units in the content area
   of nursing attributable to the differences in the
   general types of terminal behaviors identified for
   each of the three learning units.

5. *There will be no difference in the types of*
   questions asked by college pupils during the
   operation of three structured, multi-media, self-
   instructional learning units in the content area
   of nursing attributable to whether the monitor
   circulates or remains stationary during the time
   she is a monitor.

6. *There will be no difference in the types of*
   questions asked by college pupils during the
   operation of three structured, multi-media, self-
   instructional learning units in the content area
   of nursing attributable to whether the monitor is
   a registered nurse or a nursing student.

The questions collected during the data-gathering
investigation were classified into eight categories by three
judges as described in Chapter III. After the 194 pupil
questions had been classified, the questions were distrib-
uted according to the observation times in which they were
asked. Table 4.8 shows the frequency distribution of each

TABLE 4.8

FREQUENCY AND PERCENTAGE DISTRIBUTION OF TYPES OF PUPIL QUESTIONS ASKED

| Question Categories | Learning Units[a] | | | | | | Totals | |
| | Unit I N = 12 | | Unit II N = 15 | | Unit III N = 15 | | | |
	Number	Percent Within	Number	Percent[b] Within	Number	Percent[b] Within	Number	Percent[b] Total
1. Factual	0	0	0	0	14	12.6	14	7.2
2. Validation	1	2	1	3.1	41	36.9	43	22.2
3. Relevancy	0	0	1	3.1	4	3.6	5	2.6
4. Operational Procedure	43	84.3	24	75	40	36.0	107	55.1
5. Equipment Operation	4	17.8	5	15.6	3	2.7	12	6.2
6. Requests for Assistance	1	2	1	3.1	3	2.7	5	2.6
7. Personal	0	0	0	0	4	3.6	4	2.1
8. Social	2	3.9	0	0	2	1.8	4	2.1
Total	51		32		111		194	

[a] N = Number of Observation Times.

[b] Total percentage does not equal 100 percent because of rounding of numbers.

type of question for each learning unit. Percentages for each category of questions have been included to assist in interpretation of the relative frequency of each type of question within and between Learning Units.

Examination of Table 4.8 reveals that the number of observation times did not yield sufficient number of each type of question to justify the application of an analysis of variance. Many cells yield no data, and no inferential statistical treatment could be applied to the data without violating numerous assumptions. An attempt was made to increase the cell counts by collapsing the eight categories into three, but this too produced many null cells. Thus, only the frequency and proportion of question types were compared.

Table 4.8 shows that the most frequent type of question asked for all three Learning Units was the Operational Procedure question. It was the most frequent type of question in Learning Units I and II and was surpassed by Validation questions by a frequency of one in Learning Unit III. Within Learning Units I, II, and III, the Operational Procedure type of question was 84, 75, and 36 percent, respectively of all the questions asked. All Operational Procedure questions combined totaled over 55 percent of the questions asked during all three instructional units.

The next most frequent type of question asked was the Validation question. Validation questions were approximately 22 percent of the total number of questions asked; however, 95 percent of all Validation questions were asked during Learning Unit III. All of the third most frequent type of question asked, Factual, were asked during Learning Unit III. Equipment Operation questions occurred in all three Learning Units and were the fourth most common type of question asked. The other types of questions (Relevancy, Requests for Assistance, Personal, and Social) were asked less frequently and tended to be asked more during Learning Unit III than during either Learning Unit I or II.

Based on these comparisons of the frequencies and percentages of the different types of questions, the null Hypothesis Four (*that there is no difference in the number of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units in the content area of nursing attributable to the differences in the general type of terminal behaviors identified for each of the three learning units*) is rejected.

To test Hypothesis Five and Six, comparisons were made between the number of different types of questions and the expertise and movement of the monitor. Data comparing the distribution of types of questions according to types of observation times are presented in Table 4.9.

TABLE 4.9

DISTRIBUTION OF TYPES OF QUESTIONS ACCORDING TO TYPES OF OBSERVATION TIMES[a]

Monitor	Question Categories	Circulate — Learning: Unit I	Unit II	Unit III	Sub Total	Stationary — Learning: Unit I	Unit II	Unit III	Sub Total	Total
SN	(N =)	N=1	N=2	N=2	N=5	N=1	N=3	N=3	N=7	N=12
	Factual			1	1			3	3	4
	Validation		1	7	8	1		2	3	11
	Relevancy			1	1				0	1
	Operational	5	1	4	10	6	5	3	14	24
	Equipment		2		2		1	1	2	4
	Assistance				0			2	2	2
	Personal				0			2	2	2
	Social	1			1				0	1
	Sub Total	6	4	13	23	7	6	13	26	49
RN	(N =)	N=5	N=5	N=5	N=15	N=5	N=5	N=5	N=15	N=30
	Factual			3	3			7	7	10
	Validation			12	12			20	20	32
	Relevancy			2	2		1	1	2	4
	Operational	16	8	20	44	16	10	13	39	83
	Equipment	1	1	2	4	3	1		4	8
	Assistance				0	1	1	1	3	3
	Personal				0			2	2	2
	Social	1		2	3				0	3
	Sub Total	18	9	41	68	20	13	44	77	145
Total		24	13	54	91	27	19	57	103	194

[a]N = Number of Observation Times; SN = Student Nurse Monitor; RN = Registered Nurse Monitor.

Because the number of observations per cell was unequal, direct comparisons of the number and proportions of the different types of questions were not meaningful. However, when the comparisons were based on the number of observation times per cell, the results indicated that there was no difference in the types of questions asked that could be attributed to whether the monitor was a registered nurse or a student nurse. Similar comparisons also revealed that there was no difference in the types of questions asked that could be attributed to whether the monitor circulated or remained stationary during the time she was the monitor. The number of different types of questions was proportionately the same per number of observation times recorded of each monitor. Each type of question in the classification scheme was asked of each monitor. Thus, it would appear from the comparisons of the frequencies and proportions of each type of question according to the number of observation times that the null Hypotheses Five (*that there will be no difference in the types of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units in the content area of nursing attributable to whether the monitor circulates or remains stationary during the time she is a monitor*) and Six (*that there will be no difference in the types of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units in the content area of nursing attributable to*

*whether the monitor is a registered nurse or a nursing
student)* could not be rejected.

Discussion of Findings

During forty-two 30-minute observation times, 194
questions were asked by 128 student sets present in the
Independent Study Laboratory. Students infrequently asked
questions during the "normal" operation of the three struc-
tured, multi-media, self-instructional learning units. The
number of questions asked varied significantly according to
differences in the general type of terminal behaviors for
each of the Learning Units. Approximately 57 percent of all
questions collected were asked during Learning Unit III.
The difference in the number of questions asked is basically
attributed to differences in the general type of terminal
behaviors and the related learning activities. Learning
Units I and II were primarily cognitive in nature while
Learning Unit III was designed to teach a psychomotor skill.
However, other factors such as students' perceptions of the
importance of the information, students' degree of familiar-
ity with the content, and the scheduling of the Learning
Units within the courses may have influenced the difference
in the number of questions asked.

The movement of the monitor was found to be unrelated
to the number and types of questions asked. The data indi-
cated that once the student began a Learning Unit her/his
attention was focused on the material to be learned, and

the student did not interrupt the learning sequence to ask a question even though a monitor was readily available. Students tended to ask questions regardless of the proximity of the monitor.

The number and types of questions pupils asked were found to be unrelated to the expertise of the monitor. Based on a ratio of number of questions asked per student sets present, there was no indication that one monitor elicited more pupil questions than the other. Each type of question was asked of each monitor in approximately the same proportion. Evidently, both monitors were perceived by the pupils as being qualified to handle their questions.

In comparing the frequency with which different types of questions occurred, it is interesting to note that the greatest percentage of questions were Operational Procedure questions even though the students had a learning unit that oriented them to the general operation of the ISL prior to their doing Learning Units I, II, or III. Apparently one orientation unit cannot cover all of the possible combinations of ISL operations that are encountered by the students as they progress through the individual study units. The high frequency of occurrence of Operational Procedure questions during Learning Units I and II and the decrease in their occurrence during Learning Unit III could be attributable to differences in when the three units were scheduled for use within the nursing courses. (Learning Units I and

II were scheduled during Fall term and Learning Unit III
during Spring term.)

The fact that there were no Factual questions asked
during Learning Units I and II is noteworthy. Although the
reasons why students did not ask questions were beyond the
scope of this study, it is conceivable that the low occur-
rence of Factual questions could be attributable, in part,
to the characteristics of the learning units themselves.
All of the learning units included in the study had been
previously validated with a small group of students. This
validation process may have helped eliminate the major gaps
in information and thus the need to ask for new or addi-
tional information. Another factor that may have influenced
the low occurrence of Factual questions during Learning Units
I and II could be the nature of the content of these units.
These units were designed to teach the students how to apply
the communication process to purposeful nurse-patient inter-
actions. Apparently the content of these two learning units
was such that the students did not perceive the need to seek
additional information in order to perform the terminal
behaviors (to their satisfaction) as they did in Learning
Unit III. The fact that new and additional information was
sought frequently during Learning Unit III may also reflect
that the unit needs further testing and revision.

The students' need for precise information was
reflected by the frequent occurrence during Learning Unit
III for Validation questions. The nature of the content in

Learning Unit III was such that the students expressed a need for confirmation of the correctness of concepts, decisions, observations, and skills. Evidently, the terminal behaviors of Learning Units I and II did not require the same degree of confirmation of correctness as those of Learning Unit III.

Equipment Operation questions occurred during all of the Learning Units. Most of these questions were asked when mechanical problems occurred during the operation of the audiovisual equipment.

The occurrence of Relevancy, Personal and Social questions, although rare, was most frequent during Learning Unit III. The students' perceptions of the direct relevance of the content of Learning Unit III to their own personal, physical, and social well-being and their professional goals may have contributed to the occurrence of these types of questions more during Learning Unit III than during Learning Units I or II.

Summary of Findings

This study investigated six hypotheses, three of which were tested using an analysis of variance while the evaluation of the other three hypotheses was limited to comparisons of frequencies and proportions of the different types of questions.

Null Hypothesis One was formulated to predict *that there would be no difference in the number of questions*

asked by college pupils during the operation of three
structured, multi-media, self-instructional learning units
in the content area of nursing attributable to differences
in the general types of terminal behaviors for each of the
three learning units. The null hypothesis was rejected at
the .05 level of confidence.

Null Hypothesis Two was formulated to predict *that
there would be no difference in the number of questions
asked by college pupils during the operation of three struc-
tured, multi-media, self-instructional learning units attrib-
utable to whether the monitor circulates or remains station-
ary during the time she is a monitor.* The null hypothesis
could not be rejected at the .05 level of confidence.

Null Hypothesis Three was formulated to predict
*that there would be no difference in the number of questions
asked by college pupils during the operation of three struc-
tured, multi-media, self-instructional learning units in the
content area of nursing attributable to whether the monitor
is a registered nurse or a nursing student.* The null hypoth-
esis could not be rejected at the .05 level of confidence.

Null Hypothesis Four was formulated to predict *that
there would be no difference in the types of questions asked
by college pupils during the operation of three structured,
multi-media, self-instructional learning units attributable
to differences in the general types of terminal behaviors
for each of the three learning units.* Comparisons of the
frequencies and percentages of the different types of

questions indicated that there was a difference in the types of questions asked between the different Learning Units. Thus, the null hypothesis was rejected.

Null Hypothesis Five was formulated to predict *that there would be no difference in the types of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units attributable to whether the monitor circulates or remains stationary during the time she is a monitor.* Comparisons of the frequencies and proportions of question types indicated that there was no difference in the types of questions asked according to the differences in the movement of the monitor. Thus, the null hypothesis could not be rejected.

Null Hypothesis Six was formulated to predict *that there would be no difference in the types of questions asked by college pupils during the operation of three structured, multi-media, self-instructional learning units attributable to whether the monitor was a registered nurse or a nursing student.* Comparisons of the frequencies and proportions of the types of questions asked of the two monitors indicated that there was no difference in the types of questions asked according to expertise of the monitor. Thus the null hypothesis could not be rejected.

Additional Observations

Throughout the collection of the data, additional observations were made that may have directly influenced the results of the study. These are discussed here.

It was observed that college students frequently expressed gaps in understanding in the form of statements rather than questions. Examples of such statements were: "The tape came off," I can't hear anything," "I'm ready for you to help me," and "The tape sounds funny." Implied in these statements are gaps in understanding; but because they were not expressed with a raised or sustained tone of voice, they were not counted as questions. Because college students did express gaps in understanding in the form of statements, using the pupil's voice intonation as the basis of the definition of a college pupil's question did not, in the opinion of the investigator, accurately reflect the number of gaps in college students' understanding. Although the true number of gaps were not accurately measured, the types of gaps in understanding expressed in statement format were the same as those expressed in question format and thus are accurately reflected in the classification scheme.

As the monitors became familiar with the instructional programs, the monitors tended to anticipate students' questions and would answer them before the students had a chance to verbally ask the questions. This may have influenced the number of questions collected.

On several occasions during Learning Unit III, students' regularly scheduled class commitments prevented the students from staying longer in the ISL. When the students were spending a lot of time practicing the measurement of blood pressure and if the monitor were aware that the students had other class commitments, the monitor would encourage the students to complete the unit and then return to the ISL at another time to practice taking blood pressures. What effect the monitor's suggestion that the students go ahead and complete the learning unit had on the number of questions asked is unknown.

During the collection of data, it was observed that students tended to ask the RN monitor certain types of Operational Procedure questions because the RN monitor was in the ISL over a long period of time. These questions involved continuity of learning experiences from one unit to another or between the ISL and other aspects of the beginning course in nursing. Students would ask such questions as: "Do we get these parts [written program] back?" "Can you do both of them [units] today?" "Will we get it [response booklet] the next time we come back?" "Do you have to do Unit I before Unit II?" These questions were all classified as Operational Procedure type of questions, but they were specifically related to the continuity of learning experiences and the overall operation of the ISL. These types of questions were usually asked of the RN

monitor rather than the SN monitor; and occasionally when they were asked of the SN monitor, it was apparent that the SN monitor did not know the answers. This left the student unsatisfied with the monitor's response. Thus, there appeared to be some instructional advantage of having the same monitor available in the ISL over a period of time.

Another instructional advantage of having the same monitor in the ISL over a period of time was that it provided the monitor an opportunity to identify patterns of students' behaviors which might indicate possible learning problems. For example, the RN monitor in this study identified that a student's behavior was inappropriate during several ISL units. When she brought this to the attention of the course coordinator, the monitor discovered that this same inappropriate behavior had also been observed when the student was working with patients in the hospital.

On another occasion, the RN monitor observed that the pattern of a student's questioning behavior indicated that the student had a hearing problem which was preventing her from accurately measuring a blood pressure. Because the student was reluctant to acknowledge this handicap, the monitor brought this to the attention of the student's clinical instructor so that the student could be given special attention when assigned to take a person's blood pressure in the hospital.

Although the types of questions collected in this study did not indicate a frequent occurrence of Personal questions, the RN monitor revealed to the investigator that occasionally students would ask questions concerning some personal problems they had about money, boyfriends, or medical problems. Also, students would discuss concerns they had about continuing in the nursing program or about whether they really wanted to be a nurse. The fact that few Personal questions were asked during the observation times of this study may have indicated that students were reluctant to ask personal questions in the presence of a microphone. The RN monitor remarked that she had done more guidance and counseling in the ISL than she had the entire previous year when guidance and counseling were her job responsibilities.

Thus, the availability of the same monitor in the ISL over a period of time and the availability of a monitor who is prepared to do guidance and counseling appear to have some instructional advantages in handling students' questions in a structured, multi-media, self-instructional learning environment.

CHAPTER V

SUMMARY, CONCLUSIONS, IMPLICATIONS

AND RECOMMENDATIONS

Summary

Modern educational philosophy emphasizes the importance of developing and utilizing instructional programs that are adapted to the needs of individual pupils. Many institutions of higher education are incorporating the use of structured, multi-media, self-instructional learning systems into their curriculums as one means of providing more individualized instruction. Basically, these learning systems provide an opportunity for the student to learn on an individual basis for an appreciable length of time without the intervention of a teacher toward goals he has in common with other students in the group. This learning usually takes place outside the regularly scheduled classes but in facilities provided by the educational institution. Beyond merely providing the individual student the opportunity to progress at his own rate of learning, these programs are limited in the degree to which they can adapt to the learning needs of individual pupils.

In some institutions, monitors have been assigned to be available in these types of learning environments to provide whatever assistance is needed. Part of the monitor's responsibility is to handle the students' questions. Because each pupil questions from his own point of view, a pupil's questions indicate that the instructional program needs to be adapted to his level of understanding. If the monitor is to assist in making structured, multi-media, self-instructional programs more individualized, then the monitor needs to be prepared to handle pupil questions as they occur. Before a training program for monitors can be established, there must first be a description of the types of questions that are likely to occur during the "normal" operation of such learning programs. Thus, given a multimedia, self-instructional learning situation, there is a need to identify the types of questions asked by pupils as a basis for designing a training program for monitors.

The purposes of this study were to develop a classification scheme of questions pupils asked within the context of a structured, multi-media, self-instructional learning environment and to determine what, if any, effects certain variables had on the number and types of questions asked. The rationale for developing a classification scheme was to identify the types of questions monitors need to be prepared to handle when attempting to adapt structured,

multi-media, self-instructional programs to individual students.

A review of the literature revealed that most of the existing question classification schemes, while adequate for the research purposes for which they were designed, included only a few of the types of questions that were likely to be asked in a multi-media, self-instructional learning environment where machines are programmed to carry the major share of the teaching load and where students have control over the rate of presentation. Extensive research has been done on the questioning practices of teachers, while the area of pupil questioning behavior has been relatively neglected. Previous investigations on questioning activities in the classroom have emphasized the use of questions as a major part of the teacher's instructional strategy rather than as a pupil's learning strategy. All of the studies done on pupil questions have been conducted at the primary or secondary levels of education; none had been done at the college level.

This study was undertaken in two phases. Phase I was the development of a classification scheme of pupil questions while Phase II was an application of the classification scheme to a data-gathering investigation. A classification scheme of pupil questions was developed from a review of the classification schemes proposed in the literature, from questions collected during a preliminary

investigation, and in part from the questions asked during the data-gathering investigation.

During the data-gathering investigation, six hypotheses were tested. Data were collected during sixteen 30-minute observations of each of three different structured, multi-media, self-instructional learning units with each unit having different terminal behaviors. Two different individuals with different levels of professional expertise were observed monitoring the structured, multi-media, self-instructional learning units during selected observation times. The monitors were asked to circulate or to remain stationary during randomly determined observation times. Data were collected by use of a Variable-Interval Sequence-Action Camera, a continuous two channel audio tape, and student time cards. The number of questions asked by pupils was analyzed by a three-way analysis of variance, and the differences were accepted at the .05 level of confidence. The types of questions were categorized according to the classification scheme developed in Phase I. Comparisons were made of the different types of questions asked according to instructional units, expertise of monitor, and movement of monitor.

Conclusions

A classification scheme of pupil questions asked
within the context of structured, multi-media, self-
instructional learning units was developed and applied to
the data collected during a data-gathering investigation.
The data-gathering investigation was conducted during the
"normal" operation of three structured, multi-media, self-
instructional learning units in the content area of nursing.
A total of 194 questions was collected and classified into
eight categories by three judges. All three judges agreed
100 percent on the classification of 117 questions for a per-
centage of agreement of 60 percent. At least two of the three
judges agreed on the classification of 183 of the 194 ques-
tions for a 94 percentage of agreement. These percentages
of agreement give confidence that the classification scheme
provided consistent reliability from one judge to another.

Based on the data collected during the data-gathering
investigation, the following conclusions were made:

1. Given three structured, multi-media, self-
instructional learning units in the content area of nursing,
the number and types of questions asked by college pupils
varied according to differences in the general type of
terminal behaviors. An instructional unit in the content
area of nursing designed to help students develop psycho-
motor skills elicited significantly (at the .05 level) more

student questions than an instructional unit designed primarily to develop cognitive skills.

2. Given three structured, multi-media, self-instructional learning units in the content area of nursing, the number and types of questions asked by college pupils did not vary according to whether the monitor circulated or remained stationary during the time she was a monitor. The students asked questions regardless of the movement of the monitor within the structured, multi-media, self-instructional learning environment.

3. Given three structured, multi-media, self-instructional learning units within the content area of nursing, the number and types of questions asked by college pupils did not vary according to whether the monitor was a registered nurse or a nursing student. Proportionately, the same number and types of questions were asked of each type of monitor.

Implications

The main reason for developing a classification scheme of questions college pupils asked within the context of a structured, multi-media, self-instructional learning environment was to identify the types of questions a monitor should be prepared to handle. Given the types of learning units described in this study, the major type of question a monitor should be prepared to handle is an operational

procedure question. Although the students had, prior to this study, a learning unit that was specifically designed to orient them to the operation of the independent study laboratory, apparently this one general orientation unit did not cover all of the possible combinations of operational procedures that the students encounter as they progress through the individual study units. The monitor needs to be prepared to explain to the students the specific operational procedures of each learning unit.

There are indications from the data that the monitor needs to be prepared to handle pupil questions that seek confirmation of the correctness of a concept, decision, observation or skill. The monitor must also be able to provide, upon occasion, additional or new information about the content of the units. In order for the monitor to distinguish between pupil questions asking for confirmation of information and those asking for new or additional information, the monitor must be familiar with the content of the learning units. If the learning unit teaches psychomotor skills, the monitor must also be able to do the terminal behaviors herself. The monitor must be proficient enough at doing the terminal behaviors so that she can assist students in doing them and can evaluate the accuracy of a student's ability to do them.

The monitor must be prepared to handle student questions regarding the operation of audio-visual equipment especially when mechanical problems occur. On rare occasions the monitor might be asked a personal or social question. Depending on the extent to which the monitor is expected to handle this type of question determines the amount and extent of training the monitor needs in this area.

In light of the data collected in this study and additional observations made, certain implications seem appropriate for the effective and efficient utilization of the ISL in nursing. These implications are:

1. On the basis of the number and types of questions asked by college pupils during the normal operation of three structured, multi-media, self-instructional learning programs, the need for a monitor who is a registered nurse during all instructional units does not seem warranted. However, on the basis of other instructional advantages such as providing continuity of learning experiences, providing students opportunities for both personal and professional guidance and consulting, and providing opportunities for the monitor to identify possible learning problems in individual students, the assignment of a qualified faculty member to monitor the ISL does seem educationally desirable.

2. The number of students attending the ISL during the observation times indicates that more instructional units, especially non-psychomotor skills units, could be simultaneously made available for student use to increase the efficiency of the learning environment and the utilization of the monitor's talents.

3. If the ISL is to be one aspect of the beginning course in nursing and if the monitor's observations of the students' behaviors are deemed to be worthwhile, then ways need to be established for the monitor to communicate her observations to other faculty members so that the students' learning is enhanced.

Recommendations

Based on the purposes of this study and the data collected during the "normal" operation of three structured, multi-media, self-instructional learning units in one content speciality area, the following recommendations are made:

1. That the classification scheme developed in this study be tested in similar types of learning situations, in different content speciality areas, and at different levels of education;

2. That the study be repeated using different instructional units and different monitors;

3. That guidelines on how the monitor should handle the different types of questions identified in this study be developed and tested;

4. That studies be conducted to investigate the guidance and counseling functions of a monitor in a structured, multi-media, self-instructional learning environment;

5. That studies be conducted to determine how student questions can be used as a basis for revision of instructional programs;

6. That the question-asking behaviors of students be examined to identify better ways instructional materials can be designed to take into account differences in individual learning styles and abilities.

7. That studies be conducted to determine the monitors' and pupils' perceptions and attitudes toward a structured, multi-media, self-instructional learning environment and the relationship of these perceptions and attitudes to the number and types of pupil questions asked.

8. That after the classification scheme has been validated with more extensive research, ways in which the classification scheme could be used as part of a training program for monitors should be

explored. The tapes and films used to collect the research data could be used as teaching aids in developing such a training program.

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APPENDIX A

BRIEF DESCRIPTIONS OF LEARNING UNITS

APPENDIX A

BRIEF DESCRIPTIONS OF LEARNING UNITS

The following descriptions of the learning units
used in this study were taken from materials produced under
Project Grant DI0 NU 00232, Division of Nursing, Public
Health Service, Department of Health, Education and Welfare.

LEARNING UNIT I

Communication Part I--Goals

Unit 05.1

General Purposes: To help the beginning student build an understanding of some communication goals held by nurses in nurse-patient inter-actions.

To give the student practice in observing in a simulated situation, behavior that might indicate a patient's communication goal.

Prerequisites: None

Average Student Time for Completion: 57 minutes

Brief Summary of Content: The first communication unit concerns both the nurse's and patient's goals in communication.

Though the nurse communicates with others throughout the nursing process, the patient is usually the primary source of information.

Four common communication goals for the nurse are discussed in the unit and further clarified, using taped nurse-patient interactions. The goals are:

1. To obtain information.
2. To give information
3. To provide an opportunity for release of tension.
4. To help the patient explore his own problem.

The patient's goals are not so easily determined. The nurse must closely observe the patient's behavior to decide what his goals might be.

Students are asked to identify probable patient goals after listening to taped nurse-patient interactions. Some of them could be:

1. Need for more information about his treatment.
2. Need for reassurance of nurse's competence.
3. Desire to keep nurse with him a longer time.
4. Need for someone to talk to and release tension.

The nurse who plans has some general purpose in mind for talking with her patient. However, she may begin with one purpose and then shift to or add another communication goal. The nurse should remember the patient probably has a purpose in mind also, and she should continually observe his behavior to identify its meaning.

Students are given the option of completing a written program entitled "Goals" in the Independent Study Laboratory or taking it home.

LEARNING UNIT II

Communication Part III--Successful-Unsuccessful

Unit 05.3

General Purpose: To present to the student a basis for evaluating communication.

Prerequisites: None

Average Student Time for Completion: 60 minutes

Brief Summary of Content: This unit is primarily a listening exercise in which the student is asked to judge the success of communication in taped nurse-patient conversations, using specific and general criteria.

For successful communication the specific criterion is whether or not there are behavioral changes which indicate the communication goals have been reached. Examples are presented and discussed.

The general criterion for successful communication consists of three parts: feedback, appropriateness, and efficiency. As each part is presented, it is also illustrated by short nurse-patient dialogues. The student is asked to evaluate them and further clarification is added.

LEARNING UNIT III

Blood Pressure--Measurement

Unit 04.1

General Purpose: To learn how to take and record accurately
                     and safely another person's blood pressure.

Prerequisites: Unit on TPR or other source of knowledge
                     on TPR [TPR = Temperature, Pulse, Respiration].

Average Student   60 minutes
Time for
Completion:

Brief Summary   Through the use of audio tape, slides,
of Content: realia, films and response booklet, the
                     beginning nursing student learns how to
                     accurately collect data by use of the
                     measuring device, blood pressure.

                     A patient's blood pressure primarily
                     reflects information about the patient's
                     physical condition but may also give
                     information about his emotional state.
                     To understand the type of information
                     a blood pressure reveals, concepts are
                     presented and explained. They are:

                     1. Brief physiological or circulation
                        system as it relates to blood pressure.
                     2. Definition of blood pressure: Measure-
                        ment of cyclic changes of pressure
                        exerted by the blood against the wall
                        of the artery during cardiac contrac-
                        tion and relaxation.
                     3. Definitions of systole, diastole,
                        Korotkoff sounds.
                     4. Discussion of instruments used to
                        measure blood pressure: sphygmomano-
                        meter (aneroid and mercury gauges) and
                        the stethoscope.
                     5. The principle of partial blocking of
                        the flow of blood through the artery
                        to explain why sounds are heard through
                        the stethoscope.

                     Realia is available to each student for
                     examination and later for actual practice

in taking a partner's blood pressure.
A film is presented showing the correct
procedure for taking a patient's blood
pressure, as well as rationale for each
essential step.

Common errors made when taking a blood
pressure are discussed via audio-tape
and slides.

Normal ranges of systolic and diastolic
blood pressure are given for the popula-
tion as a whole. The effects of age on
the normal range are briefly discussed.

Following completion of the unit, each
student is tested as she goes through the
steps necessary to safely and accurately
take a blood pressure. A clinical
instructor observes and evaluates the
student's performance.

APPENDIX B

OVERVIEW OF MULTIMEDIA PROJECT

School of Nursing
Michigan State University

In 1967, the School of Nursing at Michigan State
University was awarded a grant for the development of multi-
media materials and methods for programmed learning in
nursing. (Project Grant DI0 NU 00232, Division of Nursing,
United States Public Health Service, Department of Health,
Education and Welfare.) The purpose of the project was to
provide a new approach to teaching the first sequence of
nursing courses through the integration of course content
with audiovisual technology. The integration process was
concentrated in the systematic planning, developing and
evaluating of instructional materials for use in an Inde-
pendent Study Laboratory which was designed to be one aspect
of a coordinated lecture-laboratory-clinical experience
method of teaching. The content presented in the Indepen-
dent Study Laboratory was supplemental to the basic course;
the content was not covered elsewhere in the course.

The main purpose of the Independent Study Laboratory
was to provide students opportunities to learn the content
of nursing more efficiently and effectively through the use
of structured, multimedia, self-instructional programs. The
instructional units were developed under the guidance and
consultation of media, learning, content, and evaluation
experts in cooperation with students. (See schematic draw-
ing of Development of Multimedia Materials on next page.)
Each unit was developed on the basis of identified objec-
tives, was structured to ensure that the objectives were met,
employed a variety of types of media, and was designed for
independent self-paced learning. Each unit was designed on
the principles of programmed learning; students were period-
ically asked to make responses to the program by doing such
things as listening to pre-recorded audio tapes, studying
corresponding slides, viewing films, observing items on the
central table, and writing responses in a response booklet.
Active student participation was encouraged in order to
achieve the terminal behaviors.

Prior to use with a large group of students, the learning units were tested with a small group of students to ascertain the students' reactions to the organization, presentation, content, and clarity of the material. Data from these testing sessions served as a guide for rewriting and reorganizing the programmed sequence and content.

The students could come into the Independent Study Laboratory at their convenience and work until they were confident that they had achieved the objectives of the learning units. The study was independent in that the student learned on an individual basis and progressed at his own rate of learning. Students were evaluated on what they learned rather than on how much or how fast they learned.

MICHIGAN STATE UNIVERSITY SCHOOL OF NURSING
DEVELOPMENT OF MULTIMEDIA MATERIALS
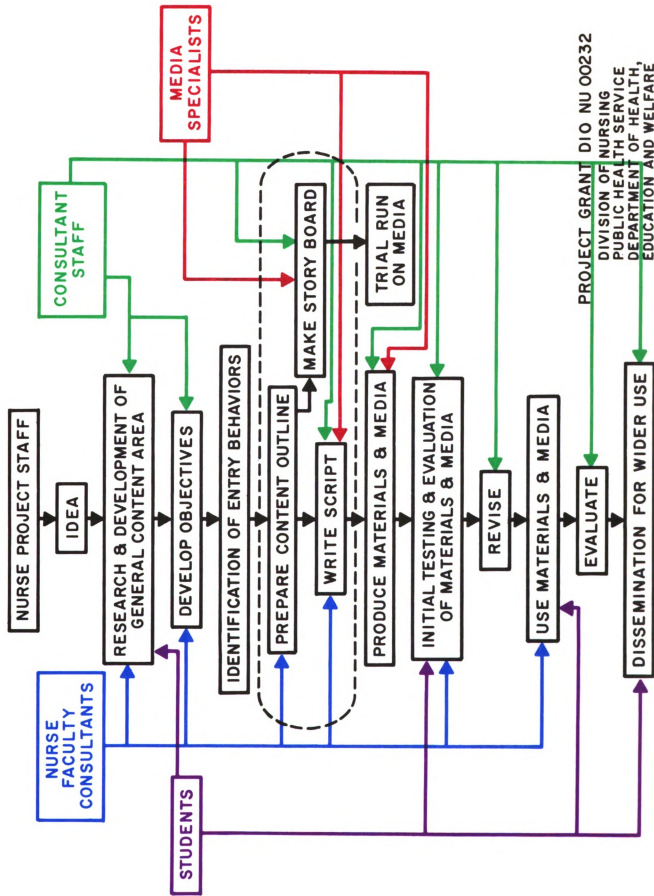
APPENDIX C

INFORMATION CONCERNING MULTIMEDIA LAB

APPENDIX C

INFORMATION CONCERNING MULTIMEDIA LAB

The multimedia lab is located in Baker Hall on the third floor, Room 321. The lab furnishes students an additional learning opportunity through the use of audio-visual equipment, such as slides, tape recordings and short films.

There are 10 carrels available for use on an individual basis or, if necessary, two people can work in the same carrel.

For each unit the student will be given a response booklet in the lab. At the end of each unit the student will take a short test to determine whether or not learning occurred. The purpose of the test is "feedback" for the student and is not graded. There is also an evaluation sheet for each student to fill out. This is for the staff of the multimedia project, to determine your thoughts and reactions to the units. No name is necessary on evaluation sheets. Please feel free to express your opinions. Each unit has been revised since last year according to comments made by students. Further revision may still be necessary.

Each time you use the lab to work on an assigned unit you will be asked to punch a computer card given you by the lab assistant. The purpose of the card is collection of information, such as how many students use the lab. This information is valuable in planning for the efficient use of the multimedia lab.

The units assigned on the accompanying schedule are required with the exception of the five communication units, which are optional. However, each student is responsible for meeting objectives of the five communication units even though they are optional [an attached list of objectives was included in course orientation materials].

There will be an R.N. instructor each day from 1-5 p.m. and a student monitor during morning hours in the multimedia lab to assist you.

Remember, you are responsible for the content of assigned units. It may serve as the source of examination questions as well as a prerequisite for future units in NE 206 and NE 207.

APPENDIX D

SCHEDULE FOR MULTIMEDIA LAB

APPENDIX D

SCHEDULE FOR MULTIMEDIA LAB

MICHIGAN STATE UNIVERSITY
School of Nursing

<u>NE 205, Fall 1970</u>

<u>Learning Unit</u>	<u>Number</u>	<u>Average Time for Completion</u>	<u>Dates Unit Available</u>
Orientation to Multimedia Lab	00.0	45"	Sept. 28-Oct. 2
Overview of Nursing Process	01.0	60"	Oct. 5-Oct. 9
Communication I[1] (Goals)	05.1	60" } optimal	Oct. 12-Oct. 16
Communication II (Verbal & Nonverbal)	05.2	60"	Oct. 12-Oct. 16
Communication III[2] (Successful & Unsuccessful)	05.3	60"	Oct. 19-Oct. 23
Communication IV (Methods to Promote)	05.4	60" } optimal	Oct. 19-Oct. 23
Communication V (Use of Questions)	05.5	60"	Oct. 19-Oct. 23
Assessment	08.0	90"	Nov. 2-Nov. 6
Effects of Illness	07.1	45"	Nov. 9-Nov. 13

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[1]Learning Unit I.

[2]Learning Unit II.

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Learning Unit	Number	Average Time for Completion	Dates Unit Available
Effects of Hospitalization	07.2	45"	Nov. 16-Nov. 20

NE 206, Winter 1971

Learning Unit	Number	Average Time for Completion	Dates Unit Available
TPR, Part I (Temperature, Pulse & Respiration)	03.1	90"	Jan. 18-Jan. 22
TPR, Part II (Temperature, Pulse & Respiration)	03.2	45"	Jan. 25-Jan. 29
Assessment (Simulation)	09.1	90"	Feb. 1-Feb. 5
Planning	10.0	90"	Feb. 8-Feb. 12
Planning (Simulation)	10.1	120"	Feb. 15-Feb. 19
Effects of Illness	07.1	45"	Mar. 1-Mar. 5
Effects of Hospitalization	07.2	45"	Mar. 1-Mar. 5

NE 207, Spring 1971

Learning Unit	Number	Average Time for Completion	Dates Unit Available
Blood Pressure[3]	04.1	120"	Apr. 5-Apr. 16
Implementation	11.1	60"	Apr. 19-Apr. 23
Implementation (Simulation)	11.2	120"	Apr. 26-Apr. 30

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[3]Learning Unit III.

APPENDIX E

PUPIL QUESTIONS

Each of the 194 pupil questions collected during

the **data-gathering investigation** was classified into the

following categories:

1. **Factual Questions.**

Questions asking for new or additional facts or information relative to the information presented in the instructional unit itself or to achievement of terminal behaviors.

2. **Validation Questions.**

Questions which elicit judgments and opinions from authority figures relative to verification of correctness of a concept, decision, observation or skill. This type includes questions of clarification, reinforcement, and confirmation.

3. **Relevancy Questions.**

Questions asking for identification of relationship between concepts, attitudes, and skills being learned in the ISL to the real world; implicitly these questions ask: Why is this important? Why am I doing this? Is the real world like this?

4. **Operational Procedure Questions.**

Questions relating to the logistics, environment, and functioning of the ISL. This type includes questions about what the learner is expected to do before, during or after each learning unit; questions about what the monitor is expected to do; questions about location of things; questions about completing the learning unit, tests of unit's effectiveness, and time cards.

5. Equipment   Questions relating to proper functioning
   Operation   and utilization of all non-nursing
   Questions.   equipment in the ISL.

6. Requests for   Simple requests for general assistance.
   Assistance.

7. Personal   Questions about own social, mental, and
   Questions.   physical well-being or professional
              goals and achievements.

8. Social   Questions about another person's social,
   Questions.   mental, and physical well-being or
              professional goals and achievements.

Pupil Questions

The classification category for each of the 194 pupil questions collected during the data-gathering investigation is indicated here. The questions are listed according to the Learning Unit and the number of observation time within the Learning Unit that the question was asked. All questions that were asked by one pupil during one contact with the monitor are bracketed together. The blank line between questions indicates where the monitor made a response to the question.

APPENDIX E

PUPIL QUESTIONS

Question Categories:

1. Factual
2. Validation
3. Relevancy
4. Operational Procedure

5. Equipment Operation
6. Requests for Assistance
7. Personal
8. Social

LEARNING UNIT I

Unit	Observation Time	Question	1	2	3	4	5	6	7	8
1	1	Are they [the carrels] set up for [Unit] one?				x				
1	2	Which part [of the response booklet] do we hand in? The yellow. . . .				x				
1	2	You want this [response booklet]?				x				
1	3	Just leave this [slide projector] on?				x				
1	3	(Is there more than one [unit to be done]?				x				
		(Both of these [units] have to be done (this week?				x				
		(Does it take an hour to do each one ([unit]?				x				
1	3	(When we use this tape are we using the (slides right? Like you want us to? (Because . . . like when they have that (first beep. . . .?					x			
		(So they do. . . . These slides do start (right at the beginning?					x			
1	3	(Could you help me?						x		
		(Am I starting the slides out in the (right place?					x			
1	4	(You don't do this one [unit] today?				x				
		(Oh, can you do both of them today?				x				
		(What date is it?				x				
		(Do you want us to change the tape?				x				

Question Categories:

1. Factual
2. Validation
3. Relevancy
4. Operational Procedure

5. Equipment Operation
6. Requests for Assistance
7. Personal
8. Social

Unit	Observation Time	Question	1	2	3	4	5	6	7	8
1	5	Where does this [response booklet] go?				x				
1	5	(Do you want this [test answer sheet (only]?				x				
		((The whole booklet?				x				
		((We can keep these [remainder of book- (let] can't we?				x				
		((My thing [test answer sheet] from last (time isn't here. Where is it?				x				
		((Do we get these parts [written program] (back?				x				
1	5	Can we keep the green part [written program]?				x				
1	6	Should I hang onto this [response book- let for next unit] or should I put it back [while she finished the test of the previous unit]?				x				
1	6	What about this green part [written program]?				x				
1	6	(When will we get this green part (([written program] back?				x				
		((We will get it the next time we come?				x				
1	6	What's all that [equipment] for?				x				
1	6	Should I just take the green part [written program]?				x				
1	7	Is that [book monitor reading] good?							x	
1	8	This [response booklet] go here?				x				

Question Categories:

1. Factual
2. Validation
3. Relevancy
4. Operational Procedure

5. Equipment Operation
6. Requests for Assistance
7. Personal
8. Social

Unit	Observation Time	Question	1	2	3	4	5	6	7	8
1	9	Do you have to do Unit I before Unit II?				x				
1	9	How long is it [Unit I]?				x				
1	9	Did someone forget to rewind it [the tape]?					x			
1	9	What about that carrel?				x				
1	10	(Do we have to go completely through (these [units] right now?				x				
		(Like can we hang on to them [response (booklets] and come back in?				x				
		(How late are you [the laboratory] open?				x				
		(How long will these [units] last?				x				
1	11	Is that the unit number on the card?				x				
1	11	(Write the student number and name (over here [on the time card]?				x				
		(And not here?				x				
1	11	(I don't have any [units] done?				x				
		(Is this [unit] the one where they (. . . um . . . hmm . . . nursing (does blood pressures and patient's (back aches?		x						
		(Does it [the unit] have films?				x				
1	11	You can get the communications' tape anytime, can't you?					x			

Question Categories:

1. Factual	5. Equipment Operation
2. Validation	6. Requests for Assistance
3. Relevancy	7. Personal
4. Operational Procedure	8. Social

Unit	Observation Time	Question	1	2	3	4	5	6	7	8
1	12	(Do you have the answer sheet [key]? ((Where is the answer sheet?				x				
						x				
1	12	(Do we get our booklets back from the (previous ones [units]?				x				
1	12	(How long is the second one--part two? ((How did they [the other students] get (done so fast? ((Where for the sign out [time cards]?				x				
										x
						x				

LEARNING UNIT II

Unit	Observation Time	Question	1	2	3	4	5	6	7	8
2	1	(Could you help me with the tape? ((Do you hear anything? ((Oh, really?					x			
							x			
				x						
2	2	Right here [placement of time card]?				x				
2	2	What's the date?				x				
2	3	Are these the test answers?				x				
2	3	Cause it doesn't have something punched out on it or something? [Reason time card won't trigger time clock]					x			
2	4	Did you get finished with the booklets that we did last week?				x				
2	5	Is this pile [of response booklets] for Communications Three?				x				

Question Categories:

1. Factual	5. Equipment Operation
2. Validation	6. Requests for Assistance
3. Relevancy	7. Personal
4. Operational Procedure	8. Social

Unit	Observation Time	Question	1	2	3	4	5	6	7	8
2	5	Could you come here for a minute?						x		
2	5	(Do you have them [response booklets] (done?				x				
		(Is this [the checked response booklet]? (				x				
		(Are any carrels set up for [unit] (three?				x				
2	6	(Are these parts [of response booklet] (meaningful [to faculty]? (			x					
		(Will we get them [response booklets] (before the mid-term?				x				
2	7	Are all three of them [units] assigned this week?				x				
2	7	Where should I put it [response booklet]?				x				
2	7	You want them [response booklets] all in one pile?				x				
2	8	(Is communication [unit] four longer? (				x				
		(Is it [that long]?				x				
2	9	Should I rewind it [the tape]?				x				
2	10	Should I put the card right here?				x				
2	11	(They [the tape] said something about (filling out the [time] card?				x				
		(It [time card] is in [the time clock]? (				x				
		(Does it [the time clock] punch it ([the card] when it [the time clock] (makes a big klunk?				x				

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Question Categories:

1. Factual
2. Validation
3. Relevancy
4. Operational Procedure
5. Equipment Operation
6. Requests for Assistance
7. Personal
8. Social

Unit	Observation Time	Question	1	2	3	4	5	6	7	8
2	11	Where're the [test] answers?				x				
2	12	(Which one [carrel] is [set up for] (Communications Three?				x				
		(You have to look at the label on (the top [of the tape]?				x				
2	13	(Is this too long a tape . . . or did (I wind it [the tape] too far?					x			
		(This [response booklet] go here?				x				
		(Where do these [time cards] go?				x				
2	15	This box [for time card]?				x				

LEARNING UNIT III

Unit	Observation Time	Question	1	2	3	4	5	6	7	8
3	1	(Any one carrel set up for Blood (Pressure unit?				x				
		(Do we need a partner for any other ([units]?				x				
3	1	(Is it [slide projector] still smelling?					x			
		(Where are the three types of [blood (pressure] cuffs?				x				
3	1	Is it [movie projector] threaded right?					x			
3	2	Should I hear it [blood pressure sounds]?		x						

Question Categories:

1. Factual		5. Equipment Operation	
2. Validation		6. Requests for Assistance	
3. Relevancy		7. Personal	
4. Operational Procedure		8. Social	

Unit	Observa- tion Time	Question	Question Categories								
			1	2	3	4	5	6	7	8
3	2	(Can I [start a unit]? (				x				
		(How long does that [unit] take? (				x				
		(Would I have time [to complete the (unit] before you close? (				x				
		(Why couldn't I ... I ... I ... be (a partner now and then do that ([the first part of the unit] later? (				x				
		(Oh, next week too? (				x				
		(There are two parts to this unit?				x				
3	2	(Could I do the test--the final one ([demonstration of ability to measure (blood pressure on a person]? (				x				
		(Is this one [cuff] smaller than the (other one [cuff]?		x						
3	2	(Is this the one [correct (sphygmomanometer]? (		x						
		(Does this [cuff on arm] have to be (snug? (		x						
		(Do you want to check that [tightness (of cuff on arm]?				x				
3	3	(Can we use this one [sphygmomanometer] (now? (				x				
		(Can you hear your own [blood pressure]? (	x							
		(How come you hook the aneroid to (the cuff? (	x							

Question Categories:

1. Factual
2. Validation
3. Relevancy
4. Operational Procedure

5. Equipment Operation
6. Requests for Assistance
7. Personal
8. Social

Unit	Observation Time	Question	1	2	3	4	5	6	7	8
		(The aneroid is [easier to read than (mercury sphygmomanometer]?		x						
		((Over sixty, right [was monitor's (diastolic reading]?		x						
3	3	Are we suppose to check what we did [blood pressure measurements] on each other?				x				
3	4	(Do you have to check this [blood (pressure] then?				x				
		((So we should go ahead and finish (the unit?				x				
		((What's that [equipment]?				x				
3	3	(Do you want me to tell you what I'd (do [when actually taking a blood (pressure on a patient]?				x				
		((Are you a registered nurse?								x
		((Do you work in the hospital at all?								x
		((When you say . . . that we have to (take a blood pressure you hold the (dial, right, or do you put it on the (cuff? When you take a routine blood (pressure with this [aneroid gauge], (do you leave it on the cuff when (you're taking it?	x							
		((Or do you hold onto it [aneroid gauge]? (	x							

Question Categories:

1. Factual   5. Equipment Operation
2. Validation   6. Requests for Assistance
3. Relevancy   7. Personal
4. Operational Procedure 8. Social

Unit	Observa-tion Time	Question	Question Categories							
			1	2	3	4	5	6	7	8
		(Do you think that ... hmm ... say a (nurse is making rounds in the morning (and she's got to take all the blood (pressures, should she wash her hands (before and after every patient? (		x						
		(Does it make that much difference ([washing hands before and after every (patient] when you're applying the (same cuff to different patients? (		x						
		(I should explain to her [partner who (represents the patient]what I'm doing? (				x				
		(Why did they [manufacturers of (sphygmomanometers] do that [make (cuffs without arrows to guide place-(ment of cuff on arm]? (	x							
		(Is this [position of patient's arm] (considered heart level? (		x						
		(But ... uh ... when they use the cuff (right along side here or at this (level [is cuff considered at heart (level]? (		x						
		(Now, how would it be . . . just like (that [position of patient's arm] (would be at heart level?		x						
3	4	(This one [sphygmomanometer]? (		x						
		(It doesn't matter which arm you take (it [blood pressure] on? (		x						
		(Then what do you do with this [place-(ment of tubes while taking a blood (pressure]? (	x							

Question Categories:

1. Factual   5. Equipment Operation
2. Validation   6. Requests for Assistance
3. Relevancy   7. Personal
4. Operational Procedure   8. Social

Unit	Observation Time	Question	1	2	3	4	5	6	7	8
		(Is this [placement of stethoscope (bell on antecubital space] like (hard enough?		x						
		(Is this the kind . . . what do you (call this syphygo...?		x						
		(They use [this type of sphygmomano-(meter] in the hospital?				x				
3	5	(See what I mean, how it [mercury (inside column] still jumps?		x						
		(It [blood pressure sounds] stopped (about 70?		x						
		(If you don't hold it [screw valve (on bulb] so tight?		x						
		(Do we use the double thing ([stethoscope]?				x				
		(Do you want me to give you the (steps [of the blood pressure pro-(cedure] like washing your hands?				x				
		(Should I explain to her [patient] (what I'm going to do?				x				
		(This week and next week [I can come (back and practice taking blood (pressures]?				x				
3	6	(Is it possible to have two different (blood pressures?	x							
		(Is that the patient's right arm ([that you routinely take his blood (pressure on]?		x						

Question Categories:

1. Factual   5. Equipment Operation
2. Validation   6. Requests for Assistance
3. Relevancy   7. Personal
4. Operational Procedure   8. Social

Unit	Observation Time	Question	1	2	3	4	5	6	7	8
3	6	(Could we go someplace else because (I'm really getting a complex that (I can't hear?				x				
		(Can we practice taking blood (pressures?				x				
3	6	Anything over . . . that is . . . like low, do you want to check it [blood pressure]?				x				
3	6	That's normal [to get a different blood pressure reading in each arm]?		x						
3	6	(Mrs. _____, is there somewhere (we can get some [more] chairs?				x				
		(Mrs. _____, do you have two (pencils?				x				
		(This way [to pencil sharpener]?						x		
3	6	(What reading do you take when it ([mercury] bounces up and down?	x							
		(You mean like ... where it [mercury] (started [bouncing] the first time (... or start ... the lowest part of (it [the bounce]?		x						
		(What if you took it [blood pressure] (twice and got different readings?	x							
		(How much would you say, like ... say (there is a difference of ten mili-(meters that is quite a difference, (isn't it?		x						

Question Categories:

1. Factual
2. Validation
3. Relevancy
4. Operational Procedure

5. Equipment Operation
6. Requests for Assistance
7. Personal
8. Social

Unit	Observation Time	Question	1	2	3	4	5	6	7	8
		(By sound changes ... I was kind of (confused, do they mean intensity (like the louder . . . it kind of (builds up to a real loud sound then (it goes down again . . . and they (want it from the point that its the (highest to the . . . until it starts (going down again? (		x						
		(Is that type of . . . are these the (older types [of blood pressure cuffs]? (		x						
		(Would you run into this kind [of cuff] (more frequently?			x					
3	6	Is that a mercury one [sphygmomano-meter]?		x						
3	7	I want to come back and practice [taking blood pressures], is that OK?					x			
3	7	(Do I have to go wash my hands? (					x			
		(Can I peek [at my own blood pressure]? (							x	
		(How could it [blood pressure] change (so quickly? (	x							
		(Is that OK [to take partner's blood (pressure on left arm]? (		x						
		(Am I on the right side [of the arm (in order to locate brachial pulse]? (		x						
		(How come it [mercury column] was (pulsating from above 120 all the way (down [the column]? (	x							

Question Categories:

1. Factual   5. Equipment Operation
2. Validation   6. Requests for Assistance
3. Relevancy   7. Personal
4. Operational Procedure   8. Social

Unit	Observation Time	Question	1	2	3	4	5	6	7	8
		(Because I was letting it [air] out too (slowly is that part of the problem? (		x						
		(In the nurse's notes, do you just (chart the blood pressure that we took (... and what it was ... and nothing (like [the other observations that you (chart for] the pulse or anything?		x						
3	7	(It [the cuff] can be a little bit (loose, can't it? (		x						
		(Right here [is the place to locate (the brachial pulse]?		x						
3	8	(Is it [my blood pressure] low? (							x	
		(Do I have a low one [blood pressure] (... a high one? (							x	
		(Can I be excused now? (				x				
		(What do you mean backwards? (	x							
		(Can I take this [cuff] off [of arm]? (				x				
		(Do you want to clean your's [ear (pieces of monitor's stethoscope]? (				x				
		(Now what am I suppose to do with (this hand [while wrapping cuff on (arm]? (	x							
		(Could you please put this [blood (pressure equipment] away for me? (						x		
		(Might it [source of difficulty in (hearing] be the stethoscope? (		x						

Question Categories:

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Unit	Observation Time	Question	1	2	3	4	5	6	7	8
		(How does the shape of the stethoscope (be completely different?	x							
		(What did I say I got [for a blood (pressure reading]?		x						
3	9	Should I turn this [projector] off?					x			
3	10	(When you're taking a [blood] pres-(sure and you start to hear the sound (that's the s...s...s, the one [blood (pressure reading] that starts with (an "S"?		x						
		(Then when you start hearing the (irregulars is that when you take (the diastolic [reading]?		x						
		(We'll get those [response booklets] (back, won't we?			x					
3	10	Mrs. _____, when the sound first begins being muffled, are you suppose to release the pressure?		x						
3	10	(Do you want to check mine [blood (pressure reading]?			x					
		(Are we suppose to tell when it [the (sounds] becomes muffled or not?		x						
		(Both numbers [where sounds become (muffled and where they disappear (should be noted]?		x						
		(When do you let the air out [of the (cuff]?	x							

Question Categories:

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Unit	Observation Time	Question	1	2	3	4	5	6	7	8
3	11	(Do you have a cotton ball [for (cleaning stethoscope]?				x				
		(Do you have the wrap-around [cuff]? (				x				
		(The cuff is ready to be inflated, (right?		x						
3	12	Would you check us?						x		
3	13	(Do you have to have a partner for (this one [second unit on Blood (Pressure]? (				x				
		(The second one [second unit on (Blood Pressure]?				x				
3	13	Is there anything I can do [while waiting for partner]?				x				
3	14	(What [blood pressure] reading did (you get? (		x						
		(Where it [blood pressure sounds] (came on? (		x						
		(Why would it [blood pressure] tend to (do that [not produce any sounds]? (	x							
		(That's [my blood pressure is] a bit (high, isn't it? (							x	
		(Could I try it [blood pressure] on (the other arm?				x				