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An Investigation of the Expectations Adult Learners Hold Regarding Effort Expenditure, Time Investment, and Learning Achievement for Four Types of Prepackaged, Self-paced Instructional Materials

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Mary Lorraine Ploor

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AN INVESTIGATION OF THE EXPECTATIONS ADULT LEARNERS HOLD REGARDING EFFORT EXPENDITURE, TIME INVESTMENT, AND LEARNING ACHIEVEMENT FOR FOUR TYPES OF PREPACKAGED, SELF-PACED INSTRUCTIONAL MATERIALS

By

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ABSTRACT

AN INVESTIGATION OF THE EXPECTATIONS ADULT LEARNERS HOLD REGARDING EFFORT EXPENDITURE, TIME INVESTMENT, AND LEARNING ACHIEVEMENT FOR FOUR TYPES OF PREPACKAGED, SELF-PACED INSTRUCTIONAL MATERIALS

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The study described adult learner expectations of effort expenditure and time investment necessary to complete four types of prepackaged, self-paced instructional materials (textbook-based, audiotape-based, videotape-based, and personal computer-based) and expected learning achievement from them. A questionnaire sent to a sample of East Lansing (Michigan) Arts Workshop patrons had a thirty-four percent effective return rate.

The method of paired comparisons was used for data collection. Interval scales were developed for the four types of prepackaged, self-paced instructional materials (stimuli) on each of the expectation variables (effort expenditure, time investment, and learning achievement) according to the Law of Comparative Judgment, Case V. An arbitrary zero point was calculated for the stimulus scaled lowest on each variable to indicate distances between the scaled stimuli. The four stimuli were scaled from least to greatest as follows for expectation of effort expenditure: videotape-based (.000), audiotape-based (.464), personal computer based (.493), textbook-based (.543); for expectation of time investment: videotape-based (.000), audiotape-based (.518), personal computer-based (.589), and textbook-based (.602); and for expectation of learning achievement: audiotape-based (.000), textbook-based (.345), personal computer-based

(.358), and videotape-based (.623).

Expectations of effort expenditure and time investment were moderately correlated for each of the four types of instructional materials. Most correlations of experience with expectation variables were nonsignificant. However, low numbers of "experienced" respondents may have hampered analysis.

Expectation of time investment explained most of the variance in expectation of learning achievement with expectation of effort expenditure contributing either negligibly or nonsignificantly. Experience did not contribute substantially to explanation of variance in expectation of learning. Regression coefficients for expectations of effort and time were negative, implying that as greater learning is expected, lesser effort expenditure and time investment is expected.

Preferred method and expectation variables were moderately correlated. Respondents did not necessarily expect their preferred method to be greater in learning or less in effort expenditure. Most respondents expected their preferred method to require greater, versus lesser, time investment.

Recommendations for strategies for development and marketing of prepackaged, self-paced instructional materials were made.

To

Alice M. and Paul N. Sweetman,

my parents,

who have loved and encouraged me.

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INTRODUCTION

The development of this research project had its beginnings in the author's work on the eight-module self-paced "Course on Cancer Prevention," during the 1980-82 National Cancer Institute-funded project at Michigan State University. Upon returning for the course posttest, medical students stated, "I really didn't know what I was getting into when I began this course," or "It took a lot of time and energy, but I sure learned a lot." The students seemed to have had either no expectations of the course or to have had unmet expectations. Two questions presented themselves: "What expectations do students from traditional classroom and teacher-centered learning backgrounds have of the self-paced formats increasingly available to them for post-secondary and professional continuing education? What are learner perceptions of prepackaged, self-paced learning materials?"

Prepackaged, self-paced instructional courseware is one type of resource discussed by Tough (1979, 2nd ed., p. 173), who finds that three percent of adults who undertake learning projects use nonhuman resources--versus self, group, or one-to-one helper--as planners. He explains, "The learner turns over the planning responsibility [for a learning project] to the object (or, in a sense, to the person who earlier created the object)....it provides decisions and sequence....Generally, the object will provide much of the subject matter in addition" (p. 79). His examples of "nonhuman resources"

include programmed instruction texts, workbooks, tape recordings, and television program series.

A second pragmatic impetus for this study was the growing number of prepackaged, self-paced courses available today. Promotional materials for these courses--directed sometimes at the individual adult learner, other times at business or professional association personnel or training and development department representatives--emphasize the benefits of their subject matter content, but rarely offer hints at required time or energy investment, or at "what I was getting into" for their completion.

Houle (1980) was less than complimentary about the unwieldy growth of prepackaged materials:

> The typical professional has many opportunities to buy "self-teaching books," packets of integrated learning materials, guided instruction, magazines with learning units or quiz sections, and manuals organized according to so-called "psychological" rather than logical principles. The torrent of new materials makes it hard for the individual professional to find, despite many promises, precisely what he or she may require. Thus the volume of the new modularized materials is a blessing in disguise; sometimes the disguise seems almost perfect (p. 240).

Not knowing "what I was getting into" and the low three percent or less of adult learners selecting nonhuman resources reflect learners' typically traditional, group-type educational experiences. They may also reflect a lack of information provided to potential students by developers and marketers of prepackaged, self-paced products about that type of learning experience.

This chapter describes the research problem from the point of view of the adult learner and of the instructional developer and marketer.

It introduces the general research questions and presents the limitations of the study.

PROBLEM STATEMENT

What types of information would be helpful to the potential purchaser of a prepackaged, self-paced course? How can the developer or marketer determine that which would let the adult learner know what he or she is "getting into?" In order to answer these questions, it would be helpful to know the expectations the adult learner holds regarding prepackaged, self-paced types of instructional materials.

This study asks what expectations adult learners, as educational consumers, bring with them when selecting among four different types of prepackaged, self-paced instructional materials:

(1) textbook-based,
(2) audiotape-based,
(3) videotape-based, and
(4) personal computer-based.

Specifically, it seeks to describe adult learner <u>expectations</u> of the (1) <u>effort</u> expenditure and (2) <u>time</u> investment necessary to complete such packages, and (3) expected levels of <u>learning achievement</u> from the four formats.

SIGNIFICANCE OF THE PROPOSED RESEARCH

To the adult learner. It is important to investigate adult learners' expectations of prepackaged, self-paced learning experiences for two reasons: (1) There is a growing emphasis on lifelong learning and on continuing education for professions, jobs, retraining, etc., and (2) the numbers of and alternatives among proprietary prepackaged, self-paced educational offerings are increasing. Both occurrences necessitate knowledgeable "educational consumer" behavior.

Adult participation in organized education and training programs has grown from 7.6 percent in 1957 (Barton, 1982, p. 39) to 12.8 percent of the adult population according to a study by the Association of American Colleges that used U.S. Census Bureau for the National Center for Education Statistics data (Ordovensky, 1983, p. 6F). Regardless of which survey of participation you look at, writes Long, "at least 18 million adults were engaged in an educational activity in 1978" (1983, p. 136). The segment of the population most likely to engage in learning as adults—those with higher levels of previous education—has continued to show higher participation rates. Surveys of participation, such as the NCES above, measure organized learning, "the part-time, school-related portion" (1982, p. 39) of adult participation that, Barton stipulates, has probably stopped growing. Yet, he indicates that growth in workplace-related programs and individualized study continues.

Growing opportunities and diversity in individualized study are evident in the catalogs of organizations such as the American Management Association Extension Institute (American Management Association, 1984)

and in self-paced programs offered by professional associations such as the Insurance Institute of America and American Medical Association. Bookstores sell both self-paced texts and audiotapes teaching a wide range of topics from foreign languages to motivation. Videotapes conduct personal in-home exercise classes and teach such diverse skills as managerial communication or cooking with a wok. Computer stores stock self-teaching programs in foreign languages, project management, and other subjects for use with one's home computer. Universities and community colleges offer correspondence and televised courses. Potential adult students face a myriad of choices.

Although millions of adults participate in educational activities, the numbers who do not--plus reported high attrition rates among adult students (Long, 1983)--also indicate need for research in the area of educational consumer behavior. Motivation to participate, whether to attend a group class or complete a self-paced module, is rooted in the beliefs and attitudes of the learner. Those beliefs and attitudes are, in turn, derived from past experiences and future expectations.

To the instructional developer and marketer. It is important to investigate learner perceptions and expectations to better meet the wants and needs of adult learners. Two elements necessary to attract and keep the adult learner are (1) promotion of educational offerings and (2) development of courses to meet learner needs and expectations. Organized adult and higher education programs have paid increasing attention to both in recent years, looking to wholistic marketing approaches (Knox, 1962; Fram, 1973; Univ. of So. California College of Continuing Education, 1978). Proprietary firms selling prepackaged,

self-paced courseware promote their materials through store displays, catalogs, and flyers, using many of the same approaches marketers use with other types of products. Yet, the tendency has been to approach adult learners from the subject matter and instructor-centered, rather than consumer-oriented, points of view (Morstain & Smart, 1977).

Effort and time spent in learning are dependent upon learner motivation. Good and Brophy (1977, p. 355) point out that teachers can influence motivation through how they present a school task, relate it to existing motivations, and show its relevancy to present needs and interests. Where there is no teacher such cues must be provided through the courseware itself and its promotional materials. Systems-based instructional development models guide materials development, packaging, and promotional decisions. Instructional developers require information about student/consumer perceptions and expectations to determine and make available cues relevant to potential consumers of different educational products. With additional information instructional developers can make more informed decisions about development, packaging, and promotion.

The fields of both instructional development and adult education stress the importance of knowing the characteristics of audiences in order to meet their needs and goals. Previously studied characteristics include, primarily, demographics, prior schooling history, and other objective data. Houle (1961) and others (Boshier, 1973; Penland, 1977; Waldon, 1984) have addressed characteristics that correlate with participation in adult educative activities. It is also important to contribute to knowledge about more subjective audience characteristics,

that is, the perceptions and expectations of adult learners (Boshier, 1976). Addressing consumer perceptions can contribute to the knowledge necessary to improve participation in and completion rate of prepackaged, self-paced study programs.

THEORETICAL AND CONCEPTUAL FOUNDATIONS

This study looks at expectations of learning and of the effort expenditure and time investment necessary to learn through a method of study: prepackaged, self-paced instructional materials. Expectations, learner achievement, effort, and time are variables previously examined in both the education and consumer behavior fields. This section provides background for their further exploration and offers evidence of support for the research need.

Adult Learners' Expectations. Expectations have been studied and discussed by educators and psychologists. The direction of study has usually been along one of two routes: (1) teachers' expectations of pupils and effects of those expectations upon performance (Rosenthal & Jacobson, 1968; Good, 1981) and (2) individual's expectations of success or failure (Weiner, 1972; Feather, 1982). Expectations are also important to the field of consumer behavior, as Cardozo writes,

> Knowledge about customer effort and expectation is important because these factors are major components of consumer behavior, and because management can, within limits, influence the amount of effort customers expend and their expectations. Customer effort includes the physical, mental, and financial resources expended to obtain a product....The expectations customers have regarding a product depend upon information gathered from a variety of sources. Within limits,

> customer expectations may be influenced by advertising, or other sales promotion methods (1970, pp. 53-54).

The student is an "educational consumer" who holds expectations about the instructional program or product to be undertaken. There are three levels of "product" in educational courseware: (1) student fulfillment of a goal as to type of knowledge desired (i.e., subject matter, such as time management, how to write a will, etc.), (2) the materials themselves, and (3) any additional benefits (e.g., availability of a time payment plan for materials). Thus, after effort (energy expended to make a purchase decision and obtain a product) is expended to locate and secure the materials in the appropriate subject matter, effort must continue in order to reach completion of those materials and achievement of learning with, possibly, credit of some sort for doing so. And, according to Cardozo, "as a customer expends greater effort, the situation becomes more important, and some dissonance is aroused when disappointed" (p. 55).

Subjects in Cardozo's study, "Under certain conditions...used their expectations as guidelines against which they evaluated the product. Either their expectations, or an array of products with which they have had previous experience, may form such guidelines." Cardozo suggests, "If this interpretation is correct, marketers should endeavor to make their offerings consistent with customer guidelines, or standards....An important corollary is that marketers should know what customer standards of evaluation are, and act accordingly" (p. 63).

McKean (1977) and McCue (1982) investigated, in nongeneralizable studies, "pedagogical expectations"—the expectations adults have of

learning in, and preferences for, formal and informal types of group instructional settings. Given pictorial (McKean) or verbal and pictorial (McCue) illustrations of both informal and formal instructional settings, subjects in these studies indicated whether they expected more learning to be taking place in the formal or the nonformal setting. While the results of their research, targeted at teacher-centered group instructional situations, have no bearing on this study, there is acknowledgement that adults as learners have experience-based expectations of educational experiences.

Blackburn (1967) also found that previous experience with instruction methods tends to be positively related to future method choice, indicating the role of educational enculturation discussed by McCue and McKean. Thus, based chiefly on prior experiences, subjects demonstrated that adults bring preconceptions, beliefs, and expectations to a learning situation.

Cross discusses the role of perception of "external barriers" as explained by Rubenson's paradigm for adult motivation to participate in educational activities. She describes a hypothetical learner, Henry, in the following example:

> Motivation according to Rubenson, is based on the "perceived" situation, which may or may not be the "real" situation. If Henry thinks he lacks the money to participate in adult education, then his expectancy is zero, and the resultant force is zero. Presumably, if someone tells an otherwise highly motivated Henry that the course he wants to take is offered at no charge, his expectancy for successful participation would become strong and the forces would add up to participation (1981, p. 119).

The above studies and the continuing problem of adult dropouts from

continuing education programs demonstrate that when expectations are not met by the educational program offered, the education industry either fails to attract clientele or produces a dissatisfied educational consumer/student.

Effort. Effort has been researched extensively by Weiner (1972; 1974; et al., 1971) within the framework of attribution theory. According to his findings, individuals in achievement situations tend to attribute success or failure to one or more of four causes: ability, task difficulty, effort, and luck. He classifies these causes as "perceived determinants of achievement behavior" (1974, p. 6) along two dimensions: stability (stable or unstable) and locus of control (internal or external). Ability and task difficulty are considered stable, that is, relatively "fixed." Effort and luck are considered unstable, with effort able to be "augmented or decreased from one moment to the next" (Weiner, 1974, p. 181) and luck subject to random variability. Along the locus of control, ability and effort are considered internal, describing the "qualities of the person undertaking the activity" (Weiner, et al., 1971, p. 2). Task difficulty and luck are generally considered as arising externally, part of the environment.

When individuals ascribe success or failure to internal causes (e.g., effort), they experience greater pride or shame and greater positive or negative evaluation than when they attribute success or failure to the external causes of task difficulty or luck (Weiner & Sierad, 1974). In looking forward to future endeavors, past success or failure ascribed to effort (unstable--"I just wasn't up to par that day."--and internally controlled--"I'll work harder next time.") is

is deemed changeable.

Palmer and Willson (1982, p. 343) find, "attributions play an important mediating role for individuals' expectations for future performance." One question Weiner, et al., (1971, p. 5) ask is "How does the individual use available information...to specify future expectations about success? For example, given a personal success experience, what cues give rise to the interpretation that 'I was just lucky' or 'I will do even better next time'." Cues affecting effort ascription include "immediate outcome, past success history, social norms, pattern of performance,... performance peaks... [and] increments or decrements in effort expenditure" (Weiner, 1974, p. 9). Experimenters have attempted to manipulate or evaluate effort with cues such as these: telling subjects about the "importance" of the task (Weiner, 1974, p. 11), telling subjects that persons who "work hard" can succeed at the particular task, looking at subject's presence or absence for task, consideration of the overcoming of personal handicaps, influencing motivation through devices such as contingent rewards and punishments (Weiner, 1974), and manipulation of task difficulty (Eisenberger, Masterson, & McDermitt, 1982, p. 499).

Atkinson and Birch write,

> in attempting to explain prior success or failure, or in confronting some new task, an individual ascribes the outcome to these four potential causes according to characteristics of the tasks and situation. The causal inferences or subjective interpretation of the individual in turn influence the expectancy of goal attainment and affective reactions to success and failure, which, in turn, determine behavior (1978, p. 348).

The "characteristics of the tasks and situation" mentioned above

imply that effort cues for the four types of prepackaged, self-paced learning materials will differ from each other. Therefore, individuals' expectations, based on previous experience and their perception of the product, will differ from each other. What might their expectations relative to effort expenditure include? While one might list such elements as replaying of an audiotape to review or search for specific information, ease of avoiding interruption while studying, or portability of materials, this writer has found no investigation of adult learners' expectations of effort expenditure to guide development or marketing of prepackaged, self-paced learning materials. Yet, individuals will build expectations of necessary effort expenditure based on their range of experience with instructional materials. Their perceptions will create a favorable, unfavorable, or neutral reaction to the product (Zaltman & Wallendorf (2nd ed.), 1983).

Time. Time is acknowledged as an important variable in learning in the classroom (Carroll, 1963; Fredrick & Walberg, 1980; Millman, Bieger, Klag, & Pine, 1983; Karweit, 1984). The relationship of time on task to achievement has also been investigated in individualized methods such as mastery learning, programmed learning, and self-study courses (Sjogren & Knox, 1965; Dilley, Machen, Dilley, & Howden, 1978; Sanderson, 1976).

Time may be looked at from several viewpoints in adult or continuing education. From the point of view that time is often equated with money (Graham, 1981), there is reason to promote efficiency in learning both from the need to keep training costs minimal while educating large numbers of persons, as in the military (Judd, McCombs, & Dobrovolony, 1979), and from the need to teach busy professional audiences urgent new

knowledge and skills, as in medical fields (DeMuth, 1979; Richards & Cohen, 1981). While the self-pacing feature of prepackaged, self-study materials can be used to promote learning efficiency in time and cost savings, the self-pacing feature can also be seen to allow leisurely, relaxed learning for members of the stay-at-home adult learner segment, including parents who do not work outside the home and persons homebound due to disability.

Time has both a physical or functional dimension and a "cognized" or perceptual dimension. The Continuing Education Unit (CEU) has attempted to relate the physical time dimension of adult education programs to the learner: One CEU is given for 10 hours of study meeting certain requirements (National Task Force on the Continuing Education Unit, 1979).

In looking at how much time the potential adult learner "expects" to spend to complete a course or to earn a certain number of CEUs, the perceptual dimension of time becomes important. When estimating time persons tend to "round off" according to personal criteria and to overestimate functional time (Mittelstaedt, Curtis, Grossbart, & Rogers, 1975). Estimates of time have been found significantly related to a customer's evaluative criteria in a study of cognized distance and time by Mittelstaedt, et al. In that study "ease of driving to the area (inverse), the price of the merchandise (direct), the quality of the merchandise (inverse), and the helpfulness of salespeople (direct)" (p. 193) were all found related to subjects' perceptions of time needed to shop at a Midwestern city shopping center.

Time, as a component of perseverence, is integral to the need for

persistence of the individual learner attempting a self-paced learning task. Thus, expectations of time investment, along with expectations of effort expenditure, become of interest to the potential consumer of the prepackaged, self-paced course. As with effort, it is suggested that expectations of time investment for the four types of prepackaged, self-paced learning materials being studied will differ from each other. Again, as with effort expenditure, expectations--expected time investment, in this case--will create a reaction to the product. Therefore those expectations require investigation.

RESEARCH QUESTIONS

The general research question to be explored is: What are adult learners' expectations of (1) time investment and (2) effort expenditure necessary for completion of study and (3) expectation of possible learning achievement for four types of prepackaged, self-paced learning materials: (1) textbook-based, (2) audiotape-based, (3) videotape-based, and (4) personal computer-based?

Specific questions to be answered include the following:

1. How are each of the four types of prepackaged, self-paced instructional materials perceived as to expected effort expenditure necessary for learning achievement?

2. How are each of four types of prepackaged, self-paced instructional materials perceived as to expected time investment necessary for learning achievement?

3. How are each of four types of prepackaged, self-paced instructional materials perceived as to expected possible learning achievement?

4. What is the relationship between expectations of effort expenditure and time investment for each of the four types of prepackaged, self-paced instructional materials?

5. What is the relationship between previous experience as a consumer of prepackaged, self-paced instructional materials and expectations of effort expenditure, time investment, and learning achievement?

6. What is the effect of expectations of time investment and effort expenditure upon expectation of learning achievement for each of four types of prepackaged, self-paced instructional materials?

7. What effect do previous experience as a consumer of prepackaged, self-paced instructional materials and expectations of effort expenditure and time investment have upon expectations of learning achievement for each of the four types of prepackaged, self-paced learning materials?

8. What is the relationship between preference for an "ideal" method of prepackaged, self-paced instructional materials and expectations of effort expenditure, time investment, and learning achievement for each of the four types of prepackaged self-paced learning materials?

LIMITATIONS OF THE STUDY

Limitations. Only four types of prepackaged, self-paced materials were considered. They included textbook- (text-), audiotape-, videotape-, and personal computer-based instruction. These types of materials rarely exist in "pure" form for distribution, e.g., audiotape combined with text is a popular format. All were defined for respondents as including accompanying instructions for their use, e.g., manual and/or workbook as needed, but to be considered in as "pure" a form as possible to better delineate differences for analysis.

Effort was made to ascertain an indication of respondents' levels of experience with prepackaged, self-paced materials. However, no information was available as to the quality of those materials used by

so-called "experienced" respondents. That is, their opinions about such materials might be based upon materials developed according to sound content, pedagogical, and design standards, or upon materials which did not fulfill those criteria.

The subject pool was not drawn from the entire adult learner population, therefore results were generalizable only to the population from which it was drawn. With evidence (see Chapters Two and Three) that adults who participate in adult education and who have attained higher levels of education are more likely to participate in further learning activities, an attempt was made to secure a sample with those characteristics.

Mail surveys are subject to two major kinds of bias: the more highly educated survey recipient is more likely to respond than poorly educated recipients and those with higher interest in the subject matter of the survey are more likely to respond (Sudman, 1976). Comparisons can be made with general census data to examine the first source of bias. As to the second, those without interest are unlikely to constitute a market for the types of instructional materials being studied. However, that bias does constitute another limitation of the study.

The study did not propose to explain cause-effect phenomena. It was a descriptive or exploratory investigation. Its conclusions offer heuristics or suggestions only, no directives.

The instruments used, while relying upon proven methods (i.e., paired comparisons), were newly created for this study. It will not be possible to compare these results across other studies.

Expectations were the focus of the study. Self-report was used. It

will not be possible to confirm results through observation of behavioral indicators.

Assumptions. Subjects were asked to make several assumptions in responding to the questionnaire including, (1) that the same fact/principle-based instructional subject was being considered regardless of the prepackaged, self-paced delivery format, (2) that the amount of objectives and content covered by each of the four types of prepackaged, self-paced materials were equivalent; (3) that the respondent has the "ideal" situation for any delivery system, i.e., possesses necessary A/V and/or computer equipment; and (4) that any exams/credit for any form of course would be equivalent. Only delivery method, therefore, method of study, differs. In an attempt to increase the salience of the topic to the respondent, hence improve reliability, respondents were also asked (5) to assume their own interest in a self-selected instructional subject of a prepackaged, self-paced course as they completed the instrument. The above assumptions were explained in the survey instrument used (Appendix A).

CHAPTER SUMMARY

This chapter explained two pragmatic impetuses for this study: (1) students who appeared to have had either no expectations or unmet expectations of a self-paced course and (2) the growing numbers of prepackaged, self-paced courses commercially available. It stated the problem statement as an attempt to describe adult learner expectations of the effort expenditure and time investment necessary to complete four

different types of prepackaged, self-paced instructional materials and their expected levels of learning achievement from them. The four different prepackaged, self-paced formats investigated were textbook-based, audiotape-based, videotape-based, and personal computer-based.

The proposed research was seen as significant to adult learners in regard to knowing more about educational consumer behavior, especially motivation to participate. The need to develop courseware to meet adult learner needs and expectations and promote that courseware made this research important to instructional developers and marketers. Expectations, learner achievement, effort, and time were discussed as variables important to educators, psychologists, and consumer behavior scientists, thus providing theoretical and conceptual foundations for the study.

Finally, the chapter proposed eight research questions for investigation. Limitations of the study pertaining to the selection of variables, subject pool, and mail survey technique were described. Certain assumptions required of respondents to the survey questionnaire instrument were presented.

CHAPTER II: REVIEW OF THE LITERATURE

INTRODUCTION

Three areas of scholarly writing relate to the topic of this research. Those areas are adult education, motivation, and educational technology. The adult learner was the focus of the first area reviewed. It offers a definition of the "adult learner," discusses studies relating to types of participation, "who" participates, and reasons for participation, and looks at the issue of completion/drop out.

In the second area, expectations were traced in relationship to their importance to motivation (to participate in educative activities), through attribution theory and the expectancy-value model. The adult learner was viewed as an "educational consumer" attempting to balance a cost-quality relationship of expected effort expenditure and time investment with learning outcomes.

The field of educational technology has provided literature regarding self-paced delivery of instruction, the basis for prepackaged, self-paced instructional materials that are the focus of this research. Literature related to self-paced instructional materials was reviewed for the third section of the chapter.

THE ADULT LEARNER

Focus of the review. While most research regarding self-paced instruction in the United States has focused on the student at the public school or university level, this study sought the opinions of adults regarding prepackaged, self-paced instructional materials. Therefore it was felt important to provide an overview including a definition, types of adult education, and reasons for adult participation in educational activities. This section provides that overview.

The adult learner. Who is the "adult learner?" The field of adult education offers many and various definitions of an adult learner. According to Long (1983), all definitions and conceptualizations have three features in common: "(1) age as a legal requirement for civil and legal designation as an adult and age as it relates to the compulsory schooling laws of a government, (2) student status as it applies to full-time or part-time educational activity, and (3) major life role, which distinguishes between individuals whose primary role is that of student in contrast with worker, parent, and so forth" (p. 268). He defines an adult as "anyone who is over eighteen years of age and not attending secondary school, or anyone who has assumed adult-like responsibilities such as marriage and parenthood" (p. 268). This definition eases data collection and provides a basis for description of a study sample by age, levels of education and employment, and marital status. Such descriptors take on more importance as increased numbers of adults mix employment, family responsibilities, and undergraduate,

graduate, or professional educational activities.

Types of adult education. Educational activities of adults have also been the foci of attempts at the definition process. In addition to "adult education," the field employs terms including: lifelong learning, recurrent education, education permanente, continuing education, professional education, further education, and nontraditional education. The first three terms imply education from infancy through adulthood but appear to receive most attention at the adult end of the continuum. Continuing and professional education generally refer to employment-related education that allows the "already-educated" person to keep abreast of a profession or remain certified. Mandated continuing education (MCE), discussed by Cross (1981), raises the issue of the voluntary or compulsory nature of adult education.

Nontraditional programs are generally characterized by nontraditional locations, delivery methods, or subject matter targeted to adult audiences (Cross, 1981). Prepackaged, self-paced instructional materials and correspondence study fall into this classification, as in Wedemeyer's (1983) definition of nontraditional learning: "outside the confines and environment of the school and classroom, with teacher and learner separated in space and time" (p. 53). Cross (1981) grouped adult learning activities under three headings: Organized (most often offered in class-type formats), self-directed, and formal learning for credit (incorporating "nontraditional" approaches such as the external degree).

Research into the self-directed and/or self-planned learning activities of adults is an area of interest when considering the use of

prepackaged, self-paced instructional materials. Tough (1979, 2nd ed.), whose 1970 study provided much of the following information, acknowledges that there are many names for the self-planning of learning projects: "self-education, self-instruction, self-teaching, individual learning, independent study, self-directed learning, self-study" (p. 93). Prepackaged, self-paced instructional materials can be employed by the self-directed adult learner to further customize the convenience and pace of his or her own studies. Indeed, the increasing development of packaged courses is a sign of recognition of the value of autonomous learning (Abercrombie, 1981). Tough (1982) also acknowledges, "The crowded bookstore shelves and the sales figures for various types of self-help books and cassettes indicate their widespread use" (p. 71).

Tough conducted intensive and highly structured interviews in 1970 and Penland (1977) interviewed a national sample of 1,501 adults for his survey of "Individual Self-planned Learning in America." Tough (1979, 2nd ed.) defined a "planner" as "the person (or group or object) that...is responsible for more than half of the detailed day-to-day planning and deciding in a learning project....what to learn,...and/or about how to learn....when to begin each learning episode, and the pace at which to proceed" (p. 77). In attempts to ascertain the extent of learning efforts by adults beyond enrollment in institution-sponsored programs, they identified the following types of planned educational activities: Self-planned, group-planned, one-to-one helper, and nonhuman resource-planned. Penland (1977) found that the three latter methods are multiply correlated with the first and all four are

interrelated. Both authors point out that while one of the above methods predominates in most learning activities, some activities are characterized by a mixed composite of the methods (included in Penland's "other" category below). Respondents' reports of types of planners from the Tough and Penland studies are presented in Table 2.1.

Table 2.1

"Planners" of Learning Projects

CATEGORY OF PLANNER	PERCENTAGE OF LEARNING PROJECTS Tough, 1970	Penland, 1979
Self-planned	68	25.3
Group-planned	12	14.6
One-to-one helper	8	29.0
Nonhuman resource	3	22.7
	(Mixed) 9	(Not reported) 8.4

(Data from: Tough, 1979, 2nd ed., p. 86; Penland, 1979, 177)

Cross (1981) offers plausible reasons for the differing percentages between the two studies. A possible explanation for the increase in use of nonhuman resources as planners is the growth in availability of audiotapes, videotapes, and self-help books between the dates of the studies. Another explanation might be a differing approach to categorization of books. Books, due to their familiarity through the traditional education process, may be viewed as "standard equipment" in self-planned activities or as "nonhuman resources" by respondents. Thus, similarly, prepackaged, self-paced instructional materials might have been viewed as belonging in either the self- or the nonhuman resource-planned catagories in that persons who "self-plan" their

initial project may then utilize nonhuman resources in reaching their goals. That confusion might or might not have shown up in the "mixed" category depending upon how much further the "planning" process was pursued in the interviews.

Participation in adult education. Who participates in adult education activities? Tough (1979, 2nd ed.) found that 98% of his 66 interviewees (all but one) had conducted at least one learning project during the previous year. According to his and Penland's findings, almost all adults will undertake self-directed learning to learn a relevant concept or skill (e.g., religious precepts, carpentry, canning pickles, etc.) at various times in their lives.

The National Center for Educational Statistics measures participation in organized adult educational activities. According to preliminary 1978 data examined by Barton (1982, p. 39), 11.6 percent of the adult population participated in education or training in 1978. Barton cautions against using NCES data regarding levels of participation. He finds the data useful, instead, for identifying "differences in participation tendencies among various population groups" (p. 39). He used the data to characterize those who participate in largest numbers in adult learning: The participant is likely to be more highly educated than the nonparticipant, younger, earning more, white, female (reversal of a trend), and in a professional or technical occupation. It is reasonable to expect this profile to hold for participation and both organized and individual learning activities. Dickinson and Clark (1975) point out, "Learning-oriented adults would tend to be quite active in both [self and group] types of learning

activities in their quest for more knowledge" (p. 5).

In his doctoral dissertation Waldon (1984) surveyed 503 members of the Association for Educational Communications and Technology with a resultant usable 296 responses. Discrimination analysis effectively categorized 101 as "participants" in continuing education with the "amount of previous participation in continuing professional education" (p. 105) the strongest contributor to the discriminant score. It is evident that adults who already participate in further educating themselves make up a group more likely to participate in further learning activities.

Huberman (1974) suggested another characteristic of participants: "We find that most adults enrolled in courses or using self-instructional materials are in a situation of change [in their personal or occupational lives]" (p. 52).

Reasons for participation. Houle (1972) states, "The adult ordinarily embarks on a learning program because it has an immediate and direct meaning for him [or her]" (p. 138). Surveys bear this out. In Penland's (1977, p. 40) national survey respondents rated "increase knowledge" and "meet responsibility" highest among listed goals for learning and "personal development" as the highest area of life in which learning was to be used. Cross and Zusman (1979) analyzed data from major studies between 1973 and 1979 and report six motivational reasons for participation:

1. desire to achieve practical personal goals--to get a new job or advance in one's present job, or to improve one's income;
2. desire to achieve personal satisfaction and other inner-directed personal goals, such as personal development

and family well-being;
3. desire to gain new knowledge, including the desire to learn for its own sake;
4. desire to achieve formal educational goals (degrees, certificates, etc.);
5. desire to socialize with others and/or escape from everyday routine; and
6. desire to achieve societal/public welfare goals (p. 35).

Studies of why adults in specific professions participate in continuing education affirm the above reasons for participation. Eskin (1981) wrote that keeping up with new knowledge appeared to motivate physicians to participate in continuing education. Richards and Cohen (1981) listed and summarized 19 studies reported since 1950 regarding physician attendance at traditional continuing medical education programs. The recurring motivational theme through those studies is new knowledge ("stay up-to-date") and maintenance and improvement of professional competence.

Why do some people not participate in educational activities as adults? Cross (1981) groups perceived barriers into three categories: situational, institutional, and dispositional. The first two categories hold the most often cited barriers of cost, time, and home and job responsibilities, among others. In the Richards and Cohen analysis (1981), the most often reported reason for nonattendance among physicians (in studies that surveyed nonparticipants) was time--inability to be away from patient and/or family obligations. Perceived situational and dispositional barriers relate directly to expectations of effort expenditure, time investment, and learning achievement of this study. Expectations are discussed next.

EXPECTATIONS

Focus of the review. Adult education research into participation shows us that some adults are more likely to participate in educational activities than others. Participation is a behavior necessary to education, an achievement-oriented activity. The adult student, or potential student, of prepackaged, self-paced materials is a consumer or customer (Rosenberg, 1978-79) who participates (alone or with guidance) by setting goals for his or her study, seeking the educational courseware, purchasing it, and following its study program to completion. In purchasing and using a packaged course, an individual fits the definition of a consumer who is "directly involved in obtaining and using economic goods and services" and in "the decision processes that precede and determine these acts" (Engel, Blackwell, & Kollat, 3rd ed., 1978, p. 3). The educational consumer weighs a cost/quality relationship with anticipated effort expenditure, time investment, and other costs balanced against expected learning achievement and other outcomes (e.g., certificate of completion). Thus, the review includes citations which have provided foundation for discussion of motivation in both the fields of education and consumer behavior.

The terms "attribution" and "attribute" occur frequently in the following sections. When a person makes an "attribution," he or she perceives causality or ascribes a reason for the occurrence of a particular event (Weiner, 1985). This ability of persons to perceive causality is the foundation of "attribution theory" which received attention after the study of attributional processes by Fritz Heider

(1958). The term "attribute," used as a noun, indicates a characteristic of a person or object.

Motivation. Motivation is not measurable except in its expression in terms of participation and/or performance--in education--or in terms of purchase and/or use—in consumer behavior. In other words, we make inferences about motivation through an individual's behavior in a situation. Atkinson (1964) recommends various uses for the term "motivation." The term as used here is understood to mean "the problem of accounting for the direction, vigor, and persistence of behavior" (p. 274), especially, the role expectations play in that accounting.

Achievement motivation, according to Atkinson and Birch (1978, 2nd ed.), "is concerned with the interaction of person and immediate environment" (p. 126). Motivation, as a function of Motive X Expectancy X Incentive, is an expectancy-value conception of motivation (Atkinson, 1964, Weiner, 1972, 1974). The arousal of motivation to approach or avoid a person, task, or object is due to the expected positive or negative utility of the consequences. The field of consumer behavior has a parallel concept: "Before purchasing a particular product, a consumer has some expectations about the outcomes associated with using that product" (Zaltman & Wallendorf, 1983). Boshier (1976) writes of the importance of creating learning environments for adults "congruent" with their "needs, expectations and learning styles" (p. 24). Ward (1973) discusses the "expectation of instructional procedures" and of "what constitutes a valid learning experience" as being a result of cultural conditioning (p. 2).

Expectations "may be the result of either known or unknown past

experiences" and "refer to a readiness to respond in a certain way to a given situation or set of stimuli" (Williams, 1981, p. 22). They are mental events "somewhat difficult to link to observable behavior" (Rest, 1976, p. 103). Yet expectations are critical to purchase and use of a product. Zaltman and Wallendorf (1983) state, "If a consumer does not expect a product to perform well, there is little reason to purchase and use that product. Furthermore, if a consumer's expectations are low and they do, in fact, happen to use the product, the consumer's perception of the product's actual performance may be influenced by his or her initial expectations about how well that product would perform" (p. 324).

In achievement situations, expectations change after success or failure at a task (such as attempting to complete a self-paced, prepackaged course). Weiner points out, "Generally, success is followed by an increment in goal anticipation while failure produces decrements in the subjective probability of success" (1974, p. 21).

Also, a consumer may have uncertain expectations regarding the consequences of buying/not buying a product. This uncertainty is known as perceived risk (Wilkie, 1976). "The amount of perceived risk," according to Kotler (1980, 4th ed., p. 165), "varies with the amount of money at stake, the amount of attribute uncertainty [whether a product has those characteristics perceived as relevant both to the product class and to the particular consumer's needs and wants], and the amount of consumer self-confidence."

Uncertainty can be high in novel tasks, such as computer-based instruction (CBI). Sarason (1979) recognized the role of expectations

in CBI and wrote, "The reality of human behavior is that it is modified by both environmental stimulation and stimulation the individual supplies for himself in the form of preoccupations, expectations, and interpretations of what is going on in the environment" (p. 208). Expectations are also important to classroom-based instruction (see Chapter I, McKean, 1977, and McCue, 1982, studies). Knox (1977) encouraged exploring expectations with adult learners in order to reach "congruent shared expectations" (p. 428).

How does the individual formulate expectations? Palmer and Willson (1982) investigated "the extent to which ability, effort, task difficulty, and luck attributions enhance prediction of individuals' expectations and feeling of pride/shame within an actual achievement situation (p. 336). Based upon their and others' findings, they suggest that attributions play an important mediating role for individuals' expectations for future performance. Those attributions may be made to ability, effort, luck, and task difficulty, via their cues from past performance and current situational cues.

Atkinson's (1982) expectancy theory of achievement motivation uses the term expectancy "to refer to a particular kind of cognitive association aroused in the person by situational cues" (p. 25). In classroom learning, situational cues appear to apply most significantly to the influence of other persons, but also to the "physical and psychological 'givens' of the classroom, the quantity and types of curricular materials, and the learning activities" (Finn, 1972, p. 390). Thus, physical attributes are also situational cues. (This is a basis for the aptitude/ or trait/treatment interaction studies that ask, "what

media attributes are relevant for learners with what personality traits for what kind of learning tasks?" (Heidt, 1978, p. 85).) With prepackaged courses, the attributes of a product may comprise some or all of those situational cues. That realization can cause us to look at motivation for learning from a slightly different viewpoint. Davies (1971) writes,

> It is probably a mistake to think of motivation as a necessary prerequisite for learning....Frequently, the best strategy is to ignore any initial motivational states and to concentrate on presenting the subject matter in such a way that student motivation is developed and harnessed during the learning process (p. 150).

Keller (1979) suggests that motivational deficiencies "may be in the learner or in the instruction" (p. 32). The latter deficiencies "should be controllable by means of effective instructional design. Furthermore, they are probably easier to control than the motivational problems that lie within the individual" (p. 32). Fennell (1980) writes that marketing researchers have learned from research on consumer wants that "elements in the person's environment as well as elements within the person may motivate behavior, i.e., may activate behavior in a particular direction" (p. 19). Thus characteristics and cues within instructional materials, along with past experience, may lead the learner toward expectations of success or failure.

To what do learners ascribe the successes--or failures--that either motivate or discourage them from future educational endeavors? Weiner (1974) has extensively researched perceptions of the causes of success and failure and proposed an attributional model of achievement motivation. His four causal categories of ability, effort, task

difficulty, and luck were presented in Chapter One. He has also produced a 2 X 2 X 2 table that further classifies the categories according to locus, stability, and controllability (Weiner, 1982).

Discussed along the dimension of locus of control (Rotter, 1966), internal or external, ability and effort are seen as causal factors internal to the person. Effort is the only one of the four factors seen to be under volitional control by the individual. (Although, Weiner, Russell, and Lerman (1978) point out that even effort can seem to be beyond our control at times as in, "I just can't seem to study for this course" (p. 62).) Dividing the factors on the basis of stability finds ability and task difficulty generally perceived as stable. Luck is perceived as more unstable. Effort has both stable and unstable elements. External factors include, primarily, those cues found in task difficulty and luck.

Each category holds cues that an individual uses to measure his or her level or absence or presence of that cause. Some are listed in Table 2.2.

Individuals use cues to develop perceptions of their own capabilities (ability and effort) and those of the task or situation (difficulty and luck). Those perceptions are important to BOTH the decision to participate and to learning. Weiner, Russell, and Lerman (1978) write that both expectancy and affect influence behavior for "attributions modify expectancy and affect, they also play an important role in determining the speed of performance, choice, persistance, and other indices of motivated behavior (p. 65). Feather (1982) conducted

Table 2.2

Cues to Causal Factors

ABILITY CUES	EFFORT CUES
Past success history (Number of, % of)	Past success history (Number of, % of)
Immediate outcome information	Immediate outcome information
Position relative to social norms	Position relative to social norms
Pattern of performance	Pattern of performance
Performance peaks	Performance peaks
Task difficulty	Success following failures
	Failure following successes
	Covariation of incentive and output
	Perceived muscular tension, sweating
	Persistance at the task
	Task difficulty
TASK DIFFICULTY	**LUCK**
Social norms (% if others succeeding/ failing at same task	Apparent lack of personal control
Objective task characteristics	Variability in outcome (Randomness, independence)
	Objective task characteristics

(From Weiner, 1972, p. 364; 1974, pp. 8-9)

four studies to test predictions of levels of performance and found, "performance levels tended to be positively related to initial estimates of chances of success....subjects draw on their past experience at similar tasks of the same order of difficulty to guide them when they estimate their chances for success for the present task" (p. 76). A study by Callaghan and Manstead (1983) found that "failure on a practice task led to lower expectations of performance on a similar task in the

future" and "anticipated pleasure at performing a similar task in the future was influenced by the conjunctions of outcomes on...two experimental tasks" (p. 20). And Weiner (1976) summarizes, "Among adults, it has been demonstrated many times that prior success or failure at a task influences the future expectancy of success, with expectancy increasing after a success and decreasing following failure" (p. 192).

Walberg (1976) discussed, "how perception of environments can 'account' for considerable variation in classroom learning" (p. 155). He points out that "different cues in the environment may lead people to the same (or different) perceptions, conclusions, or actions" (p. 157). Ritchie (1974) examined 12 different leisure activities using multidimensional scaling analysis to determine whether individuals' perceptions really differ. He found significant variations in individual perception.

Weiner (1976) suggests that "educators may find evaluations of perception useful" (p. 163). Anderson and Walberg found perceived difficulty and pace of the class linked to cognitive achievement in a 1974 study. Weiner, Russell, and Lerman (1978) also considered the role of the environment, stating, "the external environment may be facilitative rather than inhibitory" (p. 75). That external environment in prepackaged, self-paced instructional materials will include not only a home or office study setting, but also the materials and their packaging.

Palmer and Willson (1982) measured subjects' attributions for correct responses on an exam on seven-point rating scales. They found

the stable attributions of ability and task difficulty positively correlated with expectancy ratings. Their scales offer ways to view or define Weiner's four causal variables:

> You are very smart/not very smart in this subject (Ability).
> You are very lucky/not lucky at all in taking tests like these (Luck).
> This test was very hard/not hard at all (Task difficulty).
> You studied very hard/did not study at all (Effort).
> (p. 337)

Attributes. This study looks at task difficulty through perceived attributes of effort expenditure, time investment, and learning achievement. The attributes were selected as a result of experience developing and implementing a self-paced course (see Chapter I) and from the literature. This section will define "attribute" and provide a background in the ways effort, time, and learning have been discussed in educational literature.

An attribute is a characteristic of a person or object. Kotler (1980) explained product attributes: "A particular product is perceived in terms of where it stands on a set of attributes that are relevant to that product class" (p. 157). He offered examples of attributes of familiar products:

> Aspirin: Speed of relief, reliability, side effects, price
> Tires: Tread life, safety, ride, quality, price
> Cameras: Picture sharpness, speed, closeup distance, size, ruggedness, price (p. 157)

Individual consumers consider different attributes relevant to themselves. They attach different importance weights to those considered relevant and find some more salient in a specific situation

than others. Researchers obtain attributes for study in a variety of ways: from motivation, by asking subjects to generate lists of product characteristics, using an existing set (perhaps from an earlier study or one developed by marketing research), expert judgment, interviews, and others (Fennell, 1980).

Task Difficulty. Task difficulty is integral in some way to all four causal factors (see Table 2.2, above). In the factors of ability and effort, perceived task difficulty determines whether individuals think they "can" and how hard they "try." In the factors of task difficulty and luck, learners' perceptions of the objective task characteristics help them "size up" task difficulty and their "chances" of success. After concluding that the students in his dissertation study could not choose validly between two instructional methods, McIntosh (1981) asked what might be the basis for their preferences. He suggested that their criteria might have included "their perception of how easy or difficult the method was, the way they preferred to manage their time, fear of something new (i.e., PSI), etc." (p. 112).

Tasks do differ in "difficulty and hence in incentive value of success" (Atkinson, 1964, p. 280). That fact and McIntosh's (1981) suggestion (above) that persons base their preferences upon perceptions of difficulty and other factors helped prompt this study which sought to determine the perceived levels of effort expenditure, time investment, and learning achievement necessary for four different "tasks," or methods of prepackaged, self-paced study. Effort and time are discussed next.

Effort. Effort is Heider's (1958) "I try" element (versus "I can,"

which relates to ability). Effort is "considered to be a behavior, whereas performance would be an outcome" (Mitchell, 1982, p. 295). Keller (1979) also draws Mitchell's distinction between effort and performance writing, "Effort refers to whether the individual engaged in action aimed at accomplishing the task" (p. 27). Effort is especially important to learning, writes Carpenter (1957):

> All learning requires effort and the expenditure of energy in relation to the difficulty of the task. All achievement goals are to be reached at a price of energy expenditure.... conclusions [of attention to philosophies and theories of learning] should indicate that audio-visual materials and methods of instruction are as demanding of disciplined study, as rigorous and as challenging as other methods which are more generally sanctioned by educational traditions of the past. It may be wise in the current "climate of opinion" in educational circles for proponents of audio-visual approaches to learning, to make certain that these approaches are applied in ways to counteract students' tendencies toward indolence and to follow the "law of least effort" (pp. 366-367).

Attributions to effort, according to Weiner, Russell, and Lerman (1978), have "greater affective consequences than ability attributions" (p. 65). In judging themselves, individuals who fail and feel they have not put out the effort of which they are capable "punish" themselves with affects including: shame, fear, sorrow, panic, and guilt (p. 80). They use indicators such as those listed by Weiner (above, Table 2.2) to judge their effort output. Keller (1979) has also listed some "common indicators" of effort, including attention, persistence, approach/avoidance tendencies, and latency and vigor of response.

Weiner (1972) discusses the importance of attributions to effort:

> An attributional analysis of the relationship between task difficulty and intensity of performance also is based upon perceptions of effort as an outcome determinant. It is

> suggested that task difficulty is a cue that gives rise to differential attributions to effort as a determinant of achievement outcome. At an easy task effort may be perceived as unnecessary for success, while at a very difficult task effort could be perceived as a "waste of energy." Thus, effort may be considered most important at tasks of intermediate difficulty (p. 392).

One experiment found that persons saw effort (or its lack) as the most important determinant of success or failure for tasks of intermediate difficulty where the probability of success was 50% (Weiner, Heckhausen, Meyer, & Cook, 1972). Weiner wrote again in 1976, "Persons highly motivated to achieve success attribute failure to a lack of effort" (p. 197). They also "are sensitive and reactive to cues indicating the importance of effort expenditure" (Weiner, 1972, p. 396).

Persistence is a quality including effort and time in that it implies keeping at a task in spite of difficulty or opposition and, also, continuing past a usual, expected, or normal time (Webster's New Collegiate Dictionary, 1981). Effort, according to Keller (1979), "is usually measured in terms of persistence" (p. 27).

One type of "difficulty or opposition" that may occur in an instructional situation is a lack of congruence between the task and the learner's ability and cognitive style (Wittrock & Lumsdaine, 1977). The need for congruence has been researched by persons in the areas of "cognitive styles" and "aptitude treatment interactions." Those areas are not discussed here, except to acknowledge that such incongruence could result in either great frustration and/or recognition of the need for increased effort, persistence, and time on the part of the learner. Other "difficulties," identified by Noble (1980) as inherent in self-paced distance (correspondence) instruction, are the problems of

distraction and procrastination. Overcoming either requires that the learner try to muster greater effort. (Persistence is discussed more fully under the section on "Time," below.)

The discussion above of difficulties arising from incongruence, distraction, and the factors of task familiarity and task variety (Judd, et al., 1979; Eisenberger, et al., 1982) indicate that expectations of effort expenditure fall along a continuum such as that in Figure 2.1, with incongruence, novelty, many distractions, and variety of tasks all leading to higher expected effort expenditure.

There appears to be an optimum level of motivation intensity for increased effort. McClelland (1951) reported that "as a motive increases in intensity it first leads to an increase in the efficiency

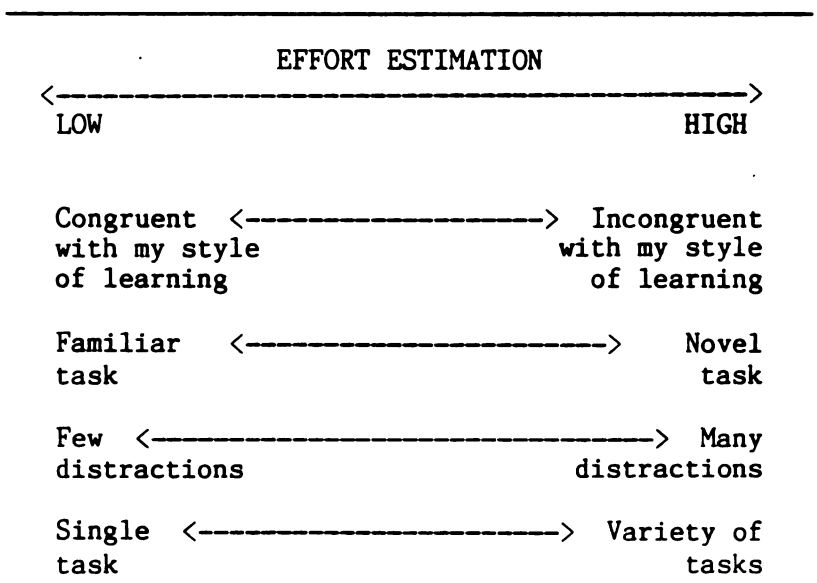

Figure 2.1: Expectation of Effort Expenditure

of instrumental activity and then to a decrease....Too little motivation leads to sluggishness and inertia, too much to disruption and defense against anxiety" (p. 485).

Time. Carroll had hypothesized in 1963 that the degree of learning is a function of "time actually spent" divided by the "time needed" (p. 730). Time has been shown to be a modest predictor of achievement according to an extensive review of time-on-task research by Fredrick and Walberg (1980). Sanderson (1976) found time spent significantly related to achievement for both females and males in an English mastery learning course. Time can be manipulated both by teachers and by students themselves. Millman, et al. (1983), demonstrated that rewards can be useful to increase the amount of time students are willing to spend learning. Learners can also manipulate their own time investment based upon situational factors, the value of their goals, and their expectations of the time investment needed to learn.

Time is an integral part of expectations, as evidenced in this definition of expectancy by Maddi (1980, 4th ed.): "a cognitive unit, or thought, referring to what you imagine will be the content and timing of events in the future" (p. 177). Fraisse (1963) writes of time as an "obstacle to be overcome in order to continue a task which has been undertaken, when the initial impulse is exhausted. If there is still an element of waiting, it is the expectation of finishing the job....The difference between present result and that which must be realized gives rise to awareness of duration" (pp. 202-203). Time is an output measure, used along with "quality" to gauge the worth of a CEU-rated program (Bramblett & Buchanan, 1978).

Mittelstaedt, Curtis, Grossbart, and Rogers (1975) found that cognized time may differ from actual time. Fraisse (1963) offers reasons: "The simple fact that frustration attracts my attention to the time interval is enough to cause overestimation of its duration" (pp. 203-204); likewise, time may appear "too short" when we await a consequence we fear and want to delay; and, also, "we are not conscious of time when we are fully satisfied with the present situation" (p. 206). Fraisse suggests that we frequently compare our intuitive estimates of time with actual measurements during activities. Individuals anticipate the probable duration of a task when they begin (an expectation), then use that as a standard against which they make judgments such as "it takes so long" or "that didn't take long" (p. 210). According to Fraisse, they estimate duration using three indicators: measurement (clock, sun, distance covered, number of pages written, number of rows knitted, etc.), affective judgments (feelings of time), and direct judgments (perception of changes around them). Regarding the third method of estimation, individuals select changes to which they attend based upon the objective task cues and factors and upon their own attitude. Fraisse offers an example: "When reading a novel I can judge the number of changes according to the number of pages I turn or I can consider nothing but the adventures I live through with the hero of the book" (p. 217). He shows that "the length of a duration depends on the number of changes we perceive in it" (p. 218). A new or different task or experience requires more attention to detail, hence to time. A too difficult task also creates more attention to changes and to time, with that attention to time increased if motivation is low.

Conclusions developed from Fraisse include those illustrated in Figure 2.2.

Two dimensions of time have been mentioned by Weiner, Russell, and Lerman (1978), as being determined by attributions: speed of performance and persistence (p. 64). Speed of performance equates to "pace of study," one of the levels of choice for a learner in Cornwall's "hypothetical hierarchy" of factors in the curriculum (1981, pp. 190-191). "Speed of performance is directly related to the attribution of failure to bad luck and lack of effort," with the expectation that "on a subsequent occasion the goal might be attained" Weiner, et al., 1971, pp. 16, 19).

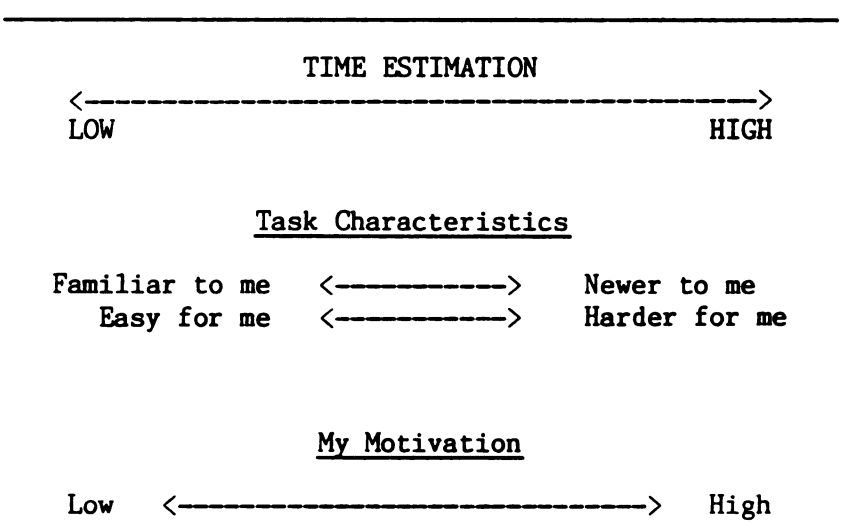

Figure 2.2: Expectation of Time Investment

Allowing control of speed of performance through self-pacing provides for effective learning, a principle supported by Sjogren and

Knox (1965) who found that "speeding-up" and "slowing-down" individuals in programmed instruction both inhibited performance. Brown, Brown, and Danielson (1975) also determined that different persons have different pacing needs in that older persons and those weak in reading ability prefer slower pace and more repetitions in televised lessons.

However, just as individuals may have different pacing needs, they may also have different pacing preferences. Thus, homebound persons may find that self-paced materials can offer an opportunity to extend time of study to fill otherwise empty hours.

Atkinson and Birch (1978, 2nd ed.) explain "the way in which motivation influences the proportion of time spent in different activities...: the proportion of time spent in a given activity depends upon the strength of the tendency to do it relative to the number and strength of tendencies for all the competing activities in that situation" (p. 145). This is a problem in classroom situations which more often than not require completion of a self-paced course by some deadline. In those cases, Judd, McCombs, and Dobrovolny (1979) report, "many students have little motivation to complete a course quickly and in some instances are actually motivated to prolong their training" (p. 135). Persons studying self-paced materials may encounter problems judging pacing if the course culminates in a scheduled examination date or is required for certification at a certain time. Keller, Goldman, and Sutterer (1978) studied a PSI course "modified" by requiring midterm and final exams on specified dates. They found this reduced students' responsibility for planning and executing their own schedules for work. This may have reduced the effect of individual differences in time

utilization" (p. 419). In a three-year study of a 15-hour-rated packaged, self-paced course for dental students "students reported spending an average of 10.8 hours working on the course with a range of four to 20 hours (Dilley, Machen, Dilley, & Howden, 1978, p. 479).

Persistence is important in considering the problem of the rate of "drop out" from both classroom-based and prepackaged, self-paced programs for adult learners because their participation is usually voluntary. Knox (1976) warns that with voluntary participation, "if the activity does not fit his expectations the adult will typically withdraw" (p. 84). Two types of factors appear to be responsible for drop out: situational factors, in particular, lack of time due to other responsibilities (Salinger, 1976); and factors internal to the person, such as unmet expectations or a perception that he or she cannot succeed at the task.

Weiner (1972) stated, "If the subject thinks that he cannot perform the task (low ability and/or high task difficulty), he relatively disengages from behavior (effort expenditure) instrumental to goal attainment" (p. 391). Janoff-Bulman and Brickman (1982) point out that subjects whose expectations are for success work harder and longer than those who are led to expect failure. Both performance and persistence are impaired by low expectations. Persons with low expectations evidence poor effort, waste time, or quit altogether. These authors wrote,

> A person turns away from a task, in our analysis, less as a function of whether they have succeeded or failed than as a function of whether or not they anticipate that further effort at that task will produce further, commensurate benefits. They may have done well, exceeding their initial expectations, and

> yet continue because they now feel they can do better still. They may have done poorly, falling short of their initial expectations, and yet quit because they now feel that they cannot do even that well (p. 226).

Models of classroom learning acknowledge that time is an important variable in learning achievement (Walker, 1976; see also Chapter One). Expectations of time investment thwarted by task attributes or anything else lead to lack of persistence and, eventually, drop out.

PREPACKAGED SELF-PACED INSTRUCTIONAL MATERIALS

Focus of the review. The review begins with a discussion of what self-paced study is and what it is not. The limited literature on prepackaged, self-paced instruction commercially available for use by adults as individuals (not classroom-based) was the focus of the second part of this section. Finally, a brief overview of each of the four types of prepackaged, self-paced delivery systems in this study is provided. While most research of self-paced instruction has been at K-12 or college levels, rather than adult or post-secondary, some of that research is reported as background for this study.

Self-paced study is known under a variety of terms. It has been called self-study, self-directed, home study, independent or individualized study, resource-based learning, and nontraditional learning. The concept of self-paced study, according to Schein (1972), involves certain assumptions:

> that learning takes place only if the student makes some active response to whatever material is presented...
>
> the response leads to some consequence: better understanding, the solution to a problem, a passing grade, etc....
>
> that individuals learn at different rates and...it makes no sense to require a large group...to cover the same material at some "average" pace....
>
> that the material to be learned can be broken down into components or units that are in some way cumulative (p. 99).

In Schein's model, which is that of the Keller Plan or Personalized System of Instruction (Keller, 1968), tutors and teachers function as consultants and evaluators ("proctors"). Although Schein discusses this

type of course as an "innovative mechanism for professional education," the systems he cites as examples were designed for and carried out with university level students. McKeachie and Kulik (1975) report that in evaluations of PSI courses in the university context, their self-pacing feature has been the most highly rated feature. Also, in spite of a high drop out rate, PSI courses generally receive favorable ratings by students (both completers and noncompleters). These authors find that students report perceptions of having learned more than in a lecture course, but also feel they have spent more in time and effort in PSI than they would have in a traditional lecture course. The "self-paced module" is a format frequently used in corporate educational settings, according to Watkins (1983).

Independent study. Independent study is often confused with self-paced study. However, while self-paced study is generally directed by its materials (e.g., programmed texts), independent study is characterized by greater freedom (Schein, 1972). Dressel and Thompson (1973) define independent study as "the student's self-directed pursuit of academic competence in as autonomous a manner as he is able to exercise at any particular time" (p. 1). In independent study the student may set his or her own objectives, course outline, materials selection, etc., frequently under the guidance of an advisor. Together the student and advisor enter into an agreement regarding the objectives to be satisfied and the type of evaluation to take place.

Nontraditional study. This is an umbrella term for ways of learning carried out away from a school or classroom environment and "with teacher and learner separated in space and time" (Wedemeyer, 1983,

p. 53). Because it is under the control of the student it is self-paced.

Self-directed learning. Self-directed learning is learner-initiated. The learner determines his or her own objectives, method of study, and way to determine progress. The self-directed learner may choose to learn from an "expert" (e.g., how to make pickles from one's neighbor), from library books, from organized classes, or from any number and assortment of methods. Rydell (1983) suggests, "Self-directed learners may determine that all or a portion of a prepackaged course meets their learning needs. On the other hand, self-directed learners may choose a number of alternative learning strategies" (p. 64). Most self-directed learners develop learning projects to serve immediate needs-to-know rather than to learn an academic subject. The work of Tough (1979, 2nd ed.) and Penland (1977), discussed earlier, provides further description of self-directed learning.

Individualized study. Individualized study does not necessarily have the independence of independent or self-directed study. In its purest form, it is study prescribed for an individual that differs in some way from study for others. The objectives, outline of subject matter, and evaluation may all be prescribed with no or little input from the student. Study may be individualized for any number of reasons, including to match a cognitive style, to furnish study in an unusual subject for which no class is available, or to accommodate a student's handicap. Klein (1982) describes conceptions of individualized study ranging from tightly teacher controlled to student

choice of learning task and activities. According to Dressel and Thompson (1973), individualized study structured in advance through programmed materials or mechanical equipment can be less independent than that carried on the the average classroom.

Self-education. Self-education is "essentially an individual and private pursuit," according to Dickinson and Clark (1975, p. 5). They contrast it to "continuing or adult education" which they describe as "learning that is conducted in the presence of someone external to the learner who plans and manages the learning process....predominantly a group activity as several persons other than the learner are usually involved" (p. 5). (Their definition of continuing or adult education appears to leave out persons studying via self-paced packages. The viewpoint taken herein is that continuing or adult education may include methods of self-education with varying degrees of self-planning and self-management.) Their study of 200 female nurses found that more were active in self-education than in group-oriented continuing education in spite of having high "interaction orientations."

Self-study. This is a term discussed by Apps (1981) who stated, "self-study is entirely organized and carried out by the learner" (p. 127). He finds self-study used by persons who want to enrich classroom studies, review former learnings, and prepare for more advanced studies in the same area. He writes of the utility of programmed materials for self-study and, also, less structured materials that provide exercises for student practice.

Houle's Categories of Educational Design Situations. Cyril O. Houle (1972) proposed 11 educational planning categories. One, his category

C-11, "Mass," is relevant to prepackaged, self-paced learning. He defines this category as, "An individual, group, or institution designs an activity for a mass audience" (p. 44). This includes a televised course tuned into by many persons at one time, but also includes sets of books and other materials accessible to many persons according to their own needs and schedules. The nature of the medium, according to Houle, "helps to define both the content and the human resources which present it" (p. 50). Instruction is standardized, not individualized, but can be personalized to reach specific audiences. Personalization is often achieved through mixing educational and noneducational goals: "efforts are made to amuse, to entertain, or to be topical as well as to teach" (p. 128). Houle's discussion is one of few (outside of literature by correspondence study practitioners) to address directing instruction at a mass audience that applies to prepackaged courses. As is customary in his writing, he decries the lack of teacher contact with learners.

Prepackaged instruction. Prepackaged instruction or courses, also known as packaged instruction and resource-based learning, have been used in two primary areas: (1) curriculum packages or kits to permit self-paced study by individual students from the elementary grades through university courses and (2) pre-produced courses for correspondence study (equivalent term: home study [Noble, 1980]) by adults. There is much written about the former area, especially the AV audiotutorial instruction of Samuel N. Postlethwait (Postlethwait, Novak, & Murray, 1971; Fisher & MacWhinney, 1976). Correspondence study has received attention, also, especially in connection with Great Britain's Open University.

Little research attention has been given to individual adult use of the prepackaged course not tied directly to an institution, such as those available through retail outlets including book, videotape, or computer stores or by mail order. Apart from costly national surveys such as Penland's (1977), adults studying on their own are a group difficult to research. Attention to the development area of prepackaged, self-paced instructional materials for adults is increasing, especially in the area of computer- and computer/video-based courseware, such as the article by Schuyler and Hilfinger (1982).

Ringis (1974) describes a prepackaged course as "a 'lesson plan' for an individual learner" (p. 105). Noble (1980) writes of packaged courses as "a substantial proportion of coursework...assembled as learning materials and provided together with some statement of intention, properly sequenced tasks, activities, and tests" (p. 169). Georgiades (1974) states, "Packaging, while not a new concept, offers many possibilities for personalizing learning" (p. 111). Ringis finds six "ingredients necessary for the structure of a package:"

1. Concept focus
2. Behaviorally-stated objectives
3. Multiple activities and methodologies
4. Diversified learning resources
5. Evaluation instrumentation
6. Breadth and/or depth suggestions [suggestions for further activities] (p. 105).

Ingredient three is more likely to be attended to in a classroom situation that offers a variety of audiovisual equipment than it is in packages for "home" study which often feature only one audiovisual method (often plus an accompanying text). The latter, according to

Wedemeyer (1976), frequently receive their names from the type of method used, such as audiotape course or television course. However, Georgiades (1974) points out that even packaged courses prepared for in-school use often offer a "monolithic approach to the learning goal--reading" (p. 104).

Conroy (1983) has compiled a directory to "Learning Packaged to Go." Her volume lists titles and producers of "off-the-shelf...commercially produced prepackaged training resources" (p. vii). Hundreds of these package are now available, she finds, with more on the way thanks to the profit motive. Conroy declares that packages are "convenient, promptly and consistently replicable, patient beyond belief, and run no risk of impairing their own ability by burnout caused by repetition" (p. 4). Her book lists packages for use by individuals and packages that guide trainers in presenting courses to groups. Those for individuals are aimed at the "independent self-directed learner who wishes to improve present skills or prepare for new responsibilities" (p. viii). Another such listing of packages is Wasserman and Applebaum's (1982), Learning Independently, a directory of 3,591 self-instruction resources including materials in subjects from accounting to zero-based budgeting and in narrow to broad topics from pipe-fitting to management principles.

"Pre-produced" is a name applied to courses packaged for use in distance education by Borje Holmberg (1981, 2nd ed.). He provides guidelines for development of courses for instruction by correspondence methods and an extensive bibliography of many technical issues in their preparation.

Resource-based learning is another term applied to packages used in

distance study by Beswick (1977), Noble (1980), and Clarke (1982). Beswick states that it is a blanket term covering methods that can be highly structured and teacher controlled or student directed using discovery techniques. But the essential element in its definition is this assumption:

> the student will learn from his own direct confrontation, individually or in a group, with a learning resource or set of resources, and activities connected with them, rather than from conventional exposition by the teacher (p. ix).

Beswick points out that the oldest form of resource-based learning is, perhaps, the book. Noble defines resource-based learning as "any system whereby teachers organize for students access to stored knowledge, rather that themselves mediating that knowledge in classroom discourse" (p. 170). An important difference between packages used for resource-based distance learning and those available "off-the-shelf" is the availability of consultation with a teacher or tutor in the former and the "on-your-own" study of the latter.

Four types of prepackaged, self-paced instructional materials. The four types of prepackaged, self-paced instructional materials in this study are based in the following delivery systems: textbook, audiotape, videotape, and personal computer. Each is discussed briefly below.

Textbook-based. As noted above, print materials such as the book are among the oldest available types of learning resources. They include the familiar bound textbook, but also come in formats including ring or spiral bound, workbooks, and manuals.

Audiotape-based. The audiotape (usually in audiocassette form) is the carrier of instruction next in popularity to print materials (Noble,

1980). Audiotape-based courses have been available since World War II, chiefly for language courses at first, but now as a growing instructional delivery medium in other areas (Grayson, 1982). Audiotape has a long history in higher education with Postlethwait's audio-tutorial method (Postlethwait, Novak, & Murray, 1971; Fisher and MacWhinney, 1976). Noble states that over 70 percent of Open University students have access to cassettes for coursework. DeMuth (1979) studied over 700 pharmacists who had completed 10 different audiocassette courses as a means of continuing profesional education. He found that subjects' highest response was to the convenience and time-saving attribute of the cassette courses.

Low cost and versatility appear to be benefits of audiocassettes for the course developer with those same benefits plus ease of portability as benefits for the learner.

Audiotapes can be useful in reducing the loneliness of self-paced learning in that they can present not only information, but also discussions that allow the learner to feel closer to peers or an instructor (Clarke, 1982).

Videotape-based. Development and production of video programs is costly and time-consuming. Its cost is the highest inhibiting factor in its use, according to Clark (1982).

Broadcast television as an instructional medium has been used and evaluated since the 1950s. Chu and Schramm (1967) produced the report, "Learning from Television, What the Research Says." Meyer and Nissen (1979) provided a bibliography of research literature related to the effects and functions of television related to children and adolescents

that numbered 918 resources.

Until recently, videotaped educational programming for adults has been available only through over-the-air broadcast to homes or educational centers, some offering two-way interactive capability (Benjamin, 1984). Brown, Brown, and Danielson (1975) investigated the use of broadcast television for off-campus adults in a college level accounting course and reached the conclusion that older persons preferred a slower pace and more repetitions. They suggest that older persons might use repeated viewing as a technique for better learning. Such a possibility becomes reality in prepackaged videocassette courses. Their conclusion supports further investigation of use of videocassettes for adults.

Increasing home use of videotape cassette systems--one in every nine American homes with, perhaps, half of American homes with TVs having one by 1987 (How-to tapes, 1984)--has made personal use of educational videocassettes a posibility. Martin (1985) calls the videocassette format for self-paced study, "a boon to the training field" (p. 41) in industry because the trainee can handle the equipment, control what he or she does, and control the rate.

Richardson (1983) has proposed five areas of research needs regarding televised instruction, needs which bear upon both broadcast and nonbroadcast formats:

1. Existing telecourse packages and their theories of content, teaching-learning processes, and evaluation.
2. Motivation of various subgroups of adults and the recruitment and retention strategies which are effective for them.
3. Instructional strategies effective for adult learners.
4. Logistics and costs of alternative delivery systems and the

audiences they are likely to reach.
5. The technical assistance and training needs of the new adopters (p. 8)

Personal computer-based. Noble (1980) cites these uses of computers "as learning laboratories" (p. 19): simulations, data bases, and managers of learning. As managers of learning they sequence and provide knowledge, offer remediation, allow model-building and decision-making, and test.

Computers are currently creating much interest in the educational arena. Meierhenry (1983) reports that most research on educational media and technology is now centered on mainframe and microcomputers, especially as an interactive learning system with television or videodisc. Corporations such as IBM, United Airlines, and others are training adults on computer terminals and microcomputers. Richardson (1983), reporting on trends in instruction for adults, states, "Soon people will be able to purchase courses in a variety of topics at their local Radio Shack, and skip the higher education agency entirely, if they so desire" (p. 6). Evaluations of computer-based instruction have been encouraging, with most studies showing either no significant difference or positive effects on student learning and attrition (Grayson, 1982). But novelty and numerous other effects play a part in many findings. An examination of computer-assisted instruction for nursing students produced evidence of greater gains in learning for the CAI group over two comparison groups, but no significant difference in attitude scores (Conklin, 1983).

CHAPTER SUMMARY

This chapter provided background for the study with an overview of the adult learner and types of educational activities available to adults. Review of the literature found that adults who participate in educational activities are those more likely to participate in the future. Also, more adults are availing themselves of self-directed methods of study, with increasing development and sales of prepackaged, self-paced courses.

Computer-based and manual searches of education and motivation literature indicated that expectations are important to persons undertaking achievement-oriented tasks, such as study via prepackaged, self-paced instructonal materials. However, previous studies on self-paced materials have been done chiefly with classroom-based instructional programs at the university level or below. The general public, the focus of this study, does not provide the "captive audience" necessary to facilitate research.

The three expectation variables of this study--effort, time, and learning achievement--were found to be important in both the education and consumer behavior fields. Persons' expectations of effort expenditure, time investment, and outcome (learning) were found to be based upon prior experience and situational cues. Their expectations are important to both their decision to purchase and, then, their persistence in the use and study of an educational product to its completion or fulfillment of their goals.

Finally, various types of "self-paced" instruction were discussed.

"Prepackaged" was defined and the limited literature available described its characteristics and availability. The four types of prepackaged, self-paced instructional materials in this study were introduced.

CHAPTER III: RESEARCH DESIGN

INTRODUCTION

The chapter describes the methods and procedures used in this descriptive study. It lists the dependent and independent variables and the research and statistical hypotheses. It explains the mail survey methodology, including sample selection. The data analysis procedures are introduced with rationale for their selection.

DEPENDENT AND INDEPENDENT VARIABLES

The general research question to be explored was: What are adult learners' perceptions of four types of prepackaged, self-paced instructional materials--textbook-based, audiotape-based, videotape-based, and personal computer-based--in respect to expectations of (1) effort expenditure and (2) time investment necessary for completion of those materials and, (3) expectation of possible learning achievement? To respond to the three parts of the question, dependent variables consisting of expectation scores were examined. These dependent variables were expectations of:

1. Effort expenditure
2. Time investment
3. Learning achievement

Expectation scores (with a range of zero to three) were derived for each of the above expectations from respondents' forced choices from all possible pairs of four types of prepackaged, self-paced instructional materials, the independent variables:

1. Textbook-based
2. Audiotape-based
3. Videotape-based
4. Personal computer-based

The following matrix (Table 3.1) illustrates 12 possible combinations of the three dependent variables and the above independent variables of method of instruction.

Table 3.1

Matrix of Expectation Variables and Types of Prepackaged, Self-paced Instructional Materials

EXPECTATION VARIABLES	TYPES OF PREPACKAGED, SELF-PACED COURSEWARE			
	Textbook-based	Audiotape-based	Videotape-based	Personal Computer-based
Effort Expenditure				
Time Investment				
Learning Achievement				

Additional independent variables included the following:

5. An "experience with prepackaged, self-paced instructional materials" score (range: zero to ten for each of the four types of materials under investigation) derived from responses to four categories of the questionnaire.

6. Respondent's choice of a personal "ideal," or preferred, method selected from the four types of prepackaged, self-paced instructional materials of the study.

7. The expectation scores for effort expenditure and time investment on the four types of instructional materials used with the expectation of learning achievement score as a dependent variable. (Kerlinger [1973, 2nd ed.] points out that a variable may be dependent in one study and independent in another or within the same study: it is dependent upon its use. In this instance the attempt is to explain learning achievement based upon information about the effort and time expectation variables.)

RESEARCH QUESTIONS AND HYPOTHESES

This was a descriptive study. The research questions and their hypotheses were concerned with whether or not there was a relationship or interaction, rather than the direction of any such interaction. The "four types of prepackaged, self-paced types of instructional materials" referred to throughout are those mentioned above: textbook-based, audiotape-based, videotape-based, and personal computer-based.

Thurstone's Law of Comparative Judgment, Case V, was used to scale the four types of prepackaged, self-paced instructional materials on each of the expectation variables: effort expenditure, time investment, and learning achievement. The test of significance for the Case V model is a goodness-of-fit test. The chi-square for discrepancies between observed and theoretical proportions tests whether Case V is the appropriate model for the data. If all the assumptions are met for scaling with the Case V model the chi-square is nonsignificant. The null hypothesis, according to Mosteller (1951) is the assumptions of the Case V model. The alternative hypothesis is that the null hypothesis is

not correct. Because those hypotheses test valid use of the model, research questions one through three are given in question form only.

Research Question 1: How are each of the four types of prepackaged, self-paced instructional materials perceived as to expected effort expenditure necessary for learning achievement?

Research Question 2: How are each of the four types of prepackaged, self-paced instructional materials perceived as to expected time investment necessary for learning achievement?

Research Question 3: How are each of the four types of prepackaged, self-paced instructional materials perceived as to expected possible learning achievement?

Research questions four through eight looked at relationships, their presence or absence and strength. Questions four and five investigated the relationship between expectations of effort expenditure and time investment for each of the four types of prepackaged, self-paced instructional materials. Question five looked at possible relationships between respondents' experience with prepackaged, self-paced instructional materials and their expectations of effort, time, and possible learning achievement. Correlational analysis was used.

Research Question 4: What is the relationship between expectations of effort expenditure and time investment for each of the four types of prepackaged, self-paced instructional materials?

Research Hypothesis 4: There will be a relationship between respondents' scores on expectations of effort expenditure and their scores on expectations of time investment for the four types of prepackaged, self-paced instructional materials.

Research Question 5: What is the relationship between previous experience as a consumer of prepackaged, self-paced instructional materials and expectations of effort expenditure, time investment, and learning achievement?

Research Hypothesis 5: There will be a relationship between respondents' scores on the expectations of effort expenditure, time investment, and learning achievement on each of the four types of prepackaged, self-paced instructional materials and their level of previous experience for each.

Questions six and seven--using expectation of learning as the dependent variable--explore the effects of effort and time expectations (question six) and those expectations plus experience (question seven) upon expectation of possible learning from each type. Multiple regression analysis was used.

Research Question 6: What is the effect of expectations of time investment and effort expenditure upon expectation of learning achievement for each of the four types of prepackaged, self-paced instructional materials?

Research Hypothesis 6: Scores for expectations of effort expenditure and time investment will have an effect upon the score for expectation of learning achievement for each of the four types of prepackaged, self-paced instructional materials.

Research Question 7: What effect do previous experience as a consumer of prepackaged, self-paced instructional materials and expectations of effort expenditure and time investment have upon expectations of learning achievement for each of the four types of prepackaged, self-paced instructional materials?

Research Hypothesis 7: Scores for expectations of effort expenditure and time investment and for experience will have an effect upon the score for expectation of learning achievement for each of the four types of prepackaged, self-paced instructional materials.

Question eight categorized respondents according to each individual's choice of a preferred method (from among the four being investigated) to investigate the relationship between a preference or "favorite" method and expectations of effort expenditure, time

investment, and learning achievement. Crosstabulation analysis was used.

Research Question 8: What is the relationship between preference for an "ideal" method of prepackaged, self-paced instructional materials and expectations of effort expenditure, time investment, and learning achievement for each of the four types of prepackaged, self-paced instructional materials?

Research Hypothesis 8: There will be a relationship between respondents' scores on expectations of effort expenditure, time investment, learning achievement, and their preferences for an "ideal" method for each of the four types of self-paced instructional materials.

DESCRIPTION OF THE SURVEY INSTRUMENT

The mailed survey instrument (Appendix A) consisted of three items: (1) cover letter, (2) page of relevant definitions, and (3) a three-part questionnaire. The four-page questionnaire was printed back and front and folded book-style. Descriptions of each of the parts of the survey instrument follow.

Cover letter. A one-page letter stated the purpose of the study and the usefulness of responses to both the doctoral research project and the development and marketing of prepackaged, self-paced instructional materials. The letter explained why recipients of the survey had been chosen. It suggested a return date for the questionnaire and promised confidentiality.

An incentive was attached to the cover letter—a lollipop to attract attention and for "energy" while completing the questions. The lollipop

incentive was chosen for two reasons: high return rates when used with two other surveys (C. R. Cooper, PhD, personal communication, January 17, 1985) and because survey recipients, East Lansing Arts Workshop patrons, were thought to appreciate novel ideas according to personnel at the Workshop.

Examples of local retailers of prepackaged, self-paced packages were mentioned in the cover letter in an attempt to increase the salience of the topic. Salience of the research topic is important to obtain cooperation from potential respondents (Sudman & Bradburn, 1982). Other attempts to increase salience were made in the introductory part of the questionnaire itself.

Definitions. A separate page of relevant definitions of terms used in the study was included following the cover letter. Respondents were asked to refer to the definitions as necessary so that everyone who responded might have the same meanings in mind.

Questionnaire. The first part of the questionnaire (page one) introduced the four types of prepackaged, self-paced instructional materials being studied. It listed subjects often covered in such packages, asked the respondent to check those of interest to him or her and add another of interest on a blank line, and to assume that he or she had decided to study a subject through prepackaged, self-paced instructional materials. This attempt to increase salience also increased the size of the questionnaire, a negative aspect when probable response rates were considered (see below).

In addition to the salience factors discussed above, a question prefaced the data-gathering portion of the questionnaire. That question

asked respondents to check a box if they would NEVER consider taking a prepackaged, self-paced course because they believed learning to take place only in the classroom or other group situation. The survey of the literature for the previous chapter made the researcher aware that many adult educators discuss adult education as primarily institutional or classroom-based. Thus the question was inserted for two reasons: (1) To reduce chances that nonrespondents would differ from respondents on this basis by giving those who favored group learning the opportunity to state that fact and respond in spite of it, and, (2) it was thought that if many respondents felt that way, their profile or responses might also differ in some way.

The second part of the questionnaire, pages two and three, held the instructions and research questions. First, respondents were asked to assign points (zero to 100) to four "importance" factors. Because the attributes of effort expenditure, time investment, and learning achievement had been selected from experience and the literature, it was necessary to gauge their importance in selection of a prepackaged, self-paced course. They were listed along with a category of "other" factors including cost, course sponsor, or whatever the respondent might deem important. The second question asked respondents to indicate which would be their "ideal" type of study from among the four types of prepackaged, self-paced delivery systems in the questionnaire. Their ideal could then be compared to the one type they scored as highest in expected possible learning achievement in that section of the paired comparisons.

The dependent variables of expectations of effort expenditure, time

investment, and learning achievement were measured on page three using a "forced-choice" method, the method of paired (or, pair) comparisons. Torgerson explains the method:

> The method of paired comparisons is essentially a generalization of the two-category case of the method of constant stimuli....In paired comparisons, each stimulus serves in turn as the standard. Each stimulus is paired with each other stimulus. With n stimuli, there are thus $n(n-1)/2$ pairs. Each pair is presented to the subject, whose task is to indicate which member of the pair appears greater...with respect to the attribute to be scaled. The subject must designate one of the pair as greater (1958, 167).

The paired comparisons method is an effective way to handle responses from both experienced respondents and those with no or little experience (who might need to make estimations or to guess). The latter persons, although naive, may have formed attitudes or opinions. Those attitudes or opinions may be effectively measured using paired comparisons (Thurstone, 1959). Persons who may have difficulty ranking objects can frequently make judgments when objects are presented two at a time (Luck, Wales, Taylor, & Rubin, 1982, 6th ed.).

An example of paired comparisons using types of sporting activities was completed to demonstrate how respondents were to circle the one stimulus in each pair judged "greater than" the other on the dependent variables of expectations of effort expenditure, time investment, and learning achievement. Further instructions were adapted from those given to subjects in a 1931 study by Thurstone in which he wrote, "If you find it difficult to decide for any pair be sure to underline one of them, even if you have to guess" (1959, p. 310).

The arrangement of the paired stimuli is important because "no

explicit provision is made for time or space errors in the law of comparative judgment" (Torgerson, 1958, p. 167) used for analysis of the data. He points out that randomizing the stimuli as to their positions in the pairs and the presentation of the pairs is often adequate. However, four stimuli were too few to randomize efficiently. Instead, a counterbalancing method was used. With counterbalancing, in so far as is possible, each stimulus appears first for half of the time and appears second for the other half the time. The order of presentation was varied slightly between each of the three sets of stimuli by starting with a different pair in each set. Torgerson offers other precautions to avoid time or space errors and practice or fatigue effects, many of which either could not be adhered to due to the small number of stimuli, or did not need to be due to the type of study (e.g., dividing "correct" responses between first and second members of pairs when there was no pattern of "correct" responses). However, all were taken into account in developing the sets of paired comparisons.

Part three, the demographic section of the questionnaire, asked for information about previous experience with the four types of prepackaged, self-paced types being studied. Fennell (1980) wrote that her analysis of consumer decision processes "suggests the importance of distinguishing between instances in which consumer's information about the marketplace is based on experience and those in which it is not" (p. 30). For example, McIntosh (1981) found prior experience with a Personalized System of Instruction to be a significant predictor of success in that method (and also in traditional lecture/discussion method as well). The experience question was divided into four

sections:

> Exposure--having seen advertisements for any of the four types of prepackaged, self-paced instructional materials;
>
> Familiarity and Minimum Experience--attempting but not completing any of the four types of prepackaged, self-paced instructional materials;
>
> High Familiarity--having taken part in development of any of the four types of prepackaged, self-paced instructional materials; and,
>
> High Familiarity and Experience--having completed any of the four types of prepackaged, self-paced instructional materials.

For data analysis, points were assigned arbitrarily to each of the above experience levels with one point for the lowest level (exposure) to four points for the highest level.

Information about respondents' media habits was sought through questions about book and newspaper reading habits, number of magazine subscriptions, and time spent watching television and listening to the radio. Ownership information regarding the hardware was sought to gauge familiarity with the electronic devices used for audiotape-, videotape-, and personal computer-based prepackaged, self-paced instructional materials.

Demographic information requested included level of education completed, household income, sex, age, marital status, number in household, ZIP code, level of employment, and whether handicapped. This information was sought primarily to furnish a profile of the respondent sample.

Follow-up mailing. A postcard thanking respondents and encouraging others to respond was mailed several weeks after the questionnaire had

been sent.

RELIABILITY AND VALIDITY OF THE SURVEY INSTRUMENT

Three types of validity must be considered when developing and using any research instrument: predictive, construct, and content. Within the instrument itself, both effort and time have previously been shown to be predictors of learning achievement. Predictive validity of the total instrument was not a concern as this was a descriptive study.

Construct validity concerns itself with the abstractness or concreteness of a variable (Nunnally, 1978, 2nd ed.). In this study expectations are measured globally with no attempt to break them down into observable attributes. This admittedly leaves each construct open to individual interpretation. However, the survey instrument attempted to guide respondents to a common understanding by furnishing a page of definitions for each construct.

Assurance of content validity was attempted through use of the well-researched method of paired comparisons technique within the already acknowledged limitations of the study. In an attempt to ascertain the aspect of content validity known as "face validity," or "an inspection of the final product" (Nunnally, 1978, 2nd ed.), the instrument was pretested with a convenience sample of 16 adult students in an evening course at Michigan State University. They completed the instrument and added suggestions for its improvement. The instrument received final revisions and review by persons regarded as competent in

survey research before mailing.

The method of paired comparisons was used to derive the expectation scores. The technique has a long history. Bock and Jones (1968) trace its development back to G.T. Fechner who suggested in 1876 that objects could be compared on other than purely physical dimensions. Most of today's use of the method relies upon Thurstone's (1959) work, especially his Law of Comparative Judgment, discussed later. Nunnally (1978, 2nd ed., p. 46) finds the method "more thorough" than straight ranking with respect to an attribute. Luck, et. al., (1982, 6th ed.) states that the method avoids order bias.

Thus, the method is a well-researched and proven technique. But individual studies must evidence their own reliability and validity. Kendall's (1970) coefficient of consistence and coefficient of agreement were used to demonstrate reliability and validity in this study.

Circular triads demonstrate inconsistencies of judgment in paired comparisons studies. A circular triad occurs when a judge (respondent) indicates that: A -> B -> C -> A, where the arrow (->) means "is preferred to" (David, 1963, p. 11). If a judge expresses preferences in a circle, a condition known as intransitivity, a ranking of the objects cannot be attained. Thus, the presence of circular triads can lessen both reliability and validity of an instrument. According to Edwards, circular triads may result from deficiencies in the judge or in the instrument. Regarding the judge, deficiencies include carelessness due to disinterest in the task or a personality or ability trait reflecting general inconsistency. Regarding the instrument, inconsistency might result from stimuli not falling "along the single dimension on which we

are trying to scale them" or differing "with respect to attributes or dimensions other than the one in which we are interested" (Edwards, 1957, p. 67). In this study, with perceptions of even naive respondents wanted, directions adapted from Thurstone (1959) were used to encourage respondents to guess. David states that the simplest explanation for circular triads "is that the judge is at least partially guessing when declaring his preferences. He may be guessing because of incompetence or because the objects are in fact very similar" (1963, p. 10).

The coefficient of consistence (Zeta, Z) ranges from 0 to 1.00 with zero "indicating the maximum number of circular triads and 1.00 indicating consistency, the absence of any circular triads" (Edwards, 1957, p. 68). When there is an even number of stimuli to be ranked the coefficient is calculated on individual judge rankings according to the formula:

$$Z = 1 - 24d/(n^3 - 4n)$$

where d is the observed number of triads for a given judge. With n=4, the possible number of triads is 0, 1, or 2.

Presence of circular triads was determined by making a matrix for each judge's responses on each of the three paired comparison segments: expectations of effort expenditure, time investment, and learning achievement. The number of times each of the four types of prepackaged, self-paced instructional materials was rated "greater than" the other for all pairs was recorded in the matrix (See Figure 3.1). These were summed across the rows to obtain "scores" for each type of instructional materials on each of the three dependent variables. If the scores

formed a ranking, 0 to 3, transitivity was assumed. With n = 4, possible triads were scores of 1,1,1,3; 2,2,2,0; 1,1,2,2.

	T	A	V	PC	SCORES
Text-based	-	0	0	0	0
Audio-based	1	-	0	0	1
Video-based	1	1	-	1	3
PC-based	1	1	0	-	2

Transitive Scores

	T	A	V	PC	SCORES
Text-based	-	0	0	1	1
Audio-based	1	-	1	0	2
Video-based	1	0	-	1	2
PC-based	0	1	0	-	1

Intransitive Scores
(Two circular triads, $\underline{Z}$ =.000)

Figure 3.1: Sample Matrices with Summed Scores

The coefficient of consistence was calculated on individual judge rankings for each of the judges who responded on the expectation of effort expenditure, time investment, and learning achievement scales.

Edwards points out that although judges may have a coefficient of consistence of 1.000, they still might not agree in the judgments they have made. He suggests using Kendall's coefficient of agreement ($\underline{u}$) to determine "the extent to which a group of judges agree in their comparative judgments" (Edwards, 1957, p. 76). The value of $\underline{u}$ ranges from -1.000, no agreement, to 1.000, complete agreement. If $\underline{u}$ is positive we know that the judges agree to some degree.

The calculation of $\underline{u}$ begins with development of a frequency matrix showing the frequency with which one stimulus (column in matrix) was judged "greater" than another (row) by all judges. Column scores below the diagonal are summed. Each column score below the diagonal is also squared, then summed. These numbers plus the number of judges, the number of combinations of the $\underline{m}$ judges taken 2 at a time or $\underline{m}(\underline{m}-1)/2$,

and the number of combinations of the n stimuli taken 2 at a time or n(n-1)/2 are then used as input into formulae explained well by Edwards (1957).

Kendall provides tables (for values of n up to 8 and judges (m) numbered up to 6) and formulae (for values of n over 8 and m over 6) to test the significance of u by "considering what the distribution would be if all the preferences were allotted at random" (1970, 4th ed., p. 152). The chi-square distribution is used. The coefficient of agreement for each of the scales in this study was calculated and reported with its chi-square value and significance level.

DESCRIPTION OF THE STUDY POPULATION

Survey recipients were chosen from patrons of the East Lansing Arts Workshop (ELAW). The Workshop offers courses that draw participants from East Lansing and surrounding area. ELAW provided a mailing list of 1,900 course participants and other interested persons. Those persons had, through their participation, indicated interest in educational opportunity outside regular school hours. Approval to undertake the survey research involving human subjects was granted by Michigan State University (see Appendix B).

David (1963) describes research of the type herein as a "consumer panel," presenting "the familiar difficulties of finding a representative and yet co-operative group" (p. 93). A study population as representative of the general population as possible was sought with the one qualification the Workshop patrons appeared to fulfill: The population was to be highly motivated toward taking advantage of educational opportunities.

Prepackaged, self-paced instructional materials of the type being studied are increasing in availability from mail order companies, and in book, video, and computer retail markets, but they require investment of both time and money. Data indicates that persons who have already invested in their educations make up the most likely market for more education. 1975 National Center for Education Statistics (NCES) data provided this profile of the "largest number" of adult learners, "They were white high school graduates, between 25 and 34 years of age, employed more than 35 hours per week, with annual family incomes of

$15,000 to $25,000. Female participants were slightly more numerous than male participants" (Cross & Zusman, 1979). That same data indicated that 57.4 per cent of adults participating in adult education had completed four or more years of college. A more recent interpretation of NCES data led to this statement, "The more education an adult has obtained, the more likely he or she is to take even more courses, the study shows" (Ordovensky, 1983, p. 6F).

The East Lansing, Michigan, area surrounds Michigan State University and is a population of high educational achievement. 96.4 percent are high school graduates. 65.4 percent of adults 25 years and over have completed four or more years of college (U.S. Dept. of Commerce, Bureau of the Census, 1983). As residents of this area, ELAW patrons were expected to represent a group with high educational achievement and interest.

SELECTION OF THE SAMPLE

Names and addresses of the 1900 members of the East Lansing Arts Workshop mailing list were received on sets of mailing labels organized by geographical area. The sampling procedure was to be manual. For these reasons a simple random sample was ruled out, both to reduce labor and to avoid possible clustering of respondents from particular neighborhoods. A systematic random sample (see Sudman, 1976) was selected.

With the exception of the pilot survey--which used a convenience

sample--no advance estimation of population characteristics was available upon which to base sample size decisions. Determination of sample size was made chiefly upon practical (cost) requirements. Tull and Albaum (1973) state that five percent is regarded as a significant proportion of a population. Five percent of the ELAW population is 93 persons. For reasons of cost, it was necessary to keep the mailing at 300.

Selection of five percent as a target was also supported by the pilot test results which indicated that the lengthy letter/ definitions/questionnaire procedure might meet with some resistance. The pilot test, using a controlled convenience sample of 16 adults in an evening course at Michigan State University, had resulted in 10 usable questionnaires. With no control over respondents from the general public it was felt that, even after improvements in the instrument, usable returns might be half that of the pilot test, or 30%.

DATA ANALYSIS PROCEDURES

Respondent data was coded and analyzed using both manual and computerized data analysis techniques. Computer-based data analysis was accomplished using the Statistical Package for the Social Sciences (SPSS) (Nie, Hull, Jenkins, Steinbrenner, & Bent, 2nd ed., 1975) and SPSS Update 7-9 (Hull & Nie, 1981) at the Michigan State University Cyber 750 computing facility. This section introduces the four major analysis procedures, Thurstone's Law of Comparative Judgment, Case V;

correlation; multiple regression; and crosstabulation.

Thurstone's Law of Comparative Judgment, Case V. Thurstone's Law of Comparative Judgment, Case V, was used to develop an interval scale for the four types of prepackaged, self-paced materials on each of the expectation variables: effort expenditure, time investment, and learning achievement. The Test of Internal Consistency (Guilford, 1954, 2nd ed., p. 163), a chi-square test for the matrix of proportions from which the interval scale is developed (based upon Mosteller, 1951), was used to test the null hypothesis of applicability of the Case V model for scaling. A description of the Case V procedure follows.

Thurstone states the Law of Comparative Judgment as follows:

$$S_1 - S_2 = x_{12}\left(\sqrt{\sigma_1^2 + \sigma_2^2 - 2r\sigma_1\sigma_2}\right),$$

in which

S_1 and S_2 are the psychological scale values of the two compared stimuli.

x_{12} = the sigma value corresponding to the proportion of judgments $p_{1>2}$. When $p_{1>2}$ is greater than .50, the numerical value of x_{12} is positive. When $p_{1>2}$ is less than .50, the numerical value of x_{12} is negative.

σ_1 = discriminal dispersion of stimulus R_1.

σ_2 = discriminal dispersion of stimulus R_2.

r = correlation between the discriminal deviations of R_1 and R_2 in the same judgment (1969, p. 41).

The "discriminal dispersion" is the standard deviation of the distribution of discriminal processes on the scale for a particular stimulus. Torgerson explains the law as "a set of equations relating the proportion of times any given stimulus k is judged greater on a given attribute than any other stimulus j to the scale values and discriminal dispersions of the two stimuli on the psychological

continuum" (1958, p. 159). The reader is referred to Thurstone (1959), Torgerson (1958), or texts by Guilford (1954), Edwards (1957), Bock and Jones (1968), David (1963), Kendall (1979), and Nunnally (1978, 2nd ed.) for derivation of the law and assumptions made in its use.

Thurstone has formulated five cases of the law. Case I concerns repeated judgments made by a single respondent. Cases II - V are forms used with multiple respondents making only one judgment for each pair of stimuli. Case V makes one assumption additional to those made by Cases I-IV, namely that all discriminal dispersions are equal. Guilford states, "Discriminal dispersions will be equal when stimuli are equally easy to place on a scale" (1954, p. 156). A Test of Internal Consistency is made using chi-square to verify that discriminal dispersions are equal and that the scaling meets all assumptions of Case V. A nonsignificant chi square indicates that Case V scaling assumptions have been met. A significant chi-square may mean "lack of normality, lack of unidimensionality, or unequal standard deviations" (Guilford, 1954, p. 165).

Implementing the Law of Comparative Judgment implies following several steps (following Guilford, 1954):

1. Develop a frequency matrix (F) of judgments for each of the stimuli in the paired comparisons.
2. From the frequency matrix develop a proportion matrix (P).
3. Compute the Test of Internal Consistency from the proportion matrix to verify that Case V can be used.
4. Use the normal curve tables to derive a matrix Z corresponding to the proportion matrix.
5. Sum the columns of matrix Z.
6. Determine the mean of each column. The means provide the scale values of the stimuli.
7. Add a constant (the absolute scale value of the stimulus with the largest negative deviation) to all scale values to develop a scale with all positive signs.

The above steps result in a scaling of stimuli located on a "psychological continuum with respect to one another only" (Torgerson, 1958, pp. 194-95), an interval scale. The scale has an arbitrary zero point based only upon judgments of differences between the stimuli. Additional statistical steps could be employed to determine a rational and psychologically meaningful zero point. Other, outside information is necessary to make that determination. Guilford (1954) illustrates the method using a second sample of subjects to obtain the needed information. In this study the exploration of the differences between the four types of prepackaged, self-paced instructional materials ended with development of the interval scale.

Correlation. Analysis of the data for hypotheses four and five was accomplished using correlational programs available in the SPSS software. This section explains reasons for choice of the method and its use for those hypotheses.

As described for the "Case V" procedure, a matrix was made of each respondent's discriminations for each set of the paired comparisons. The responses were added across the rows, giving "scores" for each of the four types of prepackaged, self-paced materials on each of the dependent variables. These "scores" provided a ranking (ordinal data) for each respondent (whose responses were transitive), but also, because of the additivity and subtractivity of the distances between items, provided an interval level of measurement. In actuality, the level of measurement fell somewhere between ordinal and interval. Thus, to select tests for the hypotheses, the researcher referred to Kirk who has

written,

> If a level of measurement greater than ordinal but less than interval is achieved, an experimenter may choose to use a parametric test in order to take advantage of the additional information that is available....it is common practice in the behavioral sciences to use the more powerful parametric tests even though the assumptions are only approximately fulfilled" (1968, p. 492-93).

Means and standard deviations for respondent data indicated normality. However, both parametric and nonparametric correlation coefficients were requested for analysis of hypothesis four in order that they might be compared and the validity of use of interval measures examined before analysis of succeeding hypotheses.

Hypothesis 4: This hypothesis looks at the two expectations of effort expenditure and time investment. As noted in Chapter Two, the quality of persistence includes both elements of effort and time. This led to the question of whether the two expectations are highly related to each other on each of the different types of prepackaged, self-paced courses. The Pearson correlation coefficient was calculated for expectations of effort expenditure and time investment for each of the four types of prepackaged, self-paced instructional materials. For comparison purposes and to determine the robustness of the interval measure, Spearman Rho and Kendall tau coefficients were also calculated using the SPSS (Nie, et al., 2nd ed., 1975) Subprogram Nonpar Corr.

Hypothesis 5: Does experience with a prepackaged, self-paced course make a difference in the expectations respondents hold regarding effort expenditure, time investment, or learning achievement on the four types of instructional materials under study? Respondents' scores on

experience (Range: zero to ten) were correlated with their expectation scores for each of the four types of prepackaged, self-paced instructional materials. The Pearson r and probability levels were calculated.

Multiple Regression. Multiple regression was used for analysis of hypotheses six and seven. This section explains reasons for choice of the procedures and their use for those hypotheses.

Multiple regression is a parametric procedure useful for prediction of a single dependent variable from any number of independent variables. Respondents had been asked their choice of a preferred method of instruction and their expectations of effort expenditure and time investment before they responded to the item that measured their expectation of learning achievement. Therefore those three measures, along with prior experience, could be used as independent variables for analysis. Using the "scores" as interval level data, and relying on the robustness of the procedure, multiple regression was employed to explore whether those measures had any impact upon expectation of learning achievement on each of the four types of prepackaged, self-paced instructional materials for hypotheses six and seven.

Hypothesis 6: The scores for expectation of effort expenditure and expectation of time investment were used as independent variables in the SPSS New Regression (Hull and Nie, 1981) analysis with the score for expectation of learning achievement as the dependent variable to determine their effect upon the dependent variable for each of the four types of prepackaged, self-paced learning materials.

Hypothesis 7: The scores for expectation of effort expenditure,

expectation of time investment, and experience were used as independent variables in the SPSS New Regression (Hull and Nie, 1981) analysis with the score for expectation of learning achievement as the dependent variable to determine their effect upon the dependent variable for each of the four types of prepackaged, self-paced learning materials.

Crosstabulation. McIntosh (1981) found that students do express preferences for type of course, but had found no interaction between preference and performance when studying lecture/discussion versus a Personalized System of Instruction course. But would preference make a difference in expectations of a course?

Hypothesis 8: Respondents had been asked to indicate their preferred method of study from among the four in this study. Their preferences were crosstabulated with the expectation variables for each of the four types of prepackaged, self-paced instructional materials to explore possibility of relationships. The SPSS (Nie, et al., 2nd ed., 1975) Subprogram Crosstabs was used for the analysis.

CHAPTER SUMMARY

The chapter described the methods and procedures used in this descriptive study. The dependent and independent variables examined in the study were listed. Research questions and research hypotheses were given as the basis for statistical analysis procedures. The mailed survey instrument, consisting of a cover letter, page of definitions, and three-part questionnaire was described. The use of a forced-choice

method of data collection, paired comparisons, was explained. The factors of predictive, construct, and content validity were discussed in respect to the instrument. Another way to judge reliability and validity, the use of coefficients of consistence and agreement, was described.

The study population, a systematic random sample from patrons of the East Lansing (Michigan) Arts Workshop mailing list was described and reasons offered for its selection. Finally, four groups of data analysis procedures were introduced: Thurstone's Law of Comparative Judgment, Case V; correlation; multiple regression; and crosstabulation. Rationale was offered for their selection.

CHAPTER IV: DATA ANALYSIS

INTRODUCTION

This chapter reports the results of analysis of the data received from respondents to the questionnaire sent to a systematic random sample of the East Lansing Arts Workshop mailing list. Survey returns, respondent characteristics, and results of tests used to assess reliability and validity are reported in the first three sections of the chapter. Next, the four types of prepackaged, self-paced instructional materials are scaled on the three expectation variables of effort, time, and learning according to the results of statistical analysis using the Law of Comparative Judgment, Case V, for hypotheses one through three. Fifth, results of the correlational analysis for time and effort expectations presents information about relationships between those variables. The correlation of experience with effort, time, and learning expectations is also presented.

The sixth part of the chapter presents multiple regression analysis results for hypothesis six, regression of effort and time expectations upon expectation of learning, and hypothesis seven, regression of experience and effort and time expectations upon expectation of learning. Seventh, relationships between expectations of greater or lesser effort, time, and learning and respondents' choices of a preferred method of prepackage, self-paced method of study from among the four types in the study are examined using crosstabulations. A

summary concludes the chapter.

SURVEY RETURNS

Survey questionnaire returns are reported in Table 4.1. Respondents were asked to indicate their ZIP code on the questionnaire so that results could be matched to the expected population. Seventy-one percent of the returns came from the city of East Lansing and the immediate surrounding area. Remaining questionnaires came from Lansing and small towns in the mid-Michigan area. This was consistent with original population proportions.

Table 4.1

Report of Survey Returns

# Sent	# Returned, Undeliverable	# Returned	# Usable Returns	% Usable Returns*
300	15	100	97	34

* Based on # deliverable

Comments were written on a number of returned surveys regarding the lollipop incentive. One respondent who described him/herself as "an educational research (sic) with 50 years experience" was "insulted by your flippant 'sucker' approach," and returned an uncompleted questionnaire. All other comments received, such as the following examples, were favorable:

Thanks for the sucker.
Thanks for the sweet treat! I happened to need it today.
Terrific gimmick--That's the only reason this survey is not in the wastebasket!

A number of respondents wrote that they found the questionnaire "interesting," and others wished the researcher "good luck" in notes on the questionnaire or envelope.

RESPONDENT CHARACTERISTICS

Demographic characteristics. The final page of the questionnaire asked for routine demographic information and, also, for information regarding personal media habits so that an overall profile of the respondent group might be presented as background for the study results. Table 4.2 presents summary data for the demographic characteristics.

It was thought that the data would have most significance if it came from a group likely to comprise a market for prepackaged, self-paced instructional materials. That is, it was hoped that respondents would be adults, well-educated, and earning at a high enough level to be expected to have discretionary income. All respondents were over the age of 20, with a majority (66%) between the ages of 25 and 44. Over sixty-three percent of respondents had total household incomes of more than $25,000. Fifty percent reported full-time employment. Almost all (94%) had at least some college education, with 76.2% of respondents having earned a Bachelor's or more advanced degree. The female-male ratio differed from the 51 percent/49 percent East Lansing area ratio

Table 4.2
Demographic Characteristics
(N=97)

Characteristic	Frequency	Percentage
Age		
20-24	8	8.2
25-34	33	34.0
35-44	31	32.0
45-54	13	13.4
55-64	9	9.3
65-74	1	1.0
75+	2	2.1
Highest Level of Education		
High School	4	4.1
Some College	9	9.3
Associate Degree (2 year)	9	9.3
College Graduate (4 year)	36	37.1
Master's Degree	30	30.9
Doctoral Degree	8	8.2
Missing	1	1.0
Approximate Total Household Income		
Under $10,000	10	10.3
$10,000-19,999	13	13.4
$20,000-24,999	8	8.2
$25,000-34,999	21	21.6
$35,000-49,999	20	20.6
$50,000+	22	22.7
Missing	3	3.1
Number of Persons in Household (Mean)	3.1	

Characteristic	Frequency	Percentage
Employment/Student Status		
Full-time employed	37	38.1
Full-time employed, part-time student	12	12.4
Part-time employed, not a student	12	12.4
Full-time student	9	9.3
Full-time student, part-time employed	3	3.1
Part-time student, part-time employed	7	7.2
Temporarily unemployed, not a student	3	3.1
Homemaker	9	9.3
Retired, disabled	5	5.2
Sex		
Male	25	25.8
Female	72	74.2
Marital Status		
Married	57	58.8
Single, widowed, divorced, or separated	34	35.1
Missing	6	6.2
Physically Handicapped		
Yes	3	3.1
No	91	93.8
Missing	3	3.1

(U. S. Dept of Commerce, 1983) in that females responding to the survey outnumbered male respondents by three to one. The higher proportion of female respondents, while high, does echo the "more than half are women" found enrolled in noncredit classes reported by Naisbitt (1984). Over half the respondents (58.8%) were married. The average number of persons per household was 3.1.

One question asked if the respondent was handicapped and, if so, how. Only three respondents reported handicaps. Reported handicaps were related to vision, asthma, and arthritis. Prepackaged, self-paced instruction is useful for handicapped, especially homebound, persons. However, this study did not result in enough numbers of handicapped persons to look at their responses as a separate set.

Media characteristics. Reading, listening, and viewing habits may play a part in an individual's receptiveness to prepackaged, self-paced instructional materials. Questions were asked to develop a profile of the respondent group's media characteristics. The ranges of responses for reading, listening, and viewing habits were especially broad. Mean responses are reported in Table 4.3 along with the range for each category.

Over ninety-four percent reported owning a television. Eighty-one percent own an audiotape or audiocassette player. Less than half of the respondents reported owning a personal computer or videocassette recorder.

Experience characteristics. Respondents were asked to check whether they had seen or received advertisements for prepackaged, self-paced instructional materials, or had started (but not completed), completed,

or developed such materials. Less than half of the respondents reported seeing or receiving ads for audiotape, videotape, or personal computer

Table 4.3

Media Characteristics
(N=97)

HABITS

Characteristic	Mean	Range
Books read in past month	3.6	0 - 15
Personal magazine subscriptions	4.0	0 - 35
Minutes spent reading newspaper yesterday	26.9	0 - 120
Hours spent watching television yesterday	1.4	0 - 9
Hours spent listening to radio yesterday	1.7	0 - 16.7

OWNERSHIP

94.8%	Television
81.4%	Audiotape or audiocassette recorder/player
24.7%	Personal computer
18.6%	Videotape cassette receiver/player

materials. The numbers of persons having developed these types of courseware is small, but probably higher than for the general population due to the university community from which the sample was drawn. With the exception of the personal computer-based type of prepackaged, self-paced courses, those respondents who had either started or completed prepackaged, self-paced courses numbered almost fifty percent of the sample. Table 4.4 summarizes responses to the experience-related questions.

"Never" question. The first page of the questionnaire was used to introduce the topic of prepackaged, self-paced instructional materials. The final item on that page was a question allowing persons who might not favor this type of study an "escape" to state their preference but respond to the rest of the questionnaire in spite of it. That item suggested they put an "X" in the blank if they "would NEVER consider taking a prepackaged, self-paced course" because they felt learning took place only in classroom or other group situations.

Four persons marked the item. Their demographics were analyzed to

Table 4.4

Experience Characteristics
(N=97)

Percentage of respondents reporting having seen or or received advertisements for the following types of prepackaged, self-paced courses:		Percentage of respondents reporting having developed or been responsible for development of the following types of prepackaged, self-paced courses:	
70.2%	textbook-based	5.2%	textbook-based
49.5%	audiotape-based	4.1%	personal computer-based
38.1%	personal computer-based	2.1%	audiotape-based
34.0%	videotape-based	1.0%	videotape-based
Percentage of respondents reporting having studied, but NOT completed the following types of prepackaged, self-paced courses:		**Percentage of respondents reporting having studied AND completed the following types of prepackaged, self-paced courses:**	
24.7%	textbook-based	27.8%	textbook-based
13.4%	audiotape-based	15.5%	audiotape-based
5.2%	videotape-based	9.3%	personal computer-based
5.2%	personal computer-based	5.2%	videotape-based

determine whether they differed in any notable way from the other 95% of respondents. Three were over 45 years of age, with the fourth in the 20-24 age range. The oldest of the four had completed high school, two held four-year degrees, and one a Master's degree. Two were single, two married. Regarding experience, the respondent holding the Master's degree reported having developed a personal computer-based course, but the other three respondents were in the "no experience" category. Two were males, full-time employed and reporting incomes over $50,000. One of the two females was retired, the other a full-time student with part-time employment and both reported their incomes below $19,000. Media habits and ownership were well within the averages of the other respondents for these four persons. The two female respondents indicated that degree of personal learning achievement would be the most important factor in their choice of a course. The two full-time employed males marked time investment or time-tied-with-effort as most important. When asked to state a preference, two indicated videotape-based materials. The other two respondents chose textbook and audiotape. One female respondent evidenced inconsistency in her judgments in the "expected effort expenditure" section of paired comparisons, making two circular triads. Overall, these four respondents did not differ in any marked way from the other 95% of respondents.

Importance of expectation factors. With the expectation variables having been selected from the researcher's experience and the literature, an indication of their importance to respondents was wanted. The three expectations were listed with a category of "other

expectations" and respondents were asked to allot 100 total points among the factors to indicate their importance if the respondent were to select a prepackaged, self-paced course. The average number of points assigned to each set of expectations is given in Table 4.5. Degree of personal learning achievement was rated most important overall, with time and effort considered next in importance and almost equally important with each other.

Table 4.5

Importance of Expectation Factors

Factor	Mean
Effort I would expect to expend to study the subject	21.3
Time I would expect to invest to study the subject	22.9
Degree of personal learning achievement I would expect to attain in learning the subject	39.9
Other expectations (for example: cost of course, sponsor of course, other elements important to you	16.2
Total points (not equal to 100 due to rounding)	100.3

Preferred method. Respondent's choice of preferred type of prepackaged, self-paced instructional materials was asked before respondents completed the paired comparisons so that their preferences might be used as an independent variable in later analysis to examine whether preference would interact with expectations of effort, time, and learning. The frequency and proportion of respondents choosing each of the four types is presented in Table 4.6.

Table 4.6

Preferred Method of Study

	Freq.	%
Textbook-based	30	30.9
Audiotape-based	16	16.5
Videotape-based	31	32.0
Personal computer-based	16	16.5
Missing	4	4.1
Total	97	100.0

RELIABILITY AND VALIDITY

To assess whether inconsistencies indicated deficiencies in either the judges or the instrument, the number of circular triads was determined on the expectation variables over all the respondents. Kendall's (1970) coefficient of consistence was calculated according to the number of circular triads found. Table 4.7 provides the number of judges who were determined to have the possible coefficients of 1.000, .500, and .000.

Ten respondents were responsible for the 11 circular triads with one judge inconsistent in both the "time" and "learning" expectations sections of the instrument. Although the chi-square for significance of the coefficient $\underline{Z}$ cannot be performed for an $\underline{n}$ of less than seven (Edwards, 1957), it can been seen that 96 percent of the ratings were totally consistent. Another three percent were consistent at the .500 level.

Table 4.7

Coefficients of Consistence

	SCALES			
Z	Expectation of Effort	Expectation of Time	Expectation of Learning	Total
1.000	91	96	92	279
.500	4	1	3	8
.000	2	0	1	3
Total	97	97	96*	290

*One respondent did not complete this set of paired comparisons.

Judges may be highly consistent in their comparative judgments yet lack agreement in those judgments. Kendall's coefficient of agreement (u) was calculated for each of the scales in this study according to Edwards (1957). The upper value of 1.000 for u indicates perfect agreement. With 97 judges (effort and time scales) the minimum value of u is -.010. With 96 judges (learning scale) its minimum value is -.011. Edwards points out, "If u takes any positive value whatsoever, then there is a certain amount of agreement among the judges" (p. 78).

The coefficients are reported with their chi-square values and significance levels in Table 4.8. There is evidence of agreement, although not a large amount, among the judges. For each of the scales the chi-square indicates that the probability of the value of u is much less than .01 if the comparative judgments of all the judges were made at random. It can be concluded that the observed value of u is significant.

To summarize, judges were consistent in their judgments on the three

Table 4.8

Coefficients of Agreement

SCALES	u	x^2	df	Prob.
Expectation of Effort Expenditure	.069	168.868	6	<.01
Expectation of Time Investment	.091	59.332	6	<.01
Expectation of Learning Achievement	.070	46.351	6	<.01

paired comparison scales. As a group they also evidenced some agreement in their comparative judgments on the three scales. The scales offer evidence of reliability and validity.

LAW OF COMPARATIVE JUDGMENT, CASE V, ANALYSIS

The Law of Comparative Judgment, Case V (Thurstone, 1959), provided the basis for analysis of the data gathered by the method of paired comparisons in the survey questionnaire. The following research questions were answered using the Law of Comparative Judgment, Case V, scaling method following procedures given by Edwards (1957):

1. How are each of the four types of prepackaged, self-paced instructional materials perceived as to expected effort expenditure necessary for learning achievement?

2. How are each of the four types of prepackaged, self-paced instructional materials perceived as to expected time

investment necessary for learning achievement?

3. How are each of the four types of prepackaged, self-paced instructional materials perceived as to expected possible learning achievement?

Using Edwards procedures (see Guilford's 1954 summary of steps in Chapter Three), the four types of instructional materials (stimuli) were scaled on a psychological continuums with respect to the degree of three attributes (expectations of effort, time, and learning) each possesses. Appendix C provides the frequency matrices (Tables C.1, C.7, C.13), proportion matrices (Tables C.2, C.8, C.14), and $\underline{Z}$ matrices (Tables C.3, C.9, C.15) used for the scaling procedures for each of the four types of prepackaged, self-paced instructional materials.

In the final step of development of the scale values (the $\underline{Z}$ matrix) a constant--the absolute value of the stimulus with the largest negative deviation--is added to the means in each column to provide an arbitrary zero point for the scale. The final row of figures in each of the $\underline{Z}$ matrices for expectations of effort expenditure, time investment, and learning achievement calculated in that final step provides the interval scale for each variable. The interval scales thus developed for each of the three variables are presented in Figure 4.1.

As can be seen, respondents expected that videotape-based prepackaged, self-paced instructional materials would require both least effort and least time of the four types of materials to study a hypothetical subject of their choosing. The other three types of materials fell close to one another on the scale, but at considerably higher expectation of effort and time, with textbook-based materials expected to require the greatest effort and time. According to the

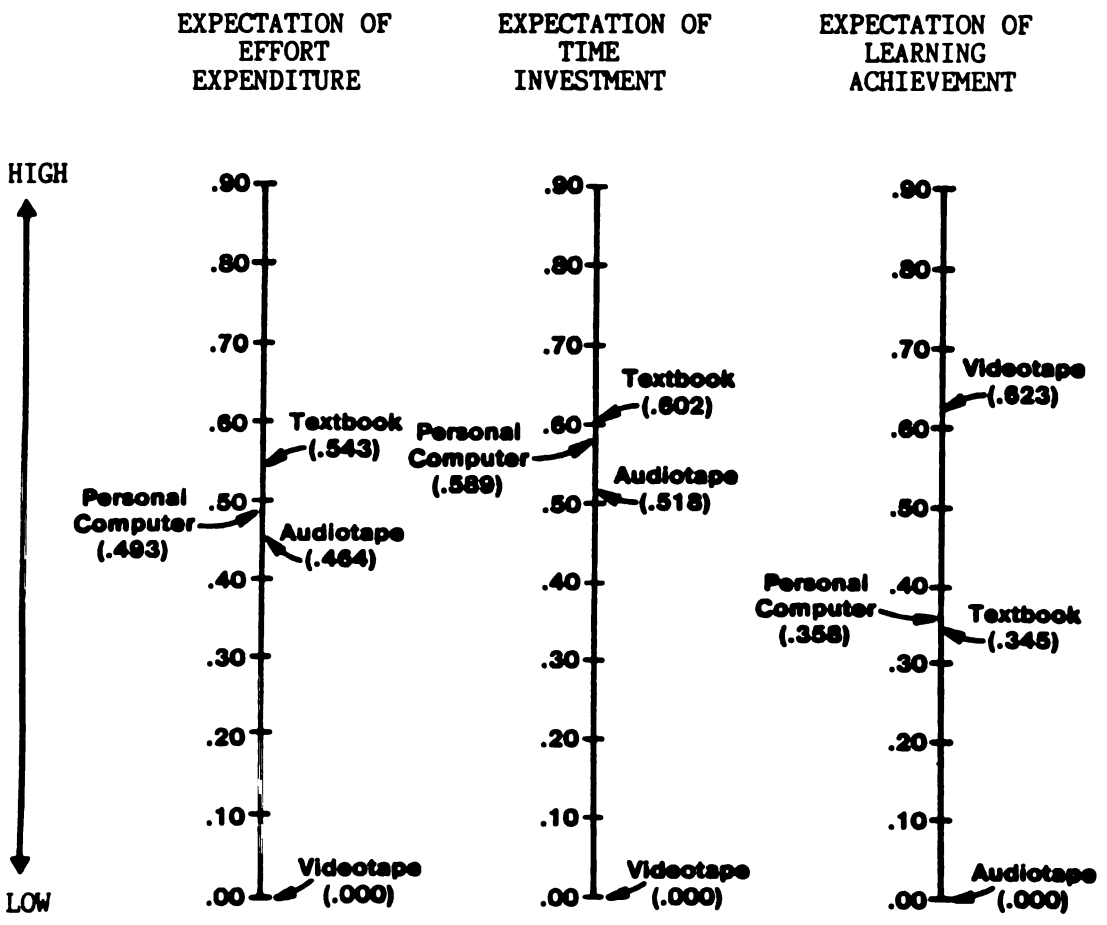

Figure 4.1: Interval Scales

interval scale, it is evident that respondents expected to exert about five and one-half times more effort to study via textbook-based prepackaged-self paced materials than via videotape-based materials, but saw textbook-based materials requiring less than twice the effort of personal computer-based or audiotape-based materials. On the time

dimension, textbook-based materials were expected to require slightly over six times more time investment than videotape-based materials but, as with effort expectations, less than twice the time investment of personal computer- or audiotape-based materials.

On the expectation of learning dimension, respondents expected greatest learning to be achieved from use of videotape-based materials, over six times more learning achieved than through audiotape-based materials. Textbook-based and personal computer-based materials were scaled almost three times lower in expected learning than videotape-based materials.

Two types of tests were performed to further analyze the data used to develop the above interval scales. First, the "Absolute Average Discrepancy" (AAD) between observed and theoretical proportions were calculated following Edwards (1957). He terms this analysis an "internal consistency check....determining how well our observed or empirical proportions...agree with those to be expected in terms of our derived scale values" (pp. 37-38). Appendix Tables C.4-C.6, C.10-C.12, and C.16-C.18 provide results of the analysis used to develop the AAD. For comparison purposes Edwards offers previous studies with AADs of .032 for seven stimuli, .024 for 20 stimuli, and .031 for 25 stimuli. The values calculated for this study of four stimuli fall at values somewhat higher than his examples. They are reported in Table 4.9.

Table 4.9

Absolute Average Discrepancy Values

SCALE	AAD
Expectation of Effort Expenditure	.024
Expectation of Time Investment	.034
Expectation of Learning Achievement	.043

The significance test for paired comparison judgments described by Edwards (1957) is a goodness of fit test for "the discrepancies between the observed and theoretical proportions obtained with Case V of the method" (p. 53). The chi-square tests whether the Case V model is appropriate for analysis of the data. According to Mosteller (1951),

> In such a test of significance involving goodness of fit, we are interested in knowing what the null hypothesis and the alternative hypothesis are....the null hypothesis is given by the [assumptions of the Case V] model....However, the alternative hypothesis is quite general: merely that the null hypothesis is not correct. In particular, the null hypothesis assumes additivity" (p. 208).

In other words, the researcher is looking for a nonsignificant chi-square. If significant, an interval scale cannot be developed for the stimuli by means of Case V due to the data not meeting the necesary assumptions, namely, that "all the discriminal dispersions are equal" (Thurstone, 1959, p. 49), plus the other assumptions for Thurstone's Cases 1-4.

The chi-square test for the Case V method is given by Edwards (1957, p. 56) as the following:

$$x^2 = \frac{\Sigma(\theta - \theta')^2}{(.21/M)}$$

with degrees of freedom given by

$$df = \frac{(n-2)}{2}$$

with n as the number of stimuli.

Analysis of the three scales for the chi-square test is provided in Appendix Tables C.19–C.27. Steps for the test of significance corresponding to the tables were as follows:

1. Development of a matrix of values of θ corresponding to the observed proportions.
2. Development of a matrix of values of θ corresponding to the theoretical proportions.
3. Subtraction of each theoretical θ' value from each corresponding observed θ value and development of a matrix of those discrepancies ($\theta - \theta'$).
4. Discrepancies are squared and summed and substituted in the above formula for chi-square.
5. Degrees of freedom are calculated and the significance of the chi-square value is evaluated using a chi-square distribution table.

Chi-square values for each of the three expectation scales were found not significant at the $p < .05$ level, resulting in no rejection of the null hypothesis. Thus, the assumptions for the Case V model held and the stimuli could be scaled on an interval scale according to the Law of Comparative Judgment. The chi-square values for the three scales are reported in Table 4.10.

Table 4.10

Chi-square Tests of Significance for the Scales of the Expectation Variables of Effort Expenditure, Time Investment, and Learning Achievement

SCALES	x^2	df	prob.
Expectation of Effort Expenditure	2.63	3	.50>p<.30
Expectation of Time Investment	3.61	3	.50>p<.30
Expectation of Learning Achievement	5.87	3	.20>p<.10

CORRELATIONAL ANALYSIS

Research questions four and five explored the possibility of a relationship between the time and effort expectation variables and, for question five, the relationship between expectations of time, effort, and experience. The research questions were as follows:

> 4. What is the relationship between expectations of effort expenditure and time investment for each of the four types of prepackaged, self-paced instructional materials?
>
> 5. What is the relationship between previous experience as a consumer of prepackaged, self-paced instructional materials and the expectations of effort expenditure, time investment, and learning achievement?

The hypotheses corresponding to the above research questions were investigated using correlational analysis. The research and null hypotheses were as follows:

> Research Hypothesis 4: There will be a relationship between respondents' scores on expectations of effort expenditure and their scores on time investment for the following types of prepackaged, self-paced instructional materials:
>
> Null Hypothesis 4: $r_{xy} = 0$ for a, b, c, d (where a, b, c, d are the four types of materials).
>
> Research Hypothesis 5: There will be a relationship between respondents' scores on the expectations of effort expenditure, time investment, and learning achievement on each of the four types of prepackaged, self-paced instructional materials and their level of previous experience for each.
>
> Null Hypotheses 5: $r_{xw} = 0$ for a, b, c, d.
> $r_{xy} = 0$ for a, b, c, d.
> $r_{xz} = 0$ for a, b, c, d.

Hypothesis Four. Significant correlations were found between expectations of effort and time for all four types of prepackaged,

self-paced instructional materials. Thus, there is evidence to reject the null hypothesis of no relationship between expectations of effort expenditure and time investment. The correlation coefficients and their probability levels are reported in Table 4.11.

Table 4.11

Correlation of Expectations of Effort and Time

Type of Prepackaged, Self-paced Instructional Material	Pearson r	prob.	Spearman r	prob.
Textbook-based	.6112	.001	.6190	.001
Audiotape-based	.5252	.001	.5503	.001
Videotape-based	.3883	.001	.4407	.001
Personal computer-based	.6389	.001	.6528	.001

As explained in Chapter Three, an interval level of data was assumed, but because the method used to develop the "scores" used for the analysis (see Chapter Three) also results in a ranking of the four types of materials for each respondent, both Pearson and Spearman coefficients were obtained. SPSS (Nie, et al., 2nd ed., 1975) Subprograms Pearson Corr and Nonpar Corr were utilized. The Pearson coefficient is slightly more conservative than the coefficient obtained by nonparametric methods. The closeness of the Pearson, Spearman, and Kendall (not reported) coefficients led to a decision to employ only interval level measurement for the remaining hypotheses.

Because no direction of relationship had been hypothesized, two-tailed tests of significance were requested. The direction of the relationship between expectations of effort expenditure and time

investment for all types of prepackaged, self-paced instructional materials was positive. As respondents expect to spend greater effort, they also expect to spend greater time. As can be seen in the table, correlations are above .50 for textbook, audiotape, and personal computer types of materials. Expectations for effort expenditure and time investment are seen as not quite as highly correlated for videotape-based materials.

Hypothesis Five: Is there a relationship between experience with prepackaged, self-paced instructional materials and respondents' expectations of effort expenditure, time investment, and learning achievement? Respondents scores for experience, ranging from zero to 10 on each of the four independent variables were correlated with their scores on the three expectation variables using SPSS (Nie, et al., 2nd ed., 1975) Subprogram Pearson Corr. The correlations are presented in Table 4.12. Primarily nonsignificant findings indicate that experience and expectations of effort expenditure, time investment, and learning achievement appear unrelated for prepackaged, self-paced instructional materials. Findings of low correlations are significant ($p < .05$) on three variables only:

- Experience with textbook-based prepackaged, self-paced instructional materials and expectation of learning achievement
- Experience with personal computer-based prepackaged, self-paced instructional materials and expectation of time investment
- Experience with personal computer-based prepackaged, self-paced instructional materials and expectation of learning achievement.

Table 4.12

Correlation of Experience Scores with the Expectation Variables

INDEPENDENT VARIABLES	EXPECTATION VARIABLES		
	Effort (n=97)	Time (n=97)	Learning (n=96)
Textbook-based Experience	-.0888 p=.387	-.0955 p=.352	.2240 p=.028
Audiotape-based Experience	-.0971 p=.344	-.0701 p=.495	.0706 p=.494
Videotape-based Experience	.0151 p=.883	.1154 p=.260	-.0343 p=.740
Personal Computer-based Experience	-.1677 p=.101	-.2803 p=.005	.2779 p=.006

MULTIPLE REGRESSION ANALYSIS

SPSS (Nie, et al., 2nd ed., 1975) Subprogram New Regression was used to investigate research questions six and seven:

6. What is the effect of expectations of effort expenditure and time investment upon expectation of learning achievement for each of the four types of prepackaged, self-paced learning materials?

7. What impact do previous experience as a consumer of prepackaged, self-paced instructional materials and respondents' expectations of effort expenditure and time investment have upon their expectations of learning achievement for each of the four types of prepackaged, self-paced instructional materials?

With so small a sample and, for question seven, a substantially

smaller group of experienced respondents, there was no effort made to predict from this data. Rather, the multiple regression analysis was directed at calculating the coefficient of multiple determination $\underline{R}^2$ to learn whether any variance in expectation of learning achievement as the dependent variable might be explained by expectations of effort expenditure, time investment, and (question seven) experience as independent variables. Neter and Wasserman (1974) explain cautions to be taken even when a large $\underline{R}^2$ is found:

> A large $\underline{R}^2$ does not necessarily imply that...[a] fitted model is a useful one. For instance, observations may have been taken at only a few levels of the independent variables. Despite a high $\underline{R}^2$..., the fitted model may not be useful because most predictions would require extrapolations outside the region of observation (p. 229).

The research and null hypotheses for questions six and seven were as follows:

> Research Hypothesis 6: Scores for expectations of effort expenditure and time investment will have an effect upon the score for expectation of learning achievement for each of the four types of prepackaged, self-paced instructional materials.
>
> Null Hypothesis 6: $\beta_1 = \beta_2 = 0$.
>
> Research Hypothesis 7: Scores for expectations of effort expenditure and time investment and for experience will have an effect upon the score for expectation of learning achievement for each of the four types of prepackaged, self-paced instructional materials.
>
> Null Hypothesis 7: $\beta_1 = \beta_2 = \beta_3 = 0$.

Hypothesis Six: The two independent variables of expectation of effort expenditure and expectation of time investment were entered into a multiple regression analysis with expectation of learning achievement

as the dependent variable. Both stepwise and forced entry procedures were attempted. With expectation of time investment entered first in the stepwise procedure, both independent variables were entered successfully for only the textbook-based and audiotape-based expectations of learning achievement category. Because interest was in the variance explained by both independent variables, regardless of the small addition made by the second, the forced entry procedure was then used. Table 4.13 reports results from the forced entry procedure.

The nonsignificant T tests for the regression coefficients for expectation of effort expenditure for videotape and personal computer-based materials indicate that expectation of effort expenditure contributes little, if anything, to expectation of learning achievement. If a linear regression model were to be built for those independent variables, expectation of effort expenditure could be dropped from any such proposed model. This also indicates that it contributes little to the variance in the significant R^2 for those two variables. The significance of F is largely due to the contribution made by expectations of time investment. Expectations of effort expenditure for textbook-based and audiotape-based prepackaged, self-paced instructional materials have significant regression coefficients, but, again, contribute less to R^2 than does expectation of time.

Also, as seen with the analysis for Hypothesis Four, expectations of effort and time are correlated. Neter and Wasserman (1974) explain:

Table 4.13

Multiple Regression Analysis of Expectations of Effort Expenditure and Time Investment on Expectation of Learning Achievement for Each of the Four Types of Prepackaged, Self-Paced Instructional Materials (N = 96)

VARIABLE	Unstandardized Regression Coefficient	T	R^2	F*
Textbook-based Expectation of Learning Achievement				
Expectation of Effort Expenditure	-.231	-2.196**	.453	38.544**
Expectation of Time Investment	-.519	-5.137**		
Audiotape-based Expectation of Learning Achievement				
Expectation of Effort Expenditure	-.220	-2.658**	.478	42.511**
Expectation of Time Investment	-.500	-6.117**		
Videotape-based Expectation of Learning Achievement				
Expectation of Effort Expenditure	-.043	-.440	.252	15.668**
Expectation of Time Investment	-.500	-4.964**		
Personal computer-based Expectation of Learning Achievement				
Expectation of Effort Expenditure	-.096	-.989	.481	43.144**
Expectation of Time Investment	-.648	-6.487**		

* Degrees of freedom: 2, 93
** Significant at $p < .05$

> When independent variables are correlated, the regression coefficient of any independent variable depends on which other independent variables are included....Thus, a regression coefficient does not reflect any inherent effect of the particular independent variable on the dependent variable but only a marginal or partial effect, given whatever other correlated independent variables are included in the model (p. 252).

Thus, certain cautions must be taken into account when interpreting the above results. The relatively small size of the sample and the intercorrelatedness of the independent variables are two of those cautions. With those taken into account, the results can be interpreted as indicating that expectations of effort expenditure and time investment do have an impact upon expectation of learning achievement with significant Fs resulting in rejection of the null hypothesis for each of the four types of prepackaged, self-paced learning materials. Furthermore, the regression coefficients are negative. This confirms the trend shown by the interval scales developed in the Law of Comparative Judgment, Case V, analysis: Expectation of greater learning appears to be inversely related to expectations of greater effort expenditure and greater time investment.

Hypothesis Seven. For hypothesis seven, experience was also entered--along with expectations of effort expenditure and time investment--into the regression analysis on the dependent variable of expectation of learning achievement. The objective was to learn whether experience might help further explain the variance in the dependent variable. As with the analysis of data for hypothesis five, this analysis is somewhat limited by small numbers of respondents considered

as "experienced." The results of the analysis are reported in Table 4.14.

The addition of experience to the independent variable list resulted in minimal differences from the results of the analysis of the previous hypothesis. Interpretation is, as noted above, somewhat hampered by the small numbers of experienced respondents. The only significant finding was for experience in textbook-based prepackaged, self-paced materials. Lack of a significant finding for experience on the other three dependent variables may have been due low numbers of respondents experienced with those types of prepackaged, self-paced instructional materials.

Again, the F tests are significant, resulting in rejection of the null hypothesis for all four dependent variables. However, as with hypothesis six, the major contributor to the variance in expectation of learning achievement is expectation of time investment.

Table 4.14

Multiple Regression Analysis of Expectations of Effort Expenditure and Time Investment and Experience on Expectation of Learning Achievement for Each of the Four Types of Prepackaged, Self-Paced Instructional Materials (N = 96)

VARIABLE	Unstandardized Regression Coefficient	T	R^2	F*
Textbook-based Expectation of Learning Achievement				
Expectation of Effort Expenditure	-.222	-2.146**	.478	28.065**
Expectation of Time Investment	-.509	-5.129**		
Experience	.079	2.083**		
Audiotape-based Expectation of Learning Achievement				
Expectation of Effort Expenditure	-.219	-2.626**	.478	28.051**
Expectation of Time Investment	-.500	-6.081**		
Experience	-.005	.154		
Videotape-based Expectation of Learning Achievement				
Expectation of Effort Expenditure	-.042	-.427	.253	10.371**
Expectation of Time Investment	-.504	-4.937**		
Experience	.016	.291		
Personal computer-based Expectation of Learning Achievement				
Expectation of Effort Expenditure	-.097	-.997	.489	29.295**
Expectation of Time Investment	-.621	-6.070**		
Experience	.053	1.145		

* Degrees of freedom: 3, 93

** Significant at $p < .05$

CROSSTABULATION ANALYSIS

In addition to the impact of experience upon expectation of learning, the role of respondents' preferred method of study from among the four types of prepackaged, self-paced instruction materials was explored. Prior to responding to the expectation section of the questionnaire, respondents had been asked to indicate their preferred method. 93 persons indicated one of the four. Frequencies of respondents for each preferred method of study were reported in Table 4.6. Because this was a categorical variable it was analyzed through crosstabulation via the SPSS (Nie, et al., 2nd ed., 1975) Subprogram Crosstabs. Measures of association were employed to judge significance. The research question responded to was:

> 8. What is the relationship between preference for an "ideal" method of prepackaged, self-paced instructional materials and expectations of effort expenditure, time investment, and learning achievement for the four types of prepackaged, self-paced instructional materials?

Research and null hypotheses for question eight were as follows:

> Research Hypothesis 8: There will be a relationship between respondents' scores on expectations of effort expenditure, time investment, learning achievement, and their preference for an "ideal" method for the four types of prepackaged, self-paced instructional materials.

Null Hypothesis 8: $P_1 = P_2 = P_3 = P_4$.

Twelve separate tables were constructed to analyze this hypothesis. Four groups of respondents, categorized by their preferred method, were crosstabulated with two categories of "greater" and "lesser"

expectations for effort expenditure, time investment, and learning achievement. The four expectation scores were collapsed into the two greater/lesser categories in order to provide the needed expected cell frequencies for chi-square test of the independence of the variables to be valid. The contingency coefficient, C, was also calculated to judge the magnitude of significant associations. Tables D.1 to D.12 in Appendix D present the crosstabulations of the variables. Statistics for three tables need to be interpreted guardedly for the following tables as they did not meet the minimum expected cell frequencies: Table D.3, preferred method by textbook-based expectation of learning achievement; Table D.7, preferred method by personal computer-based expectation of effort expenditure; and Table D.10, preferred method by videotape-based expectation of effort expenditure.

Measures of significance for the Tables D.1 to D.12 are reported in Table 4.15. As can be seen in Table 4.15, all crosstabulations are significant at the $p < .05$ level with the exception of Table D.3 which did not have the necessary minimum expected cell frequencies for the chi-square statistic to be valid. The validity of the chi-square is also uncertain for Tables D.7 and D.10 for the same reason. For all other tables, the contingency coefficient indicates a correlation ranging from small but definite to substantial between preference and the expectation variables.

In order to facilitate examination of the relationships between preferences and the three expectation variables, Table 4.16 presents the expectation variables compared with the frequencies of the four preferred methods drawn from Tables D.1 to D.12.

Examination of the comparisons reveals that, on the expectation of time investment variable, more respondents in all preference groups tend to rate their preferred method as greater for expectation of time investment. With the exception of those who rated audiotape-based methods as their preference, more respondents who preferred a method rated it as lesser for expectation of effort expenditure. Most persons who preferred personal computer-based materials rated their preference as greater in expected learning achievement. The majority of persons in all three other preference groups expected lesser learning from their favorite methods.

Table 4.15

Crosstabulation Measures of Significance
(N=93, df=3)

TABLE NO.	MEASURE	VALUE	SIG. LEVEL
D.1	χ^2	26.197	.0000
	C	.469	
D.2	χ^2	13.894	.0031
	C	.361	
D.3*	χ^2	4.142	.2466
	C	.207	
D.4	χ^2	13.776	.0032
	C	.359	
D.5	χ^2	30.352	.0000
	C	.496	
D.6	χ^2	16.260	.0010
	C	.386	
D.7*	χ^2	22.415	.0001
	C	.441	
D.8	χ^2	13.066	.0045
	C	.351	
D.9	χ^2	35.377	.0000
	C	.525	
D.10*	χ^2	25.133	.0000
	C	.461	
D.11	χ^2	27.517	.0000
	C	.478	
D.12	χ^2	14.439	.0024
	C	.367	

* Table with expected cell frequencies below minimum level.

Table 4.16

Analysis of Primary Relationships from Tables D.1 to D.12

Expectation of Effort Investment

PREFERRED METHOD	EXPECTATION LEVEL Lesser	Greater
Textbook	22	8
Audiotape	5	11
Videotape*	31	0
Personal Computer*	15	1

Expectation of Time Investment

PREFERRED METHOD	EXPECTATION LEVEL Lesser	Greater
Textbook	11	19
Audiotape	2	14
Videotape	10	21
Personal Computer	7	9

Expectation of Learning Achievement

PREFERRED METHOD	EXPECTATION LEVEL Lesser	Greater
Textbook*	20	10
Audiotape	14	2
Videotape	21	10
Personal Computer	1	15

*Chi-square not valid for table from which these numbers are taken.

CHAPTER SUMMARY

Chapter Four presented results of analysis of the survey data. 34% of deliverable questionnaires were returned providing a sample of 97. Respondent characteristics were summarized to provide a profile of the sample as a group. Demographics, media habits, and experience with prepackaged, self-paced instructional materials were among the characteristics reported. Also reported were responses to questions regarding whether the subject would ever consider studying via prepackaged, self-paced instructional materials; the importance of the expectation factors of effort, time, learning, and others; and the respondent's preferred method of study from among the four investigated in this research.

Next, coefficients of consistence and agreement were reported as a way to assess the reliability and validity of the instrument. From among 290 completed sets of paired comparisons, there were only 11 circular triads found, indicating 96 percent consistency. The coefficient of agreement was found to be small, but positive, and significant at the $p < .01$ level.

The Law of Comparative Judgment, Case V, was used to develop interval scales for the four types of prepackaged, self-paced instructional materials (stimuli) on the three expectation variables of effort expenditure, time investment, and learning achievement. Calculations of the Absolute Average Discrepancy values and a chi-square test verified that the stimuli could validly be scaled according to the Case V method. Results of the scaling indicated that videotape-based

prepackaged, self-paced materials were expected to require considerably less effort expenditure and time investment than the other three methods investigated. Textbook-based materials were expected to require the greatest effort and time, with personal computer and audiotape scaled closely to textbook. Respondents expected videotape-based materials to result in greatest learning, audiotape-based in least learning. Textbook and personal computer materials were scaled midway between videotape and audiotape methods on the expected learning dimension.

Correlational analysis resulted in reporting of the Pearson Correlation coefficient for the relationship between expectations of effort expenditure and time investment. Pearson Correlation coefficients were also reported for relationships between experience and each of the three expectation variables. Expectations of effort expenditure and time investment were found moderately correlated for each of the four types of prepackaged, self-paced types of instructional materials. Nine of the twelve correlations of experience with the expectation variables were nonsignificant. Small relationships were found between experience and the expectation variables for textbook-based experience and expectation of learning and personal computer-based experience and expectations of time investment and learning achievement. Small numbers of "experienced" respondents may have contributed to the low correlations and lack of significance.

Multiple regression analysis was reported to attempt to explain variance in expectation of learning achievement as a dependent variable by the independent variables of expectation of effort expenditure, expectation of time investment, and experience. The independent

variables explained a proportion of over .45 of the variance on the textbook-based, audiotape-based, and personal computer-based materials. A .25 proportion of the variance in videotape-based expectation of learning was explained by the independent variables. The addition of experience to the regression analysis did not contribute substantially to explanation of variance in the dependent variable of expectation of learning achievement. The regression coefficients for expectations of effort and time were negative, implying that as greater learning is expected, lesser effort expenditure and time investment is expected.

Crosstabulations of greater and lesser expectations of effort, time, and learning were made against respondents' choices of a preferred method of study from among the four investigated in this study. Twelve tables were constructed with 11 found to have significant associations among the variables. The contingency coefficient was calculated to discover the strength of relationship between the variables. There was a moderate correlation, indicating a substantial relationship between the ideal and expectation variables for all tables with a significant chi-square. Finally, it was noted that a respondent's preferred method was not always the method found to be greater in expected learning or less in expected effort expenditure. The preferred method was expected by most respondents to be greater, rather than lesser, in expected time investment.

CHAPTER V: CONCLUSIONS AND DISCUSSION OF THE RESULTS

INTRODUCTION

This study asked what expectations adult learners, as educational consumers, bring with them when selecting among four different types of prepackaged, self-paced instructional materials: textbook-based, audiotape-based, videotape-based, and personal computer-based. Specifically, it explored adult learner expectations of the (1) effort expenditure and (2) time investment necessary to complete such packages, and (3) expected learning achievement from the four formats.

A population highly motivated to participate in educational activities was sought. The 1900-person membership of the East Lansing (MI) Arts Workshop was selected. Using systematic random sampling, a mail survey methodology was employed, resulting in 97 usable questionnaires returned for a 34 percent return rate, or 5.1 percent of the population. The method of paired comparisons was the primary means of data collection. Correlation, multiple regression, and crosstabulation were used for data analysis. Respondent characteristics and results of the data analysis were reported in Chapter Four.

Chapter Five presents research conclusions drawn from the data analysis and discusses the findings in respect to the analysis and conclusions. Conclusions are presented according to the type of statistical analysis following the order of the eight research questions. Next, the three expectation variables of effort

expenditure, time investment, and learning achievement are discussed, followed by examination of the importance of respondents' experience and preferred method of study. The final section of the chapter makes recommendations for future research in regard to this topic.

RESEARCH CONCLUSIONS

The following sections summarize research conclusions based upon a review of the analyses presented in Chapter Four. All tests of statistical significance reported were at the $p < .05$ level.

Conclusion 1: Each of the four types of prepackaged, self-paced instructional materials under investigation were perceived differently as to expected effort expenditure, time investment, and learning achievement.

The Law of Comparative Judgment, Case V, analysis found that respondents were able to order the four types of prepackaged, self-paced types of instructional materials by judging which member of each pair of all possible pairs was "greater" on the dimensions of expectation of effort expenditure, expectation of time investment, and expectation of learning achievement. According to Edwards, "The ordering of the objects upon the basis of judgments is said to be on a psychological continuum" (1975, p. 19). In interpreting and discussing the results it is important to realize that the judgments were not made on actual

indicators of effort, time, or learning, but upon respondents' opinions which may or may not have been formed as the result of experience, seeing advertisements, talking with others, etc.

The interval scale values provide quantitative representation to the differences between respondents' expectations on the three variables. Types of prepackaged, self-paced instructional materials and their scale values (from least to greatest) were as follows for the expectation of effort expenditure variable: videotape-based (.000), audiotape-based (.464), personal computer-based (.493), and textbook-based (.543). They were scaled as follows on expectation of time investment (least to greatest): videotape-based (.000), audiotape-based (.518), personal computer-based (.589), and textbook-based (.602). On expectation of learning achievement, the four types were scaled as follows (least to greatest expected learning): audiotape (.000), textbook-based (.345), personal computer-based (.358), and videotape-based (.623).

Overall, videotape-based prepackaged, self-instructional materials were scaled substantially lower on expected effort expenditure and time investment for study and substantially greater on expected possible learning achievement than the other three types. Audiotape, personal computer, and textbook based types were clustered as fairly similar on expectations of effort and time needed for study. Audiotape-based materials were scaled substantially lower than the others on expected learning, with textbook and personal computer grouped very closely together midway between audiotape and videotape.

One caution to be considered in interpretation of the interval scaling results is the artificiality of the presentation of the four

types of prepackaged, self-paced instructional materials. They were presented to be in as "pure" a format as possible, rarely—except for text—found that way in actuality. Also, the definitions provided (See Appendix A.) to give respondents a common understanding, although carefully worded, may have introduced a degree of experimenter bias in giving respondents indication of greater or lesser effort, time, or learning achievement.

(Another dimension can be added to the findings of the Law of Comparative Judgment, Case V, analysis in light of an exploratory factor analysis performed on the expectation variables for all four types of prepackaged, self-paced instructional materials. The results of the factor analysis are reported in Appendix E. The analysis found that expectations of effort, time, and learning for textbook-based and computer-based materials loaded on one factor. All three expectations for audiotape-based materials loaded on a second factor. A third factor encompassed the expectations of time and learning for videotape-based materials, with expectations of effort for videotape-based materials on a fourth factor.)

Conclusion 2: There was a relationship between expectations of effort expenditure and time investment for each of the four types of prepackagd, self-paced instructional materials being studied.

A significant positive correlation was found between expectations of effort expenditure and time investment for each of the four types of prepackaged, self-paced instructional materials. Highest relation

between the variables was found on personal computer-based and textbook-based materials. Lowest relation between effort and time expectations was found for videotape-based materials.

Conclusion 3: There was no significant relationship found between respondents' experience with prepackaged, self-paced instructional materials and the three expectation variables of effort expenditure, time investment, and learning achievement with the exception of three combinations.

Respondents' experience scores were correlated with their scores on each of the three expectation variables. Experience was found to have a significant correlation on only three of the twelve possible combinations of variables. Experience with personal computer-based prepackaged, self-paced instructional materials was found to have a small but definite negative relationship with expectation of time investment necessary for study of those materials. Two small positive correlations were found between experience with textbook-based prepackaged, self-paced instructional materials and expectation of learning achievement and experience with personal computer-based prepackaged, self-paced instructional materials and expectation of learning achievement.

Conclusion 4: Expectations of effort expenditure and time investment were found to contribute significantly to expectation of learning achievement with expected time investment being the major

contributor.

The expectations of effort expenditure and expectation of time investment were found to contribute significantly to expectation of learning achievement in a multiple regression analysis. The direction of contribution was inverse, that is, as respondents expected greater learning, they expected to need less effort and time. However, regression coefficients indicated that expectation of time investment, rather than expectation of effort expenditure, was the major contributor to the expectation of learning, with the coefficients for expectation of effort expenditure found significant on only the textbook-based and audiotape-based types of materials. Regression coefficients for expectation of effort expenditure for videotape-based and personal computer-based were not significant.

Conclusion 5: Experience, expectation of effort expenditure, and expectation of time investment contribute to expectation of learning achievement with time having the major effect. However, experience made a significant contribution in only one of the possible 12 instances.

When experience was added to the multiple regression analysis along with the expectations of effort and time very little change was found from the earlier analysis. Experience had a small, positive, and significant regression coefficient on only expectation of learning for textbook-based prepackaged, self-paced instructional materials. While overall contribution of the three variables was significant, again the

major contributor to the significance was the expectation of time investment.

Conclusion 6: There was a relationship between respondents' preferred type of prepackaged, self-paced instructional materials (from among the four in this study) and some, but not all, of the expectation variables.

In a crosstabulation analysis respondents' preferred methods of study from among the four in the study were found significantly associated with textbook-based expectancies of effort expenditure and time investment; audiotape-based expectancies of effort expenditure, time investment, and learning achievement; videotape-based expectancies of time investment and learning achievement, and personal computer-based expectancies of time investment and learning achievement. Results were mixed for the expectation variables of effort expenditure and learning achievement. However, for all four types of prepackaged, self-paced instructional materials most persons perceived their preferred method as greater, rather than lesser, in time investment.

DISCUSSION OF THE RESULTS

Expectation of effort expenditure. Audiotape, personal computer, and textbook types of prepackaged, self-paced instructional materials were scaled closely on the variable of expectation of effort

expenditure. The scaling of videotape substantially below the three others along with the findings that respondents were low in experience for videotape learning, low in ownership of videotape recording/playback equipment, and high in television ownership, suggests that they may have extrapolated the passive atmosphere of recreational television viewing to study via videotape-based instruction.

But, whatever the findings for expectation of effort expenditure, expected effort expenditure was found to contribute negligibly to expected learning achievement. Respondents may have felt that, depending on the subject matter or type of instruction, they would be able to vary their effort to meet their interest (motivation) level or the demands of the instructional method. This reflects the research by Weiner (1982) indicating that effort has both stable and unstable elements. Weiner (1972, 1974) suggests that only attributions to the wholly stable elements of ability and task difficulty affect expectancy. Likewise, Palmer and Willson (1982) found that, after success or failure, expectations for performance on a future task were related to attributions to ability and task difficulty, but not to effort.

Another possible explanation for the negligible effect of expectation of effort expenditure upon expectation of learning could be the global way in which it was measured. Incongruency of learning style with method, set up and handling of necessary equipment for audiovisual-based courseware, and the organization of self-paced study, among others, all may contribute to effort attributions. Respondents, mostly unexperienced with prepackaged, self-paced materials, may not have been able to determine the attributes of those materials that would

be effort-producing.

In view of the fact that time and effort share qualities such as persistance and perseverance, they were not as highly related on any of the four types of prepackaged, self-paced instructional materials as had been anticipated. This may have been due as Weiner (1982) explained, that persons feel they can vary their effort (its unstable element) to meet challenges. For example, they may expect to be able to increase effort to reduce time spent. Or, conversely, they may expect to reduce effort by spending additional time at a task.

No attempt had been made in this study to determine each respondent's locus of control. This study may have resulted in different findings for expectations of effort expenditure had respondents been categorized according to internal/external locus of control. As Fanelli (1977) points out, "rather than attributing failure to his own lack of ability, the internal ascribes failure to his own lack of effort" (p. 56). Thus a group of subjects who were known to be internals may have perceived expectations of effort expenditure as contributing more to expectation of learning than did this respondent group.

Expectation of time investment. As for expectation of effort expenditure, audiotape, personal computer, and textbook types of prepackaged, self-paced instructional materials were also scaled closely on the variable of expectation of time investment. The scaling of videotape substantially below the three others along with the findings that respondents were low in experience for videotape learning, low in videotape recording/playback equipment, and high in television

ownership, again suggests that they may have extrapolated the passive atmosphere of recreational television viewing to study via videotape-based instruction.

A suggested explanation was based upon the opinion that with broadcast or videotaped television, the typical viewer turns on the program, watches it, and turns it off. This ability to "get it over with" may have carried over to expectations regarding time investment for instruction via videotape. The other three types of instruction may be viewed as more of the start-and-stop variety, thus perceived as consuming more time investment. This explanation would be consistent with Fraisse's (1963) explanation of time's continuity dimension. That is, activities perceived as more continuous are perceived as shorter in duration.

Time spent on task (Fredrick & Walberg, 1980) and pace (Walberg, 1976) have been found positively related to learning. The results of this study also imply that expected time contributes to expected possible learning achievement. However, expectations are an <u>inverse</u> relationship! As the respondent expects greater learning, he or she expects to spend less time. While educators find that the student will learn more with more time spent, the learner--according to these findings--expects to learn more with methods expected to require less time.

One explanation for these findings may be that respondents with experience or a preferred method of study might have seen themselves as being able to handle the materials more efficiently, thus making study less time consuming. However, experience contributed negligibly to

expected learning. (But those findings could be considered tenuous due to low numbers of experienced respondents.)

This would appear to have definite implications for the developer and marketer of prepackaged, self-paced materials. While the educator wants the learner to spend all the time he or she needs to study a subject for effectiveness, the learner wants to be efficient and effective. Frequently, the organization sponsoring the learning also requires efficiency, as Judd, McCombs, and Dobrovolny (1979) write, "Every day of training time saved by innovations in materials or procedures translates directly into considerable savings of training dollars and more efficient utilization of manpower in the field" (p. 133). What, then, must the developer and marketer consider for prepackaged, self-paced learning materials? Judd, et al., suggest a time management component prior to the actual presentation of subject matter for individualized and/or computer-managed instructional systems.

Paul Fraisse (1963) wrote of the "organizing activity of the human mind" (p. 220) that plays an important role in minimizing our perception of time passing. Drawing conclusions from his writing, instructional materials developers and marketers might take the following steps in the advertising and introduction to materials to help learners minimize their perception of time spent with the materials:

1. Organize for fewer changes. For example, group learning activities that have similar procedures; cluster similar aspects of the subject matter. Novelty draws attention to changes, hence to time being spent. Keep novelty at a minimum, especially in a program that might use equipment that is new of itself to the learner.
2. Accent the goals and purposes of study. Provide a long range view. For example, relate the particular module to the overall program, relate a program to types of employment, promotions, careers, and

other benefits derived from its completion.

3. Help the learner foresee success. For example, provide opportunity to respond and offer the "correct" answer, but also inform the learner how his or her correct response will help with understanding forthcoming subject matter.

4. Make the task challenging without being too difficult.

Motivation of the learner plays a part in the need to attend to the above suggestions. Because the motivation of a person who buys a commercially available course is unknown, the developer or marketer would be wise to pay careful attention to any elements that alleviate possible perceptions of excessive time. Whether or not the motivations of a group of learners are known, these words of Fraisse (1963) should be remembered:

> Attitude...is a function of the motivations behind it; we work toward a goal if we expect some gratification from it.
>
> When...motivation is slight, our attention turns to the various steps of the task; we are also easily distracted by outside incidents or by chance thoughts, or we may concentrate on the effort involved....When the motivation is very strong...we are absorbed by the task itself, which takes on a unity of significance, and we realize ourselves that we are not aware of the passing of time (p. 220).

Millman, Bieger, Klag, and Pine (1983), studying children and college students, have found, "it is possible to increase through rewards the <u>amount of time</u> that students are willing to spend learning" (p. 433). The incorporation of positive reinforcement, perhaps with a moderate degree of acceptable novelty, into prepackaged, self-paced learning would appear a necessity, especially where the developer and marketer are unsure of the goals of potential purchasers of the materials.

An apparent contradiction of the inverse relationship between expectations of time investment and learning achievement was found in the crossstabulation analysis: Most persons with a preferred method fell into the "greater" expectations of time investment category for their preferred method. Thus, if respondents "liked" a particular method they expected to spend more time to learn via that method. This would appear to indicate that respondents might be willing to spend more time learning with their preferred method than with other methods. If so, this conclusion is to the advantage of instructional developers and marketers in that time-on-task research indicates that if more time were spent they would learn better via their preferred method. Yet, the results of the multiple regression analysis indicates that respondents look for greater learning from least time spent. The challenge appears to be to determine the preferred methods of study of the educational market, provide them as options, and make them efficient ways to learn.

Expectation of learning achievement. The degree of personal learning achievement expected to attain in studying a subject via prepackaged, self-paced instructional materials was rated as the most important factor in selection of such a course. Expectations of time, effort, and other factors fell substantially behind the importance of expected learning.

Videotape-based prepackaged, self-paced instructional materials were expected to result in greater learning achievement than the other three types of materials studied, audiotape-based in the least learning. This researcher had expected that respondents, most of whom were highly educated through traditional schooling and not well-experienced in

self-paced study, might have placed textbook-based materials at the top of the scale.

Most reported studies of learning through television have involved children, not adults, and those studies frequently pertain to learned aggressive behaviors (Comstock, Katzman, McCombs, & Roberts, 1978). The studies do find that children learn from television, even when a program is meant only to entertain. It is probable that respondents realized that they learn from the television medium. In fact, although 74 persons were categorized as not experienced with videotape-based prepackaged, self-paced instructional materials, 31 respondents indicated that it would be their preferred method.

The expectation of learning achievement scale relates to Weiner's (1972, 1974) ability and task difficulty causal factors. Cues to those factors (Table 2.2) include past success history, pattern of performance, and objective task characteristics, among others. Learners will have experience and/or expectations for those factors regarding the methodology of a course as well as the subject matter. In other words, learners will perceive themselves as successful or failing at the task of learning via the instructional system. This study implies that learners expect themselves to be most successful at learning via videotape methods of the four considered.

What does that imply for the instructional developer and marketer? First, before deciding <u>against</u> incorporating videotape into self-paced courses, they need to carefully weigh decisions about such factors as its suitability for the subject matter, cost, availability of playback equipment to potential learners, etc. Attempts need to be made to

overcome perceived drawbacks so as to incorporate videotape whenever possible according to the results of this study. The move in industry to incorporate videotape and videodisc into computer-based training is one step in this direction that will, with increasing equipment availability and lessened costs, benefit the general learning public.

The scale also indicates that the lowest scaled method, audiotape-based, might benefit from being combined with those expected to result in greater learning. In course catalogs such as that of the American Management Association (1984) and others, audiotape lessons are frequently accompanied by text materials. This study implies that high quality text materials ought to be an essential component of audiotape-based courses. Other combinations of the four types of systems are also possible. The MacIntosh Computer of the Apple Computer Company (registered trademarks) accompanies its computer software with audiotape guides to listen to as the new owner watches the screen. Cautions implied would include minimizing any combinations that provided the bulk of instruction through a media type with a lower scaling. For example, a videotape-based course accompanied by bulky text materials might result in its being perceived lower on the scale.

In the crosstabulation of expected learning level against preferred method of study, most respondents expected lesser learning--which they had judged to be the most important factor in choice of method--from their preferred method except for those who preferred personal computer-based prepackaged, self-paced instruction. A suggested intuitive explanation might be that adult learners from traditional educational backgrounds do not trust themselves to learn from the method

they enjoy best. They have usually been handed their learning tools by an educational "authority," e.g., the teacher who selected a text or film.

This last finding requires further investigation. The unclear (results for those who preferred textbook-based materials were nonsignificant) and seemingly illogical results may be due to the small numbers of respondents in each preference group. McIntosh (1981) had found no effect upon performance for choice or preference and drew the conclusion that students could not choose validly between instructional methods. He asked (1981, p. 112), "What, then, was the basis for the preferences expressed by the students? It is possible that the criteria for their preferences were quite different from performance or satisfaction." Further investigation is needed to determine those cues or attributes used by learners to select commercially available instructional materials.

Experience with prepackaged, self-paced materials. Research hypothesis five explored the relationship between the three expectation variables and respondents' experience with the four types of prepackaged, self-paced instructional materials. Research hypothesis seven suggested that experience, along with expectations of effort expenditure and time investment, might have an effect upon expectations of learning. McIntosh (1981) had found that prior experience with a method of study (PSI) was a significant predictor of success in both PSI and lecture/discussion methods. It was reasonable to expect that experience might also affect expectations, especially for the expectation of learning achievement variable. Low numbers of

experienced respondents (see Table 4.4) hampered investigation of these hypotheses. Also, the method used to categorize respondents according to experience was arbitrary and, except for a small pilot study, untested.

The three significant correlations found for hypothesis five indicated almost negligible relationships. It appears that further research is required to establish whether experience is related to expectations of effort expenditure, time investment, and learning achievement. Such research would require a larger sample and further refinement of a method of determining levels of experience.

Preferred method of study. Hypothesis eight suggested that respondents' preferences regarding the four types of prepackaged, self-paced instructional materials would have a relationship with their scores on the expectation variables. Preferences were crosstabulated with two categories of each expectation variable: "lesser" and "greater" expectations. While three crosstabulations were unsatisfactory due to below minimum expected cell frequencies, certain trends were evident upon inspection of the other tables.

With only two of four tables significant for expectation of effort expenditure, the results were mixed. The majority of people preferring textbook-based materials saw text as lesser in effort. The majority of those preferring videotape-based materials viewed their favorite as greater in effort.

Three of four tables were significant for expectation of learning. From those tables it was evident that 15 of the 16 respondents who checked personal computer-based materials as their favorite expected

greater learning from personal computer-based instruction. However, most of the respondents who preferred audiotape and videotape types of instruction felt that their preferred methods would result in lesser learning. They tended to rate either textbook or personal computer-based instruction higher than their expressed favorite.

All four tables on the expectation of time investment dimension had significant chi-squares. The majority of respondents with a preference on any of the four types of instructional materials saw their preference as greater in expected time investment. Thus, the only clear indicator for all four types of instructional materials resulting from this hypothesis seems to be the relationship between preferred method and expected greater time investment. Other results were mixed or nonsignificant. Low cell numbers resulting from the small sample size may have been a factor.

A person's preference plays a role in the initial decision to purchase a product (such as a prepackaged, self-paced course) and to continue in its use or make future purchases. This is an aspect of educational consumerism that warrants further study. Future research needs to employ larger sample sizes and, probably, offer an increased number of types of courses from which to select. Pictures, descriptions, or samples of actual or hypothetical courses would help the potential learner who is unexperienced with prepackaged, self-paced courseware estimate more accurately what he or she might determine to be a preferred method.

RECOMMENDATIONS FOR FUTURE RESEARCH

Some recommendations have already been made for future research. The central focus of those recommendations has been the need for a larger sample of subjects, especially those from an group that could be termed experienced. Following are additional recommendations based upon the background, findings, and discussion of this study.

1. Further research needs to be done on the relationships among the various types of instructional systems regarding such variables as expectations, experience, and preferences. Future studies should be multivariate, looking at scores on the variables across all types of prepackaged, self-paced instructional materials with several samples of subjects.

2. The types of delivery systems are rarely as "pure" as defined for this study. Another study of this type needs to include more of a variety of commercially available offerings.

3. The type of subject matter to be learned is an important determinant of the elements of the delivery system. Future studies into expectations ought to take into consideration the possibility of differing expectations for courses that teach primarily cognitive or affective learnings or motor skills.

4. There is a need for follow-up studies of persons who purchase and complete (or do not complete) commercially available prepackaged, self-paced courses. Most currently available research was done with institution-based courses. The self-pacing feature in those studies was frequently limited by constraints of completion required within a

semester, term, or other time frame. Persons who might purchase commercially available instructional courseware may not a "captive audience" and will be difficult to follow up. A postage-paid registration card or some other means to follow such students needs to be developed and included with the instructional materials.

5. Instructional developers and marketers need to adopt the techniques of the marketers of other products to determine which features of promotion and instructional materials, while pedagogically sound, entice potential learners to purchase and complete instructional packages and which features do neither. A two-stage study needs to be done, first to identify attributes of self-paced instructional packages adult learners find salient and, second, to determine which of those attributes are relevant to the decision to purchase and complete such packages.

CHAPTER SUMMARY

Chapter Five presented research conclusions, discussion of the results of the analysis, and suggestions for future research. The study found that four types of prepackaged, self-paced instructional materials--textbook-based, audiotape-based, videotape-based, and personal computer-based, could be placed on interval scales for expectations of effort expenditure, time investment, and learning achievement. The videotape-based type of materials was scaled as expected to require least effort and time and result in greatest

learning.

The expectation of time variable was found to be the greatest contributer to expectation of learning. The relationship was inverse: As respondents expected a type of instructional material to result in greater learning, they also expected it to require less time. However, respondents expected to invest greater time studying their preferred methods of prepackaged, self-paced instructional materials.

The low numbers of experienced respondents hampered analysis of the impact of experience upon expectations. Despite findings of significant relationships between experience and performance in other studies, this study found nonsignificant and/or negligible relationships between experience and expectations.

This study was an effort to look at adult learners' expectations of prepackaged, self-paced instructional materials. John Keller (1983) has proposed that instructional developers consider "motivational design of instruction." Awareness of learners' expectations and the elements of instruction that serve to motivate them to initiate or continue study is prerequisite to developing promotional and instructional strategies. How do we influence expectancy for success in the educational achievement situation? How can we carry out that influence with learners who elect to study on their own? The final hope of this study is that others will also attend to these questions.

APPENDICES

APPENDIX A

Cover Letter Accompanying Mailed Questionnaire
Page of Definitions Accompanying Mailed Questionnaire
Mailed Questionnaire Instrument

MICHIGAN STATE UNIVERSITY

COLLEGE OF EDUCATION · DEPARTMENT OF COUNSELING, EDUCATIONAL PSYCHOLOGY AND SPECIAL EDUCATION

EAST LANSING · MICHIGAN · 48824-1034

February 26, 1985

Dear Mid-Michigan Resident:

You are one of a group of persons randomly selected to receive the enclosed questionnaire because you—or another member of your family—have participated in educational courses outside of regular school hours. Your family members obviously value opportunities to develop their interests and abilities to invest time and, often, extra dollars in such activities.

This survey deals with other opportunities to further our personal learning: prepackaged, self-paced courses. These packaged learning opportunities are growing in number on the shelves of B. Dalton, Waldenbooks, and other bookstores, in videotape rental and purchase centers, and on the racks of computer software at local computer stores. They come in textbook, audiotape, videotape, and on computer diskette or tape. Have you seen any?

Now—if you are an adult (if not, please give this to an adult in your house)—I need "just a lick of your time" to let me know what you think about certain aspects of those courses. So sit back, unwrap the enclosed sucker for instant energy, take a few deep breaths to relax, peruse the questionnaire, then take a pencil or pen firmly in hand and give the questions your best shot. Stick to it—the sucker should outlast the time it takes to answer the questions.

Perhaps you would like some background before you start "licking" this task. I am a doctoral student in the Educational Systems Development program at Michigan State University's College of Education. Many persons with traditional classroom-bound educational backgrounds have told me, "I didn't know what I was getting into," when they started self-paced, on-their-own types of learning experiences. The information I receive from you and others who respond to this questionnaire will be used to complete my doctoral dissertation about that problem and, hopefully, add to the base of knowledge about how to develop and market prepackaged, self-paced learning experiences so we learn better from them.

With this background in mind, you are likely ready to get started before your sucker is gone. I appreciate your help.

Please return only the completed tan-colored questionnaire by March 8, 1985, in the enclosed addressed, stamped envelope. Do not put your name or address on the returned questionnaire so that your responses remain anonymous and confidential.

Gratefully,

Mary L. Ploor

Mary L. Ploor (Ph.D. cand.)

You are already familiar with many words used in this survey. But, to assure that everyone who responds will have the same meanings in mind, please read the definitions on the next page before proceeding. These definitions indicate the way the words are used in the questions you will answer. Refer to the definitions as necessary.

* * DEFINITIONS * *

EFFORT—energy expended to make a purchase decision, obtain the product, handle the study materials, study the subject, complete an exam, and do whatever else is necessary to reach completion of the study goal.

TIME—measurable period (seconds, minutes, hours, days, etc.) during which an action, process, or condition exists or continues.

LEARNING ACHIEVEMENT—the goal of the study process, one's own satisfaction at achieving the most understanding of a topic one can within his or her own capacity.

PREPACKAGED, SELF-PACED INSTRUCTION—self-contained course of instruction, including, as needed, instructional materials, learning aids, guide or manual, pre- and/or post-tests, validation data, description of intended audience, and learning objectives, arranged with provision for an individual to set his or her own schedule for learning and to monitor his or her own progress. A package deals with a definite subject of study that is systematically arranged and intended for use at a specified level of instruction. It would be the principle source of study material for the course.

The Four Types of Prepackaged, Self-paced Instruction in This Survey

TEXTBOOK-BASED INSTRUCTION—printed course material, hard-bound, soft-bound, ring-bound, or in monograph form. Feedback to the student is generally provided through practice exercises, case studies, end of chapter questions, etc., with answers following the exercises or at the end of the book.

AUDIOTAPE-BASED INSTRUCTION—course material offered on one or more audiocassette tapes. Feedback may be provided to the student in either or both of these ways: (1) a workbook (with answers) or (2) a narrator asks questions or presents problems on the tape; a pause follows or the student is asked to stop the tape to allow time to form a response; the narrator then suggests a correct response so that the student may compare his or her own with it.

VIDEOTAPE-BASED INSTRUCTION—course material offered on one or more videocassette tapes. Feedback may be provided to the student in either or both of these ways: (1) a workbook (with answers) or (2) questions or problems is presented on the tape either by the actors or by text on the screen; a pause follows or the student is asked to stop the tape to form a response; the actor or text on the screen then suggests a correct response.

PERSONAL COMPUTER-BASED INSTRUCTION—course material offered on one or more microcomputer memory devices such as cassette tapes or floppy disks. Personal computer-based instruction presents information to learners and provides opportunity for the student to respond to questions on the information, including reacting to the learners' responses with some form of immediate feedback.

REFER TO THIS PAGE AS NECESSARY.
RETURN ONLY THE QUESTIONNAIRE IN THE MAIL.

QUESTIONNAIRE

Examples of subjects for which adults may purchase prepackaged, self-paced courses are listed below. Courses of this type (sometimes called "self-study" or "home-study") usually present facts and principles about the subject and include review questions, case studies, and practice exercises. Often such courses include a test or examination. They may offer continuing education units or certification after successful completion of one or a series of courses. The courses may be available for purchase in different formats, such as textbook-based, audiotape-based, videotape-based, and personal computer-based.

_____ Building Memory Skills
_____ Personal Financial Planning
_____ Modern Marketing Fundamentals
_____ Building Your Vocabulary
_____ Creative Problem Solving
_____ How to Set Your Own Goals
_____ Improving Customer Relations
_____ Good Study Habits
_____ How to Speak...[a foreign language]
_____ Research and Planning (insurance industry)
_____ How to Write a Will
_____ Time Management
_____ Strategic Planning
_____ Better Sales Techniques
_____ Assertiveness Training
_____ Stress Management
_____ Weight Loss Techniques
_____ Emergency Care Update (physicians)
_____ Infectious Diseases Update (physicians)
_____ _____

Did you see any subjects about which you might like to learn more at your own convenience? Check (X) those subjects in the spaces provided.

Do you know of another fact or principle-based topic—not listed—that you would consider studying on your own if a prepackaged, self-paced course existed for it? If so, write it in the blank space at the end of the list and check it.

NOW, (1) assume that you have decided to learn more about one of the subjects above. Write the name of the subject here: _____.

(2) Assume that you have also, for reasons known only to you, decided to study that subject through a prepackaged, self-paced course.

(3) Having made those assumptions, please respond as requested to the following items.

Check (X) if the following statement applies to you. But, please answer the remaining questions, too.

( ) I would NEVER consider taking a prepackaged, self-paced course because I believe that learning can take place only in the classroom or other group situation.

▶ Throughout this questionnaire:

1. Please consider the course you named above when responding.
2. Base your responses upon each course being offered in as "pure" a form as possible, even though many prepackaged, self-paced courses are, in reality, combinations of two or more of the methods in this questionnaire (for example, text accompanied by audiotapes).
3. Assume that the same objectives would be fulfilled, equivalent material covered, equivalent test or exam provided, and equivalent credit offered, regardless of the method of study.
4. Assume that you have any equipment (e.g., audiocassette player, videocassette player, or personal computer) necessary to complete the course regardless of which of the four ways it is offered.
5. Assume that all prepackaged, self-paced courses include a manual with course directives, outline, and objectives.
6. Assume that the source (producer) for the course and the cost of the course would be the same, regardless of the way it is offered.

▶ Listed below are the factors of expected (1) effort expenditure, (2) time investment, (3) learning achievement, and (4) other expectations.

Assume that you have 100 points to allocate among the factors. Allocate the points to show the importance each factor would have for you in selecting a prepackaged, self-paced course.

_____ The effort I would expect to expend to study the subject
_____ The time I would expect to invest to study the subject
_____ The degree of personal learning achievement I would expect to attain in learning the subject
_____ Other expectations (for example: cost of course, sponsor of course, other elements important to you)

100 Total points

▶ Of those listed below, the ideal way for ME to study a prepackaged, self-paced course would be...
(My preference is...)
(Check (X) only ONE response.)

( ) textbook-based
( ) audiotape-based
( ) videotape-based
( ) personal computer-based

* * INSTRUCTIONS * *

The next three sections ask you to circle ONE from each pair of items that is GREATER than the other in some way. For example, assume you were asked to circle which one of each of the following pairs of sports is GREATER FUN for you. If you have more fun playing swimming, tennis, and volleyball, than you do ice hockey, soccer, or bowling, your responses would look like this:

ice hockey - (swimming)
(tennis) - soccer
(volleyball) - bowling

In each of the following pairs of types of prepackaged, self-paced courses circle the ONE type of course from <u>each</u> pair that you think would require **GREATER EFFORT** expenditure on your part to study the subject you named on the first page. If you find it difficult to decide for any pair be sure to circle one of them, even if you have to guess.

videotape - textbook

textbook - personal computer

audiotape - videotape

personal computer - audiotape

audiotape - textbook

videotape - personal computer

E F F O R T

In each of the following pairs of types of prepackaged, self-paced courses circle the ONE type of course from <u>each</u> pair that you think would require **GREATER TIME** investment on your part to study the subject you named on the first page. If you find it difficult to decide for any pair be sure to circle one of them, even if you have to guess.

audiotape - videotape

personal computer - audiotape

audiotape - textbook

videotape - personal computer

videotape - textbook

textbook - personal computer

T I M E

In each of the following pairs of types of prepackaged, self-paced courses circle the ONE type of course from <u>each</u> pair that you think would result in **GREATER LEARNING** achievement for you if you studied the subject you named on the first page. If you find it difficult to decide for any pair be sure to circle one of them, even if you have to guess.

audiotape - textbook

videotape - personal computer

videotape - textbook

textbook - personal computer

audiotape - videotape

personal computer - audiotape

L E A R N I N G

Your response to the following questions is necessary for accurate data tabulation. Please do not omit any sections. Remember, all information provided is confidential and will be reported anonymously.

Do you have experience with any of the following types of prepackaged, self-paced instructional materials? Please check (X) all that apply.

For which of the following types of prepackaged, self-paced courses have you ever seen or received advertisements?

( ) textbook-based
( ) audiotape-based
( ) videotape-based
( ) personal computer-based

I have helped develop or been responsible for development of a prepackaged, self-paced course that was primarily

( ) textbook-based
( ) audiotape-based
( ) videotape-based
( ) personal computer-based

I have studied and completed all requirements of a prepackaged, self-paced course using instructional materials that were

( ) textbook-based
( ) audiotape-based
( ) videotape-based
( ) personal computer-based

I have studied, but NOT completed, all requirements of a prepackaged, self-paced course using instructional materials that were

( ) textbook-based
( ) audiotape-based
( ) videotape-based
( ) personal computer-based

Please answer the following questions with the closest approximate whole number. If an answer is zero (0), print 0. Do not leave any blank.

How many books have you read in the past month? _____
To how many magazines or journals do you personally subscribe? _____
How much time did you spend reading a newspaper yesterday? _____ minutes
OR _____ hours
How much time did you spend watching television yesterday? _____ minutes
OR _____ hours
How much time did you spend listening to the radio yesterday? _____ minutes
OR _____ hours

Check (X) any of the following items that you own.

( ) Television
( ) Audiotape or audiocassette recorder/player
( ) Videotape cassette receiver/player
( ) Personal computer

Highest level of education completed: (Check one)

( ) Grade eight (8) or less
( ) Some high school
( ) High school graduate
( ) Some college
( ) Associate degree (2 yr.)
( ) College graduate (4 yr.)
( ) Master's degree
( ) Doctoral degree

Approximate total household income (Check one):

( ) Less than $10,000
( ) $10,000 - 19,999
( ) $20,000 - 24,999
( ) $25,000 - 34,999
( ) $35,000 - 49,999
( ) $50,000 +

What is your sex? (Check one)

( ) Male
( ) Female

Marital status: (Check one)
( ) Married
( ) Single, widowed, separated or divorced

How many people live in your household (including yourself)? _____

Are you physically handicapped in any way? _____
If yes, indicate how: _____

What is your ZIP code? _____

What is your age? (Check one)

( ) 19 or less
( ) 20 - 24
( ) 25 - 34
( ) 35 - 44
( ) 45 - 54
( ) 55 - 64
( ) 65 - 74
( ) 75 +

Are you presently (Check the ONE that BEST describes you) . . .

( ) Full-time employed
( ) Full-time employed, part-time student
( ) Part-time employed, not a student
( ) Full-time student (includes graduate assistants)
( ) Full-time student, part-time employed
( ) Part-time student, part-time employed
( ) Temporarily unemployed, not a student
( ) Homemaker
( ) Retired/disabled

THANK YOU for taking time to respond to this survey.
Please return in the enclosed, stamped envelope.

APPENDIX B

Michigan State University Committee on Research Involving Human Subjects: Letter Granting Approval to Conduct Research

MICHIGAN STATE UNIVERSITY

UNIVERSITY COMMITTEE ON RESEARCH INVOLVING
HUMAN SUBJECTS (UCRIHS)
230 ADMINISTRATION BUILDING
(517) 355-2186

EAST LANSING • MICHIGAN • 48824

February 20, 1985

Ms. Mary L. Ploor
1124 Montevideo Drive
Lansing, Michigan 48917

Dear Ms. Ploor:

Subject: Proposal Entitled, "An Investigation of the Expectations Adult Learners Hold Regarding Effort Expenditure, Time Investment, and Learning Achievement for Four Types of Prepackaged, Self-paced Learning Materials"

I am pleased to advise that I concur with your evaluation that this project is exempt from full UCRIHS review, and approval is herewith granted for conduct of the project.

You are reminded that UCRIHS approval is valid for one calendar year. If you plan to continue this project beyond one year, please make provisions for obtaining appropriate UCRIHS approval prior to February 20, 1986.

Any changes in procedures involving human subjects must be reviewed by the UCRIHS prior to initiation of the change. UCRIHS must also be notified promptly of any problems (unexpected side effects, complaints, etc.) involving human subjects during the course of the work.

Thank you for bringing this project to my attention. If I can be of any future help, please do not hesitate to let me know.

Sincerely,

Henry E. Bredeck
Chairman, UCRIHS

HEB/jms

cc: Dr. C. G. Gentry

APPENDIX C

Tables of Matrices Developed for Analysis of Data by the Law of Comparative Judgment, Case V, for Hypotheses 1, 2, 3

Table C.1

F Matrix: Expectations of Effort Expenditure

	VIDEO-BASED	AUDIO-BASED	PC-BASED	TEXT-BASED
VIDEO-BASED	48.5	70	67	64
AUDIO-BASED	27	48.5	50	56
PC-BASED	30	47	48.5	51
TEXT-BASED	33	41	46	48.5

Table C.2

P Matrix: Expectations of Effort Expenditure

	VIDEO-BASED	AUDIO-BASED	PC-BASED	TEXT-BASED
VIDEO-BASED	0.500	0.722	0.691	0.660
AUDIO-BASED	0.278	0.500	0.515	0.577
PC-BASED	0.309	0.485	0.500	0.526
TEXT-BASED	0.340	0.423	0.474	0.500
Sums	1.427	2.130	2.180	2.263

Table C.3

Z Matrix: Expectations of Effort Expenditure

	VIDEO-BASED	AUDIO-BASED	PC-BASED	TEXT-BASED
VIDEO-BASED	0.000	0.589	0.499	0.412
AUDIO-BASED	-0.589	0.000	0.038	0.194
PC-BASED	-0.499	-0.038	0.000	0.065
TEXT-BASED	-0.412	-0.194	-0.065	0.000
Sums	-1.500	0.357	0.472	0.671
Means	-0.375	0.089	0.118	0.168
Means + .375	0.000	0.464	0.493	0.543

Table C.4

Theoretical normal deviates $z_{jj'}$ corresponding to the scale distances between the elements of the Z Matrix for Expectations of Effort Expenditure

	SCALE VALUES	VIDEO-BASED	AUDIO-BASED	PC-BASED	TEXT-BASED
SCALE VALUES	0.000	0.464	0.493	0.543	
VIDEO-BASED	0.000				
AUDIO-BASED	0.464	-0.464			
PC-BASED	0.493	-0.493	-0.029		
TEXT-BASED	0.543	-0.543	-0.079	-0.050	

Table C.5

Theoretical proportions $p_{ij'}$ corresponding to the theoretical normal deviates $z_{jj'}$ of Table C.4 for expectations of effort expenditure

	VIDEO-BASED	AUDIO-BASED	PC-BASED	TEXT-BASED
VIDEO-BASED				
AUDIO-BASED	0.321			
PC-BASED	0.311	0.488		
TEXT-BASED	0.294	0.468	0.480	

Table C.6

Discrepancies between the theoretical proportions $p_{ij'}$ of Table C.5 and the observed proportions p_{ij} for expectations of effort expenditure

	VIDEO-BASED	AUDIO-BASED	PC-BASED	TEXT-BASED
AUDIO-BASED	-0.043			
PC-BASED	-0.002	-0.003		
TEXT-BASED	0.046	-0.045	-0.006	
Sums	0.091	0.048	0.006	
Sums of Abs Values =		0.145		
Abs. Avg. Discrepancy =		0.024		

Table C.7

F Matrix: Expectations of Time Investment

	VIDEO-BASED	AUDIO-BASED	PC-BASED	TEXT-BASED
VIDEO-BASED	48.5	72	71	65
AUDIO-BASED	25	48.5	54	54
PC-BASED	26	43	48.5	53
TEXT-BASED	32	43	44	48.5

Table C.8

P Matrix: Expectations of Time Investment

	VIDEO-BASED	AUDIO-BASED	PC-BASED	TEXT-BASED
VIDEO-BASED	0.500	0.742	0.732	0.670
AUDIO-BASED	0.258	0.500	0.557	0.557
PC-BASED	0.268	0.443	0.500	0.546
TEXT-BASED	0.330	0.443	0.454	0.500
Sums	1.356	2.128	2.243	2.273

Table C.9

Z Matrix: Expectations of Time Investment

	VIDEO-BASED	AUDIO-BASED	PC-BASED	TEXT-BASED
VIDEO-BASED	0.000	0.650	0.619	0.440
AUDIO-BASED	-0.650	0.000	0.143	0.143
PC-BASED	-0.619	-0.143	0.000	0.116
TEXT-BASED	-0.440	-0.143	-0.116	0.000
Sums	-1.709	0.364	0.646	0.699
Means	-0.427	0.091	0.162	0.175
Means + .427	0.000	0.518	0.589	0.602

Table C.10

Theoretical normal deviates $z_{jj'}$ corresponding to the scale distances between the elements of the Z Matrix for expectations of time investment

	SCALE VALUES	VIDEO-BASED	AUDIO-BASED	PC-BASED	TEXT-BASED
SCALE VALUES	0.000	0.518	0.589	0.602	
VIDEO-BASED	0.000				
AUDIO-BASED	0.518	-0.518			
PC-BASED	0.589	-0.589	-0.071		
TEXT-BASED	0.602	-0.602	-0.064	-0.013	

Table C.11

Theoretical proportions $p_{jj'}$ corresponding to the theoretical normal deviates $z_{jj'}$ of Table C.10 for expectations of time investment

	VIDEO-BASED	AUDIO-BASED	PC-BASED	TEXT-BASED
VIDEO-BASED				
AUDIO-BASED	0.302			
PC-BASED	0.278	0.472		
TEXT-BASED	0.274	0.466	0.495	

Table C.12

Discrepancies between the theoretical proportions $p_{jj'}$ of Table C.11 and the observed proportions $p_{jj'}$ for expectations of time investment

	VIDEO-BASED	AUDIO-BASED	PC-BASED	TEXT-BASED
VIDEO-BASED				
AUDIO-BASED	-0.044			
PC-BASED	-0.010	-0.029		
TEXT-BASED	0.056	-0.023	-0.041	
Sums	0.110	0.052	0.041	
Sums of Abs Values =		0.203		
Abs. Avg. Discrepancy =		0.034		

Table C.13

F Matrix: Expectations of Learning Achievement

	AUDIO-BASED	TEXT-BASED	PC-BASED	VIDEO-BASED
AUDIO-BASED	48.5	57	57	77
TEXT-BASED	39	48.5	49	54
PC-BASED	39	47	48.5	54
VIDEO-BASED	19	42	42	48.5

Table C.14

P Matrix: Expectations of Learning Achievement

	AUDIO-BASED	TEXT-BASED	PC-BASED	VIDEO-BASED
AUDIO-BASED	0.500	0.594	0.594	0.802
TEXT-BASED	0.406	0.500	0.510	0.563
PC-BASED	0.406	0.490	0.500	0.563
VIDEO-BASED	0.198	0.438	0.438	0.500
Sums	1.510	2.022	2.042	2.428

Table C.15

Z Matrix: Expectations of Learning Achievement

	AUDIO-BASED	TEXT-BASED	PC-BASED	VIDEO-BASED
AUDIO-BASED	0.000	0.238	0.238	0.849
TEXT-BASED	-0.238	0.000	0.025	0.159
PC-BASED	-0.238	-0.025	0.000	0.159
VIDEO-BASED	-0.849	-0.156	-0.156	0.000
Sums	-1.325	0.057	0.107	1.167
Means	-0.331	0.014	0.027	0.292
Means + .331	0.000	0.345	0.358	0.623

Table C.16

Theoretical normal deviates z_{ij}' corresponding to the scale distances between the elements of the Z Matrix for expectations of learning achievement

	SCALE VALUES	AUDIO-BASED	TEXT-BASED	PC-BASED	VIDEO-BASED
SCALE VALUE	0.000	0.346	0.348	0.623	
AUDIO-BASED	0.000				
TEXT-BASED	0.346	-0.346			
PC-BASED	0.358	-0.358	-0.013		
VIDEO-BASED	0.623	-0.623	-0.278	-0.275	

Table C.17

Theoretical proportions p_{ij}' corresponding to the theoretical normal deviates z_{ij}' of Table C.16 for expectations of learning achievement

	AUDIO-BASED	TEXT-BASED	PC-BASED	VIDEO-BASED
AUDIO-BASED				
TEXT-BASED	0.365			
PC-BASED	0.360	0.496		
VIDEO-BASED	0.267	0.390	0.392	

Table C.18

Discrepancies between the theoretical proportions p_{ij}' of Table C.17 and the observed proportions p_{ij} for expectations of learning achievement

	AUDIO-BASED	TEXT-BASED	PC-BASED	VIDEO-BASED
AUDIO-BASED				
TEXT-BASED	0.041			
PC-BASED	0.046	-0.005		
VIDEO-BASED	-0.069	0.048	0.046	
Sums	0.156	0.053	0.046	
Sums of Abs Values =		0.255		
Abs. Avg. Discrepancy =		0.043		

TEST OF SIGNIFICANCE FOR THE CASE V MODEL

Table C.19

Values of θ corresponding to the P Matrix Table (Table C.2) for Expectations of Effort Expenditure

	VIDEO-BASED	AUDIO-BASED	PC-BASED	TEXT-BASED
VIDEO-BASED				
AUDIO-BASED	31.82			
PC-BASED	33.77	44.14		
TEXT-BASED	35.67	40.57	43.51	

Table C.20

Values of θ' corresponding to the P' Matrix Table (Table C.5) for Expectations of Effort Expenditure

	VIDEO-BASED	AUDIO-BASED	PC-BASED	TEXT-BASED
VIDEO-BASED				
AUDIO-BASED	34.51			
PC-BASED	33.89	44.31		
TEXT-BASED	32.83	43.17	43.85	

Table C.21

Values of $\theta - \theta'$ corresponding to the $P - P'$ Matrix Tables for Expectations of Effort Expenditure

	VIDEO-BASED	AUDIO-BASED	PC-BASED	TEXT-BASED
VIDEO-BASED				
AUDIO-BASED	-2.69			
PC-BASED	-0.12	-0.17		
TEXT-BASED	2.84	-2.60	-0.34	
Summation of $(\theta - \theta')^2$				22.22
Std. Dev. of θ				8.46
Chi-square				2.63
Degrees of Freedom				3

Table C.22

Values of θ corresponding to the P Matrix Table (Table C.8) for Expectations of Time Investment

	VIDEO-BASED	AUDIO-BASED	PC-BASED	TEXT-BASED
VIDEO-BASED				
AUDIO-BASED	30.53			
PC-BASED	31.18	41.73		
TEXT-BASED	35.06	41.73	42.36	

Table C.23

Values of θ' corresponding to the P' Matrix Table (Table C. 11) for Expectations of Time Investment

	VIDEO-BASED	AUDIO-BASED	PC-BASED	TEXT-BASED
VIDEO-BASED				
AUDIO-BASED	33.34			
PC-BASED	31.82	43.39		
TEXT-BASED	31.56	43.05	44.71	

Table C.24

Values of $\theta - \theta'$ corresponding to the $P - P'$ Matrix Tables for Expectations of Time Investment

	VIDEO-BASED	AUDIO-BASED	PC-BASED	TEXT-BASED
VIDEO-BASED				
AUDIO-BASED	-2.81			
PC-BASED	-0.64	-1.66		
TEXT-BASED	3.50	-1.32	-2.35	
Summation of $(\theta - \theta')^2$				30.58
Std. Dev. of θ				8.46
Chi-square				3.61
Degrees of Freedom				3

Table C.25

Values of θ corresponding to the P Matrix Table (Table C.14) for Expectations of Learning Achievement

	AUDIO-BASED	TEXT-BASED	PC-BASED	VIDEO-BASED
AUDIO-BASED				
TEXT-BASED	39.58			
PC-BASED	39.58	44.43		
VIDEO-BASED	26.42	41.44	41.44	

Table C.26

Values of θ' corresponding to the P' Matrix Table (Table C.17) for Expectations of Learning Achievement

	AUDIO-BASED	TEXT-BASED	PC-BASED	VIDEO-BASED
AUDIO-BASED				
TEXT-BASED	37.17			
PC-BASED	36.87	44.71		
VIDEO-BASED	31.11	38.65	38.76	

Table C.27

Values of $\theta - \theta'$ corresponding to the $P - P'$ Matrix Tables for Expectations of Learning Achievement

	VIDEO-BASED	AUDIO-BASED	PC-BASED	TEXT-BASED
VIDEO-BASED				
AUDIO-BASED	2.41			
PC-BASED	2.71	-0.28		
TEXT-BASED	-4.69	2.79	2.68	
Summation of $(\theta - \theta')^2$				50.19
Std. Dev. of θ				8.55
Chi-square				5.87
Degrees of Freedom				3

APPENDIX D

Tables D.1 to D.12:
Crosstabulation of Preferred Method
by Expectation Variables

Table D.1

Crosstabulation of Preferred Method by Expectation of Effort Expenditure for Textbook-based Prepackaged, Self-paced Instructional Materials

PREFERRED METHOD / Number (Col %)	EXPECTATION LEVEL Lesser	Greater	Row Total
Textbook	22	8	30
	59.5	14.3	32.3
Audiotape	0	16	16
	0	28.6	17.2
Videotape	9	22	31
	24.3	39.3	33.3
Personal Computer	6	10	16
	16.2	17.9	17.2
Column Total	37	56	93
	39.8	60.2	100.0

Table D.2

Crosstabulation of Preferred Method by Expectation of Time Investment for Textbook-based Prepackaged, Self-paced Instructional Materials

PREFERRED METHOD / Number (Col %)	EXPECTATION LEVEL Lesser	Greater	Row Total
Textbook	11	19	30
	27.5	35.8	32.3
Audiotape	13	3	16
	32.5	5.7	17.2
Videotape	13	18	31
	32.5	34.0	33.3
Personal Computer	3	13	16
	7.5	24.5	17.2
Column Total	40	53	93
	43.0	57.0	100.0

Table D.3

Crosstabulation of Preferred Method by Expectation of Learning Achievement for Textbook-based Prepackaged, Self-paced Instructional Materials

PREFERRED METHOD / Number (Col %)	EXPECTATION LEVEL Lesser	Greater	Row Total
Textbook	20	10	30
	28.2	45.5	32.3
Audiotape	14	2	16
	19.7	9.1	17.2
Videotape	26	5	31
	36.6	22.7	33.3
Personal Computer	11	5	16
	15.5	22.7	17.2
Column Total	71	22	93
	76.3	23.7	100.0

Table D.4

Crosstabulation of Preferred Method by Expectation of Effort Expenditure for Audiotape-based Prepackaged, Self-paced Instructional Materials

PREFERRED METHOD / Number (Col %)	EXPECTATION LEVEL Lesser	Greater	Row Total
Textbook	8	22	30
	20.0	41.5	32.3
Audiotape	5	11	16
	12.5	20.8	17.2
Videotape	14	17	31
	35.0	32.1	33.3
Personal Computer	13	3	16
	32.5	5.7	17.2
Column Total	40	53	93
	43.0	57.0	100.0

Table D.5

Crosstabulation of Preferred Method by Expectation of Time Investment for Audiotape-based Prepackaged, Self-paced Instructional Materials

PREFERRED METHOD / Number (Col %)	EXPECTATION LEVEL: Lesser	Greater	Row Total
Textbook	24	6	30
	63.2	10.9	32.3
Audiotape	2	14	16
	5.3	25.5	17.2
Videotape	5	25	31
	15.8	45.5	33.3
Personal Computer	6	10	16
	15.8	18.2	17.2
Column Total	38	55	93
	40.9	59.1	100.0

Table D.6

Crosstabulation of Preferred Method by Expectation of Learning Achievement for Audiotape-based Prepackaged, Self-paced Instructional Materials

PREFERRED METHOD / Number (Col %)	EXPECTATION LEVEL: Lesser	Greater	Row Total
Textbook	12	18	30
	27.3	36.7	32.3
Audiotape	14	2	16
	31.8	4.1	17.2
Videotape	15	16	31
	34.1	32.7	33.3
Personal Computer	3	13	16
	6.8	26.5	17.2
Column Total	44	49	93
	47.3	52.7	100.0

Table D.7

Crosstabulation of Preferred Method by Expectation of Effort Expenditure for Videotape-based Prepackaged, Self-paced Instructional Materials

PREFERRED METHOD / Number (Col %)	EXPECTATION LEVEL Lesser	Greater	Row Total
Textbook	14 20.9	16 61.5	30 32.3
Audiotape	12 17.9	4 4.3	16 17.2
Videotape	31 33.3	0 0	31 33.3
Personal Computer	10 14.5	6 23.1	16 17.2
Column Total	67 72.0	26 28.0	93 100.0

Table D.8

Crosstabulation of Preferred Method by Expectation of Time Investment for Videotape-based Prepackaged, Self-paced Instructional Materials

PREFERRED METHOD / Number (Col %)	EXPECTATION LEVEL Lesser	Greater	Row Total
Textbook	10 26.3	20 36.4	30 32.3
Audiotape	5 13.2	11 20.0	16 17.2
Videotape	10 26.3	21 38.2	31 33.3
Personal Computer	13 34.2	3 5.5	16 17.2
Column Total	67 72.0	26 28.0	93 100.0

Table D.9

Crosstabulation of Preferred Method by Expectation of Learning Achievement for Videotape-based Prepackaged, Self-paced Instructional Materials

PREFERRED METHOD	Number (Col %)	EXPECTATION LEVEL Lesser	Greater	Row Total
Textbook		2	28	30
		4.4	58.3	32.3
Audiotape		14	2	16
		31.1	4.2	17.2
Videotape		21	10	31
		46.7	20.8	33.3
Personal Computer		8	8	16
		17.8	16.7	17.2
	Column Total	45	48	93
		48.4	51.6	100.0

Table D.10

Crosstabulation of Preferred Method by Expectation of Effort Expenditure for Personal Computer-based Prepackaged, Self-paced Instructional Materials

PREFERRED METHOD	Number (Col %)	EXPECTATION LEVEL Lesser	Greater	Row Total
Textbook		26	4	30
		38.2	16.0	32.3
Audiotape		4	12	16
		5.9	48.0	17.2
Videotape		23	8	31
		33.8	32.0	33.3
Personal Computer		15	1	16
		22.1	4.0	17.2
	Column Total	68	25	93
		73.1	26.9	100.0

Table D.11

Crosstabulation of Preferred Method by Expectation of Time Investment for Personal Computer-based Prepackaged, Self-paced Instructional Materials

PREFERRED METHOD	Number (Col %)	EXPECTATION LEVEL Lesser	Greater	Row Total
Textbook		19	11	30
		63.3	17.5	32.3
Audiotape		4	13	16
		10.0	20.6	17.2
Videotape		1	30	31
		3.3	47.6	33.3
Personal Computer		7	9	16
		23.3	14.3	17.2
	Column Total	30	63	93
		32.3	67.7	100.0

Table D.12

Crosstabulation of Preferred Method by Expectation of Effort Expenditure for Personal Computer-based Prepackaged, Self-paced Instructional Materials

PREFERRED METHOD	Number (Col %)	EXPECTATION LEVEL Lesser	Greater	Row Total
Textbook		16	14	30
		36.4	28.6	32.3
Audiotape		11	5	16
		25.0	10.2	17.2
Videotape		16	15	31
		36.4	30.6	33.3
Personal Computer		1	15	16
		2.3	30.6	17.2
	Column Total	44	49	93
		47.3	52.7	100.0

APPENDIX E

Varimax Rotated Factor Matrix of the Expectation Variables after Rotation with Kaiser Normalization

Table E.1

Varimax Rotated Factor Matrix
of the Expectation Variables
after Rotation with Kaiser Normalization

EXPECTATION VARIABLES	FACTORS 1	2	3	4
Effort:				
Textbook	-.5766	.3511	.2172	-.4069
Audiotape	-.1457	-.7046	-.0271	-.1599
Videotape	-.0565	-.0014	-.2153	.9791
Personal computer	.7114	.2908	-.0057	-.0629
Time:				
Textbook	-.6477	.3061	.4179	-.2225
Audiotape	-.0494	-.8391	.0102	.1388
Videotape	.0050	-.0565	-.6881	.2852
Personal computer	.7576	.4628	.1550	-.1273
Learning:				
Textbook	.6051	-.3118	-.4486	.0297
Audiotape	.0567	.7559	.1843	-.1117
Videotape	.0164	.0321	.7911	-.0195
Personal computer	-.6588	-.2852	-.2740	.0690

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