Self-Directed Learning and Learner-Control Sequencing: an Examination of the Relationship Between Two Instructional Delivery Systems and the Acquisition and Application of Subject Matter for Teacher Candidates.

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SELF-DIRECTED LEARNING AND LEARNER-CONTROL SEQUENCING: AN EXAMINATION OF THE RELATIONSHIP BETWEEN TWO INSTRUCTIONAL DELIVERY SYSTEMS AND THE ACQUISITION AND APPLICATION OF SUBJECT MATTER FOR TEACHER CANDIDATES

A Dissertation

Submitted to the Graduated Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirement for the degree of
Doctor of Philosophy

in

The Department of Curriculum and Instruction

by

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B.S., Mississippi State University, 1975
M.Ed., Southeastern Louisiana University, 1990
May, 2001
DEDICATION

This dissertation is dedicated to my son, Drew.

May nothing be impossible to you.
ACKNOWLEDGMENTS

I want to thank the members of my committee who guided me through this dissertation. They are Dr. Kenton Denny, chair, Dr. Dianne Taylor, Dr. David Houchins, Dr. Joe Witt, and Dr. Irvin Peckham. I especially want to thank Dr. Dianne Taylor and Dr. David Houchins who provided support, understanding, and encouragement when I thought that I would never finish. I also want to thank Dr. Kenton Denny. He provided the necessary knowledge and support especially during the final weeks of the study.

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ABSTRACT

The purpose of this study is to examine the relationship between different instructional delivery systems (learner-control versus instructor-control) and the acquisition and application of subject matter by teacher candidates. Further, self-directed learning and student ability are utilized to predict student outcomes. Prior technology ability and student ability and learner-controlled sequencing events during a Web-based lesson are also analyzed for predicting student outcomes. Finally, learning and assessment time of subjects in the learner-control group are measured.

Undergraduate and graduate students (N=99) enrolled in an undergraduate language arts course participated in the study. Subjects in the learner-control group learned about early literacy utilizing a Web-based lesson. Subjects in the instructor-control group were taught the same content but by lecture.

All subjects were administered a pretest and posttest developed by the primary investigator. Additionally, subjects completed the Self-Directed Learning Readiness Scale (Guglielmino, 1977), and the Profiler Survey: Basic Technology Skills Checklist (SCRTEC, 1999). Learning and assessment time were recorded for subjects in the learner-control group.

Results indicated that there was little increase in mastery between the pretest and posttest scores for subjects in the learner and instructor-control groups. Neither self-directed learning readiness and prior ability contributed to predicting learner outcomes. Prior technology ability, student ability, and learner-controlled sequencing events during the Web-based lesson also failed to predict student mastery. Subjects in one class section
spent significantly more time on learning and assessment than their peers in the other class section of the learner-control group. Instructional delivery systems may not be the determining factor that influences student outcomes. Instructional design as opposed to mode of delivery is probably the more pressing issue to be addressed. In addressing learner-control, course designers might begin with tighter instructional control and gradually introduce learner-control activities over time. This developmental approach may allow students to become more comfortable with Web instruction and learner-control.
CHAPTER 1: INTRODUCTION

Self-Directed Learning and Lifelong Learning

Certainly society has the need for a population that is educated and capable of dealing with the changing demands of citizenship, the workplace and family. One of the primary goals of lifelong education is to equip individuals with the knowledge and skill to continue their learning beyond formal schooling. Self-directed learning is a critical trait for individuals to insure learning throughout their lifetime. The ability of a person to identify and address a learning need is essential if we are to become a society of lifelong learners.

The concept of self-directed learning is commonly linked to the seminal work of Houle (1961) who identified three types of adult learners: (a) activity-oriented, (b) goal-oriented, and (c) learning-oriented (pp. 15-16). Each kind of learner valued education to be important throughout their lifetime. Adults from each type viewed learning as continuing beyond formal schooling. Cropley (1979) identifies self-directed learning as a critical component of lifelong education. Lifelong learning should:

1. Last the whole life of each individual
2. Lead to the systematic acquisition, renewal, upgrading and completion of knowledge, skills and attitudes made necessary by the constantly changing conditions in which people now live
3. Have, as its ultimate goal, promotion of the self-fulfillment of each individual
4. Be dependent for its successful implementation on people’s increasing ability and motivation to engage in self-directed learning activities
5. Acknowledge the contribution of all available educational influences, including formal, non-formal and informal (p.3).

In this sense, self-directed learning can be viewed as a means and an end to lifelong education.

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Definition for Self-Directed Learning

The notion of self-directed learning and lifelong education continues to be espoused by adult educators (Candy, 1991; Gibbons & Phillips, 1982; Grow, 1991; Knowles, 1975, 1980; Long, 1992; Smith, 1990; Tough, 1979). Specifically, the concept of self-directed learning may best be defined by examining its two major tenets: (a) self-direction is a method for organizing instruction, and (b) self-direction is a characteristic for learning.

Several authors assert that self-direction may be directly related to how instruction is organized and delivered (Candy, 1991; Gibbons & Phillips, 1982; Knowles, 1984; Long, 1992; Millar, Morphet, & Saddlington, 1986; Tough, 1979). Knowles states that a learning activity may be either instructor-directed or self-directed. An instructor directed activity requires the teacher to be responsible for all or much of the learning experience. Students are mostly receiving and recording information. Self-directed learning activities often include both the content and procedure for learning. The student takes responsibility for his/her instruction (e.g., content and process of learning), and the teacher serves as a facilitator or encourager instead of a content expert.

Self-direction, as an internal individual characteristic or trait, is viewed by many to be the outcome of lifelong learning (Brookfield, 1986; Hubbard, 1994; Kasworm, 1983; Kerka, 1994; Knowles, 1984; Meichenbaum and Biemiller, 1998; Okabayashi & Torrance, 1984). Self-direction requires that the individual possess certain abilities and skills. For instance, Okabayashi and Torrance (1984) define self-directed learning as an individual possessing the following characteristics:
the ability to sense the relevant and important and to solve problems; awareness of sources of information and ability to use them; flexibility in viewing things; independence in thinking; skills in following instructions and rules with flexibility; skills in recognizing and accepting responsibility for one’s own learning; curiosity; self-starting in doing things; great energy and persistence; self-confidence and self-motivation; and the ability to defend a position (p. 102).

Knowles (1984) supports the notion that self-directed learning for individuals is a lifelong process. Students must be equipped with skills that enable them to:

(a) diagnose their needs, (b) formulate goals, (c) identify human and material resources for learning, and (d) implement and evaluate their own learning outcomes (p. 301).

Knowles and others advocate that instructors relinquish some control of learning, so that students may develop self-directed learning skills, and ultimately become successful lifelong learners (Brookfield, 1986; Hubbard, 1994; Kasworm, 1983; Kerka, 1994; Meichenbaum and Biemiller, 1998; Okabayashi & Torrance, 1984).

While many authors agree that self-directed learning is a critical outcome of education, disagreement on what constitutes self-directed learning still remain. The most critical issues that separate the research and researchers of lifelong learning are whether individuals are better suited to be self-directed or if the instructional process and content are the focus for educating individuals. For purposes of this study, self-directed learning is defined as a method for organizing instruction. In the following section, several theories related to self-directed learning as a means to organize instruction will be presented. Related research supporting self-directed learning as a method of instruction will be provided.
Theories About Self-Directed Learning as a Method For Organizing Instruction

There are three basic theoretical paradigms addressing self-directed learning. They are: (a) behavioral theory (b) cognition, and (c) humanism. Each paradigm will be briefly described in the following sections.

Behavioral Theory. Behavioral theory or learning theory, is grounded in the works of Skinner (1953) who proposes that most behavior exhibited by an individual is learned through interaction with the environment. Skinner is most noted for contributing the "three-term contingency" to learning theory. In this model, certain antecedent environmental events (stimuli) signal that a behavior will be reinforced or punished. Consequent events (stimuli) serve to strengthen or weaken the response/behavior.

Skinner (1969) argues strongly against the study of non-observable characteristics in the study of learning. Self-direction as a personal trait has little or no meaning from a behavioral perspective. The emphasis is on the observable behavior that an individual exhibits and on the environmental events that precede or follow those behaviors. The behaviorist would not recognize that an adult model of learning has utility because basic learning theory is seen sufficient to explain both child and adult learning. From this, the behavior(s) associated with self-direction would be in response to immediate environmental demands or possibly be a response class of behaviors with a long and "lean" history of reinforcement (Skinner, 1969).

Certainly behavioral theory has influenced adult learning as evidenced by Tough (1979) and Knowles (1980). Their linear models of learning move students through a series of steps to reach their learning goals. The movement of simple to more complex learning is a hallmark of learning theory.
Cognition. The focus of cognitive theory rests in the learning process itself. The center of learning is internal and not external. Influenced by theorist such as Piaget and Inhelder (1969) and Bruner (1960), cognitive theory is characterized by hypotheses of the internal nature and structure of thought. While a thorough review of the range of research is beyond the scope of this investigation, several characteristics of cognitively influenced instruction may be offered. Bruner (1960) forwarded the cognitive theory of education which places an emphasis of rearranging thought patterns and gaining insight as the basis for learning new academic and social behavior. The most applied demonstration of cognitive theory is “discovery learning.” In a discovery model, teachers do not impart knowledge, rather they arrange the environment to facilitate the discovery and organization of knowledge. Motivation is presumed to occur as a result of the innate need for the individual to impose organization on objects or events in the arrangement.

Several of the proposed methods and underlying tenets of self-directed learning are clearly influenced by a cognitive orientation. Merriam and Caffarella (1999) state that learning is a process of constructing meaning. Individuals make sense of their own learning experiences. Meaning is made by the individual and is dependent on previous and current knowledge structures. Therefore learning is an internal cognitive process. The constructivism viewpoint emphasizes “active inquiry, independence, and individuality in a learning task” (Candy, 1991, p. 278). For example, Candy, one of several constructivist advocates for self-directed learning, states that teaching and learning for individuals is a process of negotiation that involves “the construction and exchange of personally relevant and viable meanings” (p. 275).
Humanism. The works of Carl Rogers and Abraham Maslow (1968) form the foundation for humanism. For self-directed learning, the humanistic focus is on the individual and self development (Cafarella, 1993). The individual assumes primary responsibility for learning. Learning is centered on the needs of the student, and those needs are more important than content. The role of the instructor is to serve as facilitator of knowledge as opposed to a content expert. Merriam and Cafarella (1999) state that humanists believe that individual behavior is not predetermined by environment or one’s subconscious. Individuals control their own destiny. Therefore, behavior is a consequence of personal choice.

Knowles’s (1980) theory about adult learning (andragogy) is based on a humanistic philosophy. Andragogy is the “art and science of helping adults learn” (p. 43). There are two predominant assumptions behind andragogy. The first assumption is that knowledge is actively produced by the learner and is not passively received from circumstances. The second assumption is that learning is an interactive process of construction, integration, and transformation of one’s experiential world (Merriam, 1993).

Mezirow’s (1991) Transformation Theory is also based on the humanistic philosophy for self-directed learning. A brief description of the theory will be discussed next.

Transformation Theory. The foundations of Mezirow’s (1991) Transformation Theory are based on the work of critical theorist Jurgen Habermas (1971) who outlined three domains for adult learning: (a) technical, (b) practical, and (c) emancipatory. These
domains are grounded in areas of social existence: (a) work, (b) interaction, and (c) power. Each domain suggests a different method of individual learning and different learning requirements.

Mezirow (1981) states that the technical domain refers to “the ways one controls and manipulates his or her environment” (p. 4). This action is based on empirical scholarship (i.e., formulating and testing a hypothesis). The practical domain involves interaction or collaboration between instructor and student. Educational practitioners commonly employ group work and other interactive strategies so that learners may share their experiences and resources as equal members of the group. Mezirow states that the practical domain requires “systematic inquiry which seeks the understanding of meaning rather than to establish causality” (p. 5). Emancipatory involves getting learners to reflect on how their knowledge is developed. “Insights gained through critical self-awareness are emancipatory in the sense that at least one can recognize the correct reasons for his or her problems” (p. 5). Mezirow (1991) contends that Habermas’s (1971) domains are critical for self-directed learning. The domains involve different ways of knowing, and therefore different learning needs, educational strategies and methods, and techniques for evaluation, are required. Educators must master the demands of all three domains and become adept at working with individual differences among students (p. 21). In order for students to be self-directed learners, teachers must progressively decrease their control of instruction and increase student responsibility for learning.

Mezirow’s (1991) Theory of Transformation, formed the foundation for models based upon levels of instructional control (Candy, 1991; Gibbons & Phillips, 1982; Grow,
Models Depicting Different Levels of Instructional Control

Several authors have observed that students are not prepared to be self-directed learners (Candy, 1991; Gibbons & Phillips, 1982; Grow, 1991; Long, 1989; & Millar, Morphet, & Saddington, 1986). Several models may assist educators in how to release instructional-control so that students become more self-directed. These models are described next.

Teaching for Self-Education. Gibbons and Phillips (1982) state that self-education is based on the assumption that “to be fully human is to be in control of oneself and responsible for one’s actions” (p. 74). They propose a model for self-education involving three transitions that are the primary responsibility of formal school systems. The transitions are: (a) teacher-directed to student-directed learning, (b) student-directed learning to guided self-education, and (c) guided self-education to independent pursuit of excellence (p.74). The process of transitioning from teacher-directed to student-directed learning is depicted in Figure 1.1.

The transition from teacher-directed to student-directed learning should begin at the kindergarten level. Activities at this level should be mostly teacher-directed. By grade 6, students should be guiding most of their learning. They should be selecting learning goals and content, learning approaches that conform to their educational needs, and monitoring the approaches that they have chosen. Further, by the twelfth grade,
Students should be at a level where they can pursue their education independent of teacher-direction (Gibbons and Phillips, 1982).

Releasing instructional control to the student is a process that involves helping students transform from a technical learning process (teacher selects goals and content, decides learning approaches, and monitors its use), through practical (student selects goals and content, teacher decides on learning approaches and monitors its use), to emancipatory (student selects goals and content, decides learning approaches, and monitors its use). Grow (1991), like Gibbons and Phillips (1982), also suggests that self-directed learning is a transformational process that occurs in stages.

Grow (1991) suggests that teachers should release some instructional control so that individuals may become self-directed learners. Instructional delivery should not be
governed by subject matter but by “the balance between teacher directiveness and student control, usually set by the student’s ability to participate as a self-directed, self-motivated, responsible learner” (p. 136). Further, it seems that the determining factor for separating self-directed learning involving mostly teacher-control from self-directed learning that is mostly controlled by the student, may be whether the student chooses to assume primary responsibility for designing, implementing and evaluating their learning experiences (Brockett & Hiemstra, 1991; Merriam & Caffarella, 1991).

The Staged Self-Directed Learning Model (SSDL), based on Mezirow (1981), Tannenbaum and Schmidt (1958) and Hersey and Blanchard (1988), suggests how teachers can actively assist their students in becoming more self-directed. Figure 1.2 illustrates the SSDL. The SSDL Model depicts the teacher matching the learner’s stage of self-direction and preparing the student to progress to higher levels of learning independence.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Student</th>
<th>Teacher</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>Dependent</td>
<td>Authority, Coach</td>
<td>Coaching with immediate feedback. Drill. Informational lecture. Overcoming deficiencies and resistance.</td>
</tr>
<tr>
<td>Stage 2</td>
<td>Interested</td>
<td>Motivator, guide</td>
<td>Inspiring lecture plus guided discussion. Goal-setting and learning strategies.</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Involved</td>
<td>Facilitator</td>
<td>Discussion facilitated by teacher who participates as equal. Seminar. Group projects.</td>
</tr>
<tr>
<td>Stage 4</td>
<td>Self-directed</td>
<td>Consultant, delegator</td>
<td>Internship, dissertation, individual work or self-directed study-group.</td>
</tr>
</tbody>
</table>

Figure 1.2 Situated Self-Directed Learner Model
Grow (1991) states that Stage 1 learners need clear teaching methods that are organized. This includes precise objectives and straightforward instructional techniques to achieve educational goals (i.e., technical domain). Stage 2 learners respond more to the teacher serving as a motivator. Learners at this stage are mostly confident that they can learn, but they are ignorant about the subject content (i.e., technical, practical domains). In Stage 3, learners have equipped themselves with skills and knowledge to further their education. They see themselves as “participants” (p. 133). They are ready to explore subject matter with the assistance of a teacher-guide. However they need to develop more confidence in their ability to work with others. Stage 3 learners benefit from learning more about how they learn (i.e., practical domain). The final stage represents learners who are self-directed. They are able to set their own goals and standards with or without the aid of a teacher. They take responsibility for their learning. For example, they are able to: (a) manage time, (b) set goals, (c) accept criticism from their peers, (d) utilize appropriate educational resources, and (e) evaluate their own learning outcomes (i.e., emancipatory domain).

Millar, Morphet, and Saddlington (1986) use the leadership grid (Figure 1.3) created by Tannenbaum and Schmidt (1958) to explain the process of how students assume learning responsibility.

Millar, Morphet, and Saddlington (1986) state that the diagonal line represents the ratio between teacher authority and student responsibility. A possible vacuum exists on the diagonal line, when the teacher is desiring to be a consultant and students are at a point of selling concepts that they have learned. It may be difficult for teachers to abdicate power because they are rarely involved in the task. Though Millar, Morphet,
and Saddington (1986) provide situations for the learning process, they still suggest that teachers need to abdicate power so that students may become self-directed learners. The focus of their model suggests how teachers may abdicate power through communicative processes (i.e., practical domain). Emancipation of student learning occurs through self-reflection.

Candy (1991), similar to Millar et al., (1986) suggests that if one subscribes to the notion that being self-directed means teachers releasing instructional control, a continuum for learner controlled instruction may resemble the one depicted in Figure 1.5.

**Learner Controlled Instruction Continuum.** Candy (1991) suggests that self-directed learning is related to instructional method. He defines self-directed learning as an educational experience that is shared by the teacher and student. It is a "mode of
organizing instruction in formal settings (learner control).” (p. 23). Candy suggests that the teaching/learning experience may be based on a continuum “extending from teacher-control at one extreme to learner-control at the other” (p. 8). Figure 1.4 illustrates the continuum for “learner controlled instruction” as indicated by Candy (p. 10).

The continuum begins with (a) the teacher having almost complete control over instruction. There is little room for student input. The sequence on the continuum moves next to: “(b) lectures, (c) lessons, (d) programmed instruction, (e) individualized instruction, (f) personalized instruction, (g) interactive computer-managed learning, (h) discovery learning, and (i) independent study” (pp. 10 - 11).

![Learner-Control Continuum Showing Different Instructional Delivery Systems](image)

Lectures are characterized by the teacher providing information to the student during the learning period. Interaction between student and teacher is mostly controlled
by the teacher. This interaction is usually demonstrated by the teacher asking a question and the student responding with an answer. (Resnick, 1983).

Lessons are defined as providing instruction that is correlated to a defined set of objectives written by the teacher. Lessons are teacher-directed through demonstration of the skill objective (e.g., the student will be able to write the numbers one to ten in sequential order). Students are provided drill and practice to obtain mastery of the objective. There are more interactions between the teacher and student. However, they are still controlled mostly by the teacher. The student has some control over pacing of their own seatwork (Resnick, 1983). Many models of "effective instruction" are based on this level of the continuum (Rosenshine & Stevens, 1986; Stallings, 1977).

Programmed instruction is education provided to students via workbooks, textbooks, or electronic devices. Students progress at their own rate, and information is provided in small steps. Immediate feedback is provided about achievement (Zane, 1987).

Individualized instruction is defined by adapting the learning experience to meet individual needs within a group (Sindelar & Collins, 1987). Personalized instruction, based on Keller's Personalized System of Instruction (PSI) (Keller, 1968), is characterized by students, individually or in groups, proceeding through course units of instruction usually provided on a computer. Students are required to pass each unit exam with a minimum score. Teachers or teacher assistants act as consultants. Students decide how fast or slowly they want to complete the material (Schunk, 1991).

Interactive computer managed learning, also associated with computer assisted instruction, is defined as an individual interacting in a conversational mode with a
computer that has a programmed lesson plan (Gueulette, 1982; Hartley & Davies, 1977). Instruction is individualized by directing students to information areas that are appropriate for their learning. Learning tasks are presented in a meaningful sequence. Students may progress at their own rate (Fitzgerald, Fick, & Milich, 1986).

Student control of learning is increasingly evident during discovery learning. It is characterized by students encountering new information that does not fit their existing knowledge structures. This produces frustration and "disequilibrium." The teacher suggests a new way of ordering the information, which assists the student in inventing a new structure (Lawson, 1983, p. 118).

Independent study is characterized by a high degree of learner-control. When students engage in independent study, they are making decisions about many instructional elements including the "setting of objectives, choices about pacing, sequencing, content and methodology, and assessment of learning outcomes" (Candy, 1991, p.13). Independent study closely resembles what students should be doing as self-directed learners.

Candy states that the movement from one level of the continuum to another suggests a developmental sequence for instruction. Figure 1.5 suggests that even when instances involve high levels of teacher-control (e.g., lectures, lessons etc.), there is still some learner-control residual. The reverse can also be said for high levels of a learner-controlled situation. The teacher may have some residual control (e.g., scaffolding, guided questions) over students to make decisions compulsory for them (p. 207).

Candy (1991) states that the main disadvantage of the Learner Control Continuum is that learners may not always want to know how to take more control of
their learning and may actually resent having to learn on their own. Teachers also have difficulty giving up their role as full-time instructor. The task of serving as a facilitator of learning is very different from that of telling students what to know and how they should learn.

Several authors have advocated that in order to be a self-directed learner, students need to possess more instructional control of their learning (Boud & Bridge, 1975; Candy, 1991; Gibbons & Phillips, 1982; Grow, 1991; Knowles, 1980; Long, 1989; Millar, Morphet, & Saddington, 1986; Pratt; 1988; Tough, 1979). The term, learner-controlled instruction has several different definitions. These descriptions will be investigated next.

Definitions for Learner Control

Boud and Bridge (1975) used four dimensions to describe learner control. They are: (a) pace (the time and place which the student identifies as the most advantageous and appropriate to learn), (b) choice (which course or part of the course to study), (c) method (selecting individualized study packages, lectures, textbooks etc.), and (d) content (choosing what to learn according to the individual’s goals and interests) (p. 4).

McGrath (1992), Milheim (1990), and Murphy and Davidson (1991) define learner-control in terms similar to Boud and Bridge (1975), and relate the definition to encompass computer technology. Learner-control is characterized as the amount of “pacing, sequencing, and content” selection controlled by the student during computer-assisted instruction (CAI). Specifically, Milheim states that learner-control “allows students to choose the speed, order or individual topics that most suit their (the learners)
specific needs or learning styles" (p.7). Murphy and Davidson add that when students have control over their learning, the use of CAI may be advantageous to their learning. This is based on the concept that the student is the best judge of their instructional needs. McGrath indicates that sequencing of the lesson is possibly one of the most important issues of learner-control during CAI.

Reeves (1993), Williams (1996), and Yang and Chin (1997) concurred with McGrath (1992), Milheim (1990), and Murphy and Davidson (1991). However the language used for their definitions of learner-control reflect the interest of educators in technology design and how it relates to learning and instruction. They state that learner-control are design features of CAI that helps the student to select independently the "path, rate, content" and type of feedback in learning. Santiago and Okey (1992) also focus on technology design. In the presence of technological instructional design options, learners have the freedom of choice to make decisions, exercise authority, and assume partial or total responsibility for their instruction on the computer.

Major Theories Related to Learner Control Sequencing

Learner-controlled instruction using the Internet's World Wide Web involves both constructivist and reductionist paradigms. Milheim and Martin (1991) suggest that there are two major learner-control theories that emphasize sequencing events. Motivation Theory (Keller, 1983) and Information Processing Theory (Gagne', 1965) will be described next.

Motivation Theory. Keller (1983) defines motivation as the magnitude and direction of the student's behavior. This theory focuses on the choices that individuals make concerning their goals and the magnitude of effort that they exercise to reach them.
There are four categories of motivational conditions that can be used to increase student performance in a learner-controlled environment. These categories are:

(a) interest (the stimulation of the learner's curiosity and the continuance of this stimulation),
(b) relevance (the learner's perception of personal need),
(c) expectancy (the perceived possibility of success),
(d) satisfaction (the rewards received from learning).

Relevance and expectancy are more likely to be an internal locus of control while interest and satisfaction are more likely connected to external locus of control. If instruction is relevant to student's personal needs, then there may be an increased willingness to spend time on learning, because instruction makes sense to them.

Expected outcomes are critical incentives for learning. If instruction can satisfy the learner's hope for success, then it will build up the student's confidence to become a lifelong learner.

Milheim and Martin (1991) state that relevance and expectancy are very important in learner-control. Learners are more likely to control these two categories without assistance from the teacher. Interest and satisfaction are likely to be controlled by outside forces. Giving instructional control to the student allows them to direct their own learning sequence and content selection. Therefore, students will be able to control (at least partially) their own learning according to their personal needs and desires (relevance) and/or hope for learning success (expectancy).

Information Processing Theory. Milheim and Martin (1991) state that the human brain is viewed as a processor of information that receives, codes, stores, retrieves and integrates information and knowledge. Gagne' (1965) hypothesizes that three types of memory are needed for information processing: (a) sensory, (b) short-
term, and (c) long-term. While these structures are important for processing, emphasis is placed on encoding which begins during sensory memory processing. Atkinson and Shiffrin (1968) state that information processing begins when the individual receives stimuli from the environment via visual, auditory, or tactile cues (sensory memory). The learner then selects the needed information and rejects unessential data. After facts have been encoded (selected and transformed) into recognizable patterns in short-term memory, it is translated into meaningful knowledge that is encoded for later use in long-term memory.

The encoding process can be influenced and developed by various types of learner control strategies over sequencing, and choice of instructional content (Milheim & Martin, 1991). Learner-control provides individuals time, freedom, and flexibility to complete the process of encoding.

In summary, learner-control may provide learners with flexibility of sequence and choice of content to complete the process of encoding based on an individual's schema. This schema is dependent on prior experiences, knowledge, ability, interest, cultural background, and mental developmental differences (Gagne', 1965).

Overall, learner-control strategies can be used in an individualized learning environment (Milheim & Martin, 1991). Learner-control sequencing based on theories of motivation and information processing can promote self-control. Learner-control is a desired characteristic for students to become self-directed learners. To become a self-directed learner, teachers need to abdicate some instructional control to the students.

Have teachers relinquished enough instructional control for students to be self-directed learners by the time they graduate from high school? Gibbons and Phillips
(1982) advance the notion that students should be independent learners by the time they reach the twelfth grade. If teachers have surrendered some instructional control during the formal school years, students in postsecondary institutions should possess some skills to control their own learning. As the use of technology for learning increases, it is critical that students have the abilities and skills to take control of their learning so that they are self-directed learners. Because learner-control is a component of self-directed learning, it is an important area to examine for students learning on the World Wide Web.

**The Need for Studies About Web-based Instruction**

Web-based instruction requires students to determine: (a) what to learn, (b) how to learn subject matter, (c) how to sequence their lesson, and (d) when their learning objective is mastered (Hannafin, Hall, Land, & Hill, 1994). We know little of the validity for training teachers using the Web. The effectiveness of Web-based instruction when compared to conventional methods seems questionable.

**Importance.** Web-based instruction has been influenced by the impact of its use in business and industry. Martin (1999) reports that there are four factors occurring in the workplace that are influencing the growth of Web-based instruction. The first factor is the rapid change in required skills for the workforce. This is due to the increasing reliance on digital technologies and the transformation to a knowledge-based economy. The demand for individuals skilled in developing and using information technology (IT) is evidenced in manufacturing and services, transportation, health care, government, and education fields (Meares & Sargent, 1999). Further, The United States Department of Commerce (1998) reported that IT’s contribution to the United States economy almost doubled between 1977 and 1998, advancing from 4.2% to 8.2% (p. 5). The need for
individuals experienced in IT is expected to double by 2006 (Information Technology Association of America, p 4). This need along with rapid changes in technology itself, is propelling the need for continuous training (Martin, p. 221).

The second factor that is influencing the growth of Web-based instruction is the cost effectiveness of training using the Web. Martin (1999) states that many corporations spend 70% of their educational expenses providing lodging, meals, transportation, and instructors. Providing instruction on the Web eliminates these costs and also makes the learning process more efficient. Less time is spent in the classroom.

Thirdly, recruitment and retention of employees is driving the growth of Web-based instruction. The present workforce is increasingly mobile, and corporations can no longer guarantee long term employment to its employees. Therefore, training programs are used as a tool for retention of company jobholders (Martin, 1999, p. 222).

The final factor that is driving the growth of Web-based instruction, is the tremendous influx of adult learners. The demand for providing educational services Online is precipitated by demands for flexibility and convenience for nontraditional students who cannot meet the customary demands of attending classes during the day or evening at a university setting (Martin, p. 223). University officials have felt the impact of these four factors already and are eager for their faculty to create and promote Web-based courses (Schnorr, 1999).

Recently more colleges and universities are offering graduate and undergraduate coursework and degree programs via the World Wide Web (Gibbs, 1998; Kearsley, Lynch, & Wiser, 1995). Massy and Zemsky (1995) state that most colleges and
universities are making major investments in their technological capacities so that they may meet the demands of their students.

One influential factor that is effecting Colleges of Education to change their way of preparing teachers, are professional education groups. These organizations are demanding that preservice teachers receive training using information technology. The International Society for Technology in Education (ISTE, 1996) and The National Council for Accreditation of Teacher Education (NCATE, 1997) state that teacher preparation institutions must begin training their candidates to use technology for instructional purposes.

The demands of the workplace call for classroom teachers to prepare their students for employment by providing instruction using technology. Keeping up with these rapid changes in technology and the work environment, requires teachers and students to realize that they are lifelong learners (Martin, 1999). Preparing students for lifelong learning means that teachers will need to change some of their instructional methods. Learning about instructional methods and strategies using information technology (e.g., Web-based instruction) for teacher candidates may assist in preparing them to relinquish some instructional control to their future students. Providing opportunities for students to control their learning during Web-based instruction, may contribute to self-directed learning and ultimately lifelong learning.

The Online Academy. A current program that assists in preparing preservice teachers for using information technology is the The Online Academy (Meyen, 1997). This is a federal project funded by the Office of Special Education Programs (OSEP). Meyen, Deshler, Aust, Ramp, Freeman, & O'Donnell, 1999) report that the purpose of
the Online Academy is to improve instruction of the teacher education curriculum by integrating research-based interventions that are effective for training general education and special education preservice teachers of students with disabilities. A major goal of the Academy is to provide access to their instructional modules for teacher educators.

OSEP directed the Academy to design and implement instructional modules in the following content areas: (a) Reading, (b) Positive Behavior Support, and (c) Technology in Education. Each module contains empirically based interventions that are effective for preparing teachers of students with disabilities. The modules are not intended to be used as an entire course. They serve as a resource for instructors to infuse all or part of the lessons into existing coursework.

A lesson from the Online Academy Reading Module (Meyen, Deshler, Aust, Ramp, Freeman, & O'Donnell, 1999) is used as the treatment for subjects in the treatment (learner-control) group for this study. Lesson One, "The Development of Literacy: As Reading Instruction Begins," (Glaeser, Lenz, Gildroy, & McKnight, 1999) is a self-contained lesson (i.e., the instructor does not have to respond to assessments, practices, or activities) that provides information about reading growth and development of children from birth to the third grade. The lesson provides examples of best practice methods that promote literacy from kindergarten to the third grade.

Certainly federal projects such as the Online Academy (Meyen, 1997) contribute to assisting preservice teachers in utilizing information technology for their future students. Additionally, modules such as those designed by the Online Academy may assist researchers in developing theory and determining effective design for Web-based lessons.
Lack of Theory. One factor that inhibits research is the absence of theory in studies examining Web-based instruction. Currently the literature contains no theory relating to studies examining Web-based instruction (Blackhurst, Hales, & Lahm, 1998; Kearsley, Lynch, & Wizer, 1995; Lockee, Burton, & Cross, 1999; Moore, 1989; Mudge, 1999). The few studies reporting results, compare Web-based instruction with traditional instructional delivery (Jones, 1999; Navarro, & Shoemaker, 1999; Schulman, & Sims, 1999) and theory is not mentioned. The lack of a coherent learning theory behind Web-based instruction is critically absent.

Advantages and Disadvantages. Massy and Zemsky (2000) and Mudge (1999) offer several advantages to learning on the Web. For instance, Mudge states that students may be able to access their Web-based course from anywhere in the world. Further, learning material can be accessed as many times as students need. Finally, students may learn when they desire. Time is not a concern. Massy and Zemsky state that Web-based instruction allows instructor to accommodate for individual differences. Further, students will be able to pace their learning which addresses different learning styles.

Mudge (1999) states that disadvantages for Web-based instruction include the following: (a) security issues such as Internet hackers invading the course Web-site; (b) converting normal text to Hyper Text Markup Language (HTML); (c) small bandwidth size for transferring data, and (d) lack of prior knowledge of technology. Massy and Zemsky (2000) add that the cost of developing a Web-based course can be expensive. Providing faculty monetary incentives for developing Web-based courses

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seem to be a concern. Additionally, university financial constraints make it difficult to keep up with software and hardware upgrades.

Certainly there are advantages and disadvantages to Web-based instruction. Though they are mentioned, none have been examined in studies. The need to study advantages and disadvantages for Web-based instruction is crucial.

**Summary**

There exists a great deal of literature that suggests the need and process for developing self-directed learning. Central to the majority of these theories is that for self-direction to be developed, the process for instruction must be moved from teacher to student control.

With the increasing emphasis on Web-based instruction, the need for research to examine factors related to the development of self-directed learning is critical (Rogers & Laws, 1997). Specifically, we need to begin to address how well students are prepared to take advantage of Web-based instruction and the impact of that instruction on student learning.

Another factor that needs critical attention is the ability of students to take control of their learning during Web-based instruction. Research is scarce concerning the effectiveness of learner-control during Web-based instruction on student outcomes (Moore, 1989; Navarro & Shoemaker, 1999; Schulman & Sims, 1999). Ruffini (1999) and Meyen, Lian, and Tangen (1997) also state that the issue of learner-controlled instruction using the World Wide Web for instructional delivery must be addressed.

Nelson (1990) adds that while students have the freedom and control to browse the
instructional environment on the Internet, they often get lost while navigating from one provided link to the other. This results in a “cognitive overload” (p. 295). Therefore some students may not be suited to control their learning during Web-based instruction.

There are many questions concerning the effectiveness of using the World Wide Web compared to traditional methods of instructional delivery (Massy & Zemsky, 2000; Mudge, 1999). Blackhurst, Hales, & Lahm (1998) indicate that little to no evidence exists concerning instructional content (e.g., type of content that is appropriate for delivery), and management of instruction (e.g., how to individualize instruction, how to administer tests). Navarro and Shoemaker (1999) add that little to no evidence exists concerning the types of students who would benefit from on-line instruction. Lockee, Burton, and Cross (1999) maintain that issues such as prior knowledge of technology and content while learning on the Web, have not been addressed. It is obvious that several questions have yet to be answered about using the World Wide Web as an instructional delivery system for learning.

Limitations to the Study

Several limitations may have contributed to the outcomes of this study. They are listed and briefly explained below. A discussion of overall and specific restrictions with a prescription for how to address the limitations in future studies will be presented in Chapter Five.

Sampling. A quasi-experimental design was implemented, and random sampling was not employed in this study. Subjects were already assigned through enrollment in the language arts classes.
Time span. Data collection began at the beginning rather than the middle or end of the semester. Instructors for the language arts courses had planned the course sequence of study for students prior to the semester. They were willing to provide a maximum of two class sessions per instructor during a one week period. Subsequent time constraint was that three of the class sections met at the same time and on the same days. Instructors did not want to provide part of their class time to data collection. They wanted to provide two full class sessions during one week instead of a portion of the class session over a two week time span. Another primary limitation of this study was that only one lesson was used to determine outcomes.

Sequencing. This study provided results from one lesson at the beginning of the semester. There is a possibility that subjects in the learner-control group may have become more adept at navigating around the lesson and utilizing the lesson supports.

Technology Difficulties. Nearly one-third of the subjects (31%) in the learner-control group experienced technological difficulties. The most common technology problem was related to the computer freezing and subjects not being able to continue the Web-based lesson. To correct the problem, subjects were required to shut down the computer and reboot. This caused a break in learning time and may have contributed to the low scores on the posttest for some subjects. Additional technical difficulties involved fuzzy graphic displays on some of the computer monitors. Pictures and graphics were distorted. Colors were muted or no color could be seen on the monitor. Some computer terminals displayed an illegal function notice while subjects were engaged in learning. This notice immediately closes the program. Therefore, subjects spent time beginning the lesson again.
**History.** On the day that data were collected for Class Section One, the University was staging their annual Fall Fest. The combination of Fall Fest and class occurring on a Friday, may have influenced subjects to terminate the lesson earlier and complete the posttest more quickly than they would have at another time.

**Instrumentation.** Reliability for the pretest and posttest instrument should be considered when analyzing the results of the lesson assessment. Though the reliability for the pretest was strong (.82), the posttest reliability was much lower (.52).
CHAPTER 2: REVIEW OF THE LITERATURE

This chapter reviews the literature of studies investigating the concept of self-directed learning, self-directed learning readiness, Web-based instruction and learner-control. Experimental studies seeking the effects of learner-control using sequencing events, learner-control with prior technology ability and student ability are discussed.

Self-Directed Learning

Self-directed learning is defined as a method for organizing and delivering instruction. There are a wealth of studies investigating some aspect of self-directed learning. Some studies investigating self-directed learning were ethnographic interviews that examined how subjects judge themselves to be self-directed learners (Caffarella & Caffarella, 1986; Caffarella & O’Donnell, 1991; Taylor, 1986; Usher & Johnston, 1988). Other studies about self-directed learning, studied the relationship between a specific human attribute and self-directed learning (Brockett, 1985; Kreber, 1998). However Glaubman, Glaubman and Ofir (1997) and Barta (1989) examined self-directed learning in two different contexts.

Glaubman et al. (1997) investigated the effects of self-directed learning, story comprehension, and self-questioning using 93 children from seven kindergarten classes. Subjects were randomly assigned to three groups: (a) metacognitive theory training, (b) active processing theory training, and (c) a control group using conventional questioning by teachers. Self-directed learning was measured by asking students to match and grade for size, the components of “nine screws, nine bolts, and nine matching holes on a specially prepared wooden stand” (p. 364). The subjects were graded using an
observation sheet structured by the authors. The sheet contained eleven subscales that followed specifications for self-direction at the kindergarten level.

A pretest/posttest design with delayed posttest was implemented. A Multivariate Analysis of Variance (MANOVA) was used to determine differences between variables. Results indicated that metacognitive training was superior to the active processing or regular questioning techniques \[ F(2,32) = 8.6, p < .001 \]. Delayed posttest scores occurred three months later and indicated that metacognitive training continued to be superior to the other two methods \[ F(2,32) = 7.06, p < .01 \].

Metacognitive training increased self-directed learning for kindergarten subjects in one group \[ F(2,88) = 3.84, p < .05 \]. A delayed posttest was not implemented to measure for self-directed learning. The authors concluded that metacognitive training strategies assisted subjects in becoming aware of their learning and task needs and their thinking processes. It is possible that subjects gained skills through the metacognitive intervention to direct their own learning. Glaubman et al. (1997) provided evidence that self-directed learning may be increased in kindergarten age children and therefore is not an innate trait. Self-direction can be developed or increased by intervention.

Barta (1989) compared teacher-directed and self-directed instruction for learning keyboarding skills. Subjects were 33 students enrolled in an undergraduate keyboarding class at a large midwestern university. Groups were assigned to a teacher-directed or student directed group with the same materials. The difference in the 2 treatments was the presence of an instructor. A pretest and posttest was administered to all subjects. Results indicated a significant difference in the number errors made by students on the
posttest. Students in the teacher-directed group made two and one-half times less errors than subjects in the self-directed group. No statistical evidence to support this statement was presented in the article. Therefore caution should be used when considering the results of this study.

Only two studies were identified that involved directly measuring self-directed learning behavior. Both Glaubman et al. (1997) and Barta (1989) measured for self-direction using different methods designed to quantify self-directed learning by directly measuring behavior representative of self-direction. The majority of research has relied up self-report to quantify self-direction.

Guglielmino (1977) developed the Self-Directed Learning Readiness Scale (SDLRS) which measures for the presence of certain personal attributes that are linked to learning success. The SDLRS is a 58 item Likert-scale questionnaire that measure eight factors associated with self-directed learning. The factors are: (a) openness to learning opportunities, (b) creative thinking, (c) future orientation, (d) self-concept as an effective learner, (e) initiative and independence in learning, (f) informed acceptance of responsibility of one’s own learning, (g) love of learning, and (h) ability to use basic study skills and problem solving skills. The instrument has been used in the studies described below (Guglielmino & Roberts, 1992; Kasworm, 1983; & Owen, 1999; Okabayashi & Torrance, 1984).

Self-Directed Learning Readiness

While the research on the SDLRS (Guglielmino, 1977) is limited, several researchers have recognized the importance of self-direction in a range of learning
situations. Guglielmino and Roberts (1992) reported a positive correlation between self-directed learning readiness and job performance. Subjects were 753 telecommunication workers from the United States and 655 workers from Hong Kong, China working in the same field. All subjects were administered the SDLRS. Results of the correlational study showed a positive relationship between self-directed learning readiness and work performance (r = .83) as measured by work errors and work attendance. While the study may be criticized for lack of validation with English as a second language populations, it did support a tentative relation between self-direction and performance.

Owen (1999) used the SDLRS to determine the relationship between student wellness and self-directed learning. Kinesiology graduate students (N=185) completed the SDLRS and a wellness measure. Results from the SDLRS indicated that creativity, a component of the scale, was significantly correlated with physical, intellectual, and emotional wellness. Subjects identified as self-directed learners appeared to express themselves creatively and it seemed to be correlated with their emotional and physical health.

Okabayashi and Torrance (1984) examined whether brain hemisphere dominance was related to achievement and levels of self-direction. Academically gifted students in grades 4 through 7 (N=148) were administered the SDLRS (Guglielmino, 1977) and The Your Style of Learning and Thinking Test (TYSLTT) (Torrance & MccCarthy, 1980). Results of the three-way ANOVA indicated significant main effects for students who process information using both the right and left hemisphere as measured by the TYSLTT. The results of the SDLRS showed no significant group main effects for self-
directed learning. These data may suggest that students who use a variety of learning inputs indicative of right and left hemisphere usage, tend to achieve at higher levels. In addition, the responses measured as self-direction on the SDLRS did not discriminate between the high and low achievement groups. The authors suggest that this might be due to the limited exposure to instruction designed to facilitate self-direction at the elementary school level.

Little empirical evidence exists about the effectiveness of self-directed learning procedures. Okabayashi & Torrance (1984) offer that measurement of self-direction is difficult due to the range of abilities and skills that an individual must possess to become a self-directed learner. Guglielmino’s readiness scale (SDLRS, 1977) seems to be the only systematic measure currently available. While published research is limited, the use of the SDLRS has been reported in several unpublished studies (Adams, 1993; Brockett, 1982; Eisenman, 1988; Hudspeth, 1992; Posner, 1990; Rakes, 1991; Stubblefield, 1993). Results from these studies using the Self-Directed Learning Readiness Scale appear ambiguous. Part of the reason for these results stems from the scale being used in correlational studies for self-directed learning as a personal attribute. There is no evidence of the SDLRS being used in studies examining instructional presentation formats and student outcomes during nonclassroom-based instruction.

Web-based Instruction

The World Wide Web is an open-ended environment where learners determine: (a) what is to be learned, (b) how material is to be learned, (c) how to sequence the lesson, and (d) when the learning goal is reached (Hannafin, Hall, Land, & Hill, 1994).
But we know little of the validity for training teachers using the World Wide Web. The effectiveness of Web-based instruction when compared to lecture seems questionable.

Most of the published literature on Web-based instruction is devoted to case studies that describe personal experiences using the World Wide Web (e.g., Collins, 1996; Mende, 1998; Meyen, Lian & Tangen, 1997; Lewis, Treves, & Shaindlin, 1997). Limited empirical evidence exists about the instructional effectiveness of learning online. The efficacy of Web-based instruction as opposed to traditional formats remains largely unknown (Jones, 1999; Navarro & Shoemaker, 1999; Schulman & Sims, 1999).

Schulmann & Sims (1999) compared Web-based to traditional lecture formats. Subjects (N=99) were enrolled in five different College of Business courses. They completed a pretest and posttest of course content from their respective courses. Results of the posttest suggested that students enrolled in the online version for the respective courses scored (M = 77.80), about the same as students enrolled in lecture groups (M = 77.58). Neither group scored above 80% in either treatment. The results of Shulman’s study seem to support results of the second experimental study on Web-based instruction.

Jones (1999) studied demographic and performance differences between Web-based instruction and lecture. Specifically, three areas were examined: (a) student outcomes in Web-based and traditional lecture courses where they were allowed to select the instructional delivery mode, (b) background differences of students who selected lecture presentation to those who chose Web-based instruction, and (c) the “advantages” of Web-based instruction. Two groups of undergraduate subjects (N=89)
taking an introductory statistics course participated. Overall grade point average (GPA) and individual scores from the Mathematical Association of America's College Level Algebra Test were used as covariates. A repeated measures Analysis of Covariance (ANCOVA) was conducted with and without use of the covariates—GPA and algebra pretest. Results indicated no significant difference between the traditional class instruction and online instruction groups. GPA and algebra pretest covariate results showed no significant difference between the web-based and the traditional groups on prior achievement and math ability. Results of these studies (Jones, 1999; Shulman & Sims, 1999) seem to support each other. Students appear to achieve using either instructional delivery system. It is interesting that neither method appears to be a superior teaching approach for assuring student mastery of the material.

Navarro and Shoemaker (1999) continued exploring the effectiveness of Web-based instruction using students enrolled in a graduate-level MBA course on macroeconomics. Student aptitude, gender, and language background were correlated with cyberlearning success. Interactions and communications between learners and the professor while learning on the Web were also described. All of the 63 graduate students lived off-campus, and all were employed full-time in different businesses. The 32 subjects in the cyberlearning group listened to lectures from a CD prepared by the course professor. Additionally they were required to participate in business policy threaded discussions online. The 31 subjects in the lecture group were required to attend class, listen to the lectures presented by the professor, and participate face-to-face in policy discussions. Data were collected using weekly quizzes, a mid-term and final exams for both groups.
Results indicated that scores were equivalent for subjects in both groups. Gender, ethnicity, age, primary language, and academic background did not predict course achievement. The majority of the cyberlearners (90%) stated that they had adequate opportunities to interact with the professor using email, threaded discussion, and the class bulletin board. As with other studies, the small sample size and sample selection limit the ability to draw large inferences from the study.

To date, no studies have used a learning module developed by the Online Academy (Meyen, 1997) for their instrumentation. Specifically, the Beginning Word Reading, Lesson One, “The Development of Literacy: As Reading Instruction Begins,” (Glaeser, Lenz, Gildroy, & McKnight, 1999) has not been used as an experimental instrument to determine the relationship between two instructional delivery systems.

All of the aforementioned studies seem to support that learning on the Web may be equivalent to traditional lecture. Limitations to each of the studies must be considered. Small sample size and lack of random assignment are two major limitations found in these studies. Additionally, two of the studies provide insufficient descriptions of procedures and data analysis. Replication would be difficult.

**Learner-Controlled Sequencing**

Studies examining whether students are able to sequence their own lesson dates back to the early 1960's. Mager (1961), and Mager and McCann (1961) examined the effects of student choice (i.e. sequencing and pacing) on instructional content. In Mager's case study, six students in a college electronics course were given the opportunity to sequence a lesson instead of the instructor. The students were able to control the length of each instructional session. The instructor's role was that of
facilitator during the experiment. The teacher answered students' questions, but no other information or explanations were provided. Results indicated that when students were given instructional control, the course sequence was considerably different from a teacher developed lesson. Further, time spent during each instructional session varied across subjects.

In the second case study, Mager and McCann (1961) investigated six engineers during a training course that occurred over a six month period. Subjects were given control over sequencing and pacing of the provided training materials. They were allowed to ask for guidance from anyone in the company, but they were not to accept instruction that they did not want. Results of the study indicated that training time was reduced by 65%. Subjects scored higher on job evaluations than their peers who did not receive the same type of training. The authors suggest that subjects' readiness for employment and confidence levels were increased because they were able to sequence their own training lessons. Content sequence varied across subjects, but in no case was sequencing similar to the order that would have been used by the training session instructor.

The results of these studies suggest that students at the postsecondary level may be able to control sequencing better than the instructor. These studies were conducted in classroom settings. Other studies involving sequencing events, utilized the computer for instruction.

For the most part, students with high ability seem to sequence less and learn equally or better than students with lower ability (Gay, 1986, McGrath, 1992). When Gay (1986) investigated the effects of prior knowledge on the amount of structure or
control offered, students with high prior knowledge of DNA spent less time and sequenced less than subjects in the other treatment groups. All subjects (N=80) were undergraduates enrolled in an Introductory Biology course. Prior to treatment, students were administered a multiple choice pretest covering the subject of DNA. Independent variables were: (a) the student’s prior knowledge, (b) program-controlled instruction, and (c) learner-controlled instruction. Dependent variables were posttest achievement scores and time on task (sequencing was part of this). Subjects were randomly assigned into program or learner control groups. In the program-control treatment, students had to complete the learning task as specified by the computer lesson. Students were allowed to control their own pacing through the lesson. The learner-control group was allowed to control the pace, sequence, amount of practice, mode of presentation (e.g., video, audio, graphics, or text), and type of content (e.g., rules, key points, examples, or practice). The results of the 2 x 2 Analysis of Variance (ANOVA) showed that there was a significant interaction between treatment groups and prior knowledge $F(1, 79) = 10.53, p < .001, MSe = 37.81$. Subjects with lower prior knowledge about DNA in the learner-control group ($M = 14.35, SD = 2.81$) were significantly different than their counterpart subjects in the program-control group ($M = 17.25, SD = 1.74$).

The results of the ANOVA measuring time on-task revealed a significant interaction between treatment and prior knowledge $F(1,79) = 10.53, p < .01, MSe = 1280.2$. Students with high prior knowledge in the learner-control treatment spent much less time and sequenced less ($M = 61.15, SD = 7.19$) than students in the learner-control group with low prior knowledge ($M = 69.45, SD = 13.09$), the program-control group
with high prior knowledge \((M = 66.35, SD = 8.21)\), and the program-control group with low prior knowledge \((M = 71.85, SD = 9.26)\).

McGrath (1992) found similar results with sequencing as Gay (1986). Students used a computer tutorial with four versions: (a) hypertext lesson where the learner could choose the sequence of the lesson; (b) a computer-assisted instructional version where the student worked from screen to screen in a predetermined order, but could select which of the 6 sections of the lesson that they wished to work through; (c) a no-menu version that required the learner to view the entire lesson in a predetermined manner; and (d) a paper version of the lesson. Subjects \((N=103)\) were taking a required instructional media course as part of their teacher preparation curriculum. They were randomly assigned to one of the four groups. Additional data were collected on the number of nonsequential choices made by students in the first two groups (hypertext free-choice; CAI, limited choice). All students received the same lesson. Results of the Analysis of Covariance (ANCOVA) concerning time spent on the lesson, showed that there was a significant effect for lesson type, \(F(3,93) = 2.785, p < .05\), and a significant interaction, \(F(3,93) = 4.006, p < .05\). A comparison between the extremes of learner-control (Hypertext and Paper) indicated a significant difference \(t(51) = -2.219, p < .03\). No significant differences were noted between the Hypertext and No Menu groups.

McGrath (1992) also indicated that subjects with high spatial scores made fewer nonsequential selections than those with low spatial scores \(F(2,52) = 4.991, p < .02\). Subjects in the Low Spatial Hypertext group made more nonsequential choices than the High Spatial hypertext group. McGrath implies that subjects with high ability under the
learner-control condition using hypertext might view fewer screens because they may have better knowledge of what they need.

The results of Hannafin and Sullivan's (1995) study seemed to differ from Gay (1986) and McGrath (1992) concerning the number of sequencing events. They examined the effects of a learner and program control instructional program using a full and lean version on the achievement, option use (sequencing) and time-in-program of 274 high and low ability students in the ninth and tenth grade. There were four different treatment groups: (a) program-control, lean, (b) program-control, full, (c) learner-control, lean, and (d) learner-control, full. Participants in the program-control version were required to view and respond to all screens, compared to those in the learner-control version who were allowed to either add optional screens (lean version) or bypass them (full version). Subjects were blocked by ability according to the results of their math achievement test that was administered the previous year. They were randomly assigned within ability blocks to one of the four versions of the geometry computer program.

Results from the MANOVA showed that there were significant effects for type of instructional control $F (3,264) = 4.13 \ p < .01$, control mode $F (3,264) = 89.31 \ p < .001$, ability $F (3, 264) = 19.41 \ p < .001$, and interaction for type of instructional control by control mode $F (3, 264) = 13.29 \ p < .001$. Results of Univariate Analysis of Variance revealed that subjects under learner-control ($M = 14.97$) scored significantly higher on the posttest than those under program-control ($M = 13.69$), $F (1,266) = 5.30, \ p < .05$. High ability subjects ($M = 16.45$) performed significantly better than low ability learners.
\( M = 12.21 \), \( F(1,266) = 58.59, p < .001 \). Subjects with high ability also selected more optional screens (61%) compared to low ability learners (48%), \( F(1,132) = 17.07, p < .01 \).

In the full version of the geometry program, high ability students (79%) viewed about the same amount of screens as the subjects in the lean version (76%). The difference appeared in the lean program, with high ability subjects viewing 43% more optional screens than did subjects with low ability (19%).

Other studies examining learner-controlled sequencing have found no significant effect for sequencing events (Lanza & Roselli, 1991; Merrill, 1990). Lanza and Roselli, employed 60 undergraduate students enrolled in an introductory computer course. Subjects in this study were required to complete a lesson using a computer in the laboratory or classroom setting. The main difference between the treatment program and the control program was that the treatment program allowed students to move freely along the instructional material selecting either the instructional or test segment. Subjects in the control group could only move forward through the lesson. Study results indicated no significant differences between the treatment and control groups.

Milheim (1990) investigated the effects of learner-controlled pacing, sequencing and time between short and long-term posttests using an interactive video lesson on student achievement and time-on-task. Pacing and sequencing had two levels: (a) student-control and (b) instructional program control. At the student-controlled level for pacing, subjects could press a computer key when they were finished with each text page. Student-control of sequencing allowed the subjects to choose the order of the six lessons to be presented. Subjects under program-control of pacing viewed each line of

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text on the screen for one second per line. All of the students in the program-control for sequencing group viewed the lessons in a predetermined order. Subjects (N=99) were undergraduates taking a media course. All subjects were randomly assigned to one of four treatment groups: (a) learner-control of pacing and sequencing, (b) learner-control of pacing/program-control of sequencing, (c) program-control of pacing/learner-control of sequencing, and (d) program-control of pacing and sequencing. All six modules were viewed individually by students using an interactive video system. Results indicated that sequencing control was not significant in either immediate or delayed posttest conditions for achievement.

The results of studies examining learner-controlled sequencing appear inconclusive. Mager (1961) and Mager and McCann (1961) support allowing students more control of sequencing their own lessons. Two studies indicate that students with high ability or prior knowledge of subject content sequence less (Gay, 1986; McGrath, 1992). One study reports that students with high ability sequence more when given control (Hannafin & Sullivan, 1995). Still additional research supports that sequencing control may not be a significant factor for learning during CAI (Lanza & Roselli, 1991; Milheim, 1990). While the results of these studies do not clearly support student sequencing, there is a need to continue to examine sequencing to clarify the impact of this critical student behavior.

**Learner-Control and Prior Knowledge**

Ross and Rakow (1981) examined the effects of learner-control and prior knowledge on achievement. A pretest was administered to educational psychology
students (N=124) completing a math rules lesson. A posttest and delayed posttest were administered to determine immediate and long-term retention of the material. The math rules lesson was developed by the primary investigators. Subjects were randomly assigned to four groups: (a) program-control, (b) lecture, (c) nonadaptive, and (d) learner-control. Results of the 4 x 3 ANOVA indicated main effects for treatments [F(3, 120) = 2.80, p < .05], and for test [F(2, 240) = 331.08, p < .01]. Subjects’ immediate retention in the program-control group was 21.29% higher than subjects in the learner-control, lecture, and nonadapted groups. Delayed posttest scores showed that the program-control group still scored significantly higher than the other groups [F(3, 120) = 5.74, p < .01].

Carrier, Davidson and Williams (1985) studied the effects of ability and locus of control on learner-control and program-control. All sixth grade subjects (N=65) were enrolled in a computer literacy class at a private school. Subjects were randomly assigned to one of three treatment groups: (a) no-options/lean version, (b) no-options/full version, and (c) options/full version. No-options was in reference to a program-control treatment. Options referred to a learner-controlled treatment. Results indicated that subjects with high ability and high internal locus of control (i.e., students believe their own efforts will lead to successful achievement) performed better on the full version than either the lean or options versions of the computer program. Higher ability students in the options treatment selected more material. Students with lower ability, when given the option to choose more material, elected for lesser amounts. Students with lower ability under choice conditions, performed no differently than students of their respective ability in the program-control group.
The results from these studies (Carrier, Davidson & Williams, 1986; Ross & Rakow, 1981) support each other concerning prior knowledge of the subject matter and/or ability. These studies appear to support previous research (Gay, 1986; Hannafin & Sullivan, 1995) indicating students with high prior knowledge perform better when given control of their learning than students with low prior knowledge. It is possible that students with high prior knowledge may be more suited for learner-controlled instruction.

Learner-Control and Prior Technology Ability

Examining prior technology ability is a much needed area for future research. The familiarity with Web-based conventions (e.g., hyperlinks, back buttons, etc.) and basic problem solving (e.g., error messages, printing problems, support applications) could possibly impact a student's performance under Web-based instruction.

There appears to be little or no evidence of studies including prior technology ability as a variable for learner-controlled instruction. Though some studies indicate students possess technology experience (Hooper, Temiyakarn & Williams, 1993; Kinzie, Sullivan & Berdel, 1992), it was not included as an experimental variable.

Time On-Task and Assessment Time

Research supports that the amount of time students spend actively involved in instruction may be related to achievement (Denham & Lieberman, 1980; Fisher, Berliner, Filby, Marilave, Cahen, & Dishaw, 1980; Greenwood, 1991). Achievement and time spent learning have been found to be greater under instructor-controlled conditions than learning independently (Sindelar, Smith, Harriman, Hale, & Wilson, 1986). Students engaged in learning on the Web may often do so without the presence of an instructor.
Current studies about Web-based instruction, do not include data about time on-task. The current study attempts to quantify the amount of time students spent completing a Web-based lesson. A brief review of studies reporting time on-task during CAI are reviewed below.

Several studies involving learner-control, have measured for time on-task during instruction (Frietag & Sullivan, 1995; Gay, 1986; Hannafin & Sullivan, 1995; Hicken, Sullivan & Klein, 1992; Milheim, 1990; and Ross & Rakow, 1981). Three studies reported decreased time on-task. Gay (1986) reported that there was a significant difference between the learner-control group and program control group for time on-task. Results of the ANOVA showed that subjects in the learner-control group were more efficient than subjects in the program-control group $F(1, 79) = 10.53, p<.01$. Milheim also disclosed that subjects in the learner-control group spent significantly less time learning than subjects in the program control group $F(1, 98) = 69.99, p= .000$ (effect size = 2.65). Ross and Rakow (1981) experienced similar results for time on-task. Subjects in the learner-control group spent less time on-task than the program-control group $F(2, 122) = 4.67, p<.05$. Still, subjects in the program-control group scored significantly higher than the learner-control group.

Frietag and Sullivan (1995) also reported that subjects in the learner-control group spent less time on-task while learning. Subjects were matched to the learning condition that they preferred, and the matched group scored higher than subjects who were not tied to their preferred learning condition.

Two studies appear to contradict the findings of spending less time on-task under learner-control conditions. Hicken, Sullivan, and Klein (1992) and Hannafin and

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Sullivan (1995) reported that subjects in the learner-control group spent more time on-task than the program-control group.

Hannafin and Sullivan (1995) indicated that subjects spent more time on-task in the learner-control group ($M = 48.3$ minutes) than subjects in the program control group ($M = 40.7$ minutes), $F(1,266) = 9.33, p < .01$. Subjects with high ability spent more time on-task ($M = 45.9$ minutes) than subjects with low ability ($M = 43.1$ minutes). However, the differences were not significant.

Hicken, Sullivan and Klein (1992) reported that the overall time spent by subjects in the learner-control groups using a full (102.47 minutes) or lean (102.61 minutes) computer program were the same. Differences were noted for specific components of the computer program. Subjects who had access to the full computer program, but were able to bypass some elements of instruction (FullMinus program), spent significantly more time learning $F(1,92) = 31.38, p < .01$ (effect size $= 1.16$) than subjects who received just the core instructional program but were able to request for added instruction (LeanPlus program).

Results appear contradictory for studies investigating instructional time on-task. A few studies show that subjects in the learner-control group spend less time on-task than their counterparts in the program-control group (Gay, 1986; Milheim, 1990; and Ross & Rakow, 1981). Freitag and Sullivan (1995) also found that subjects in the learner-control group spend less time on-task when they are matched with their desired learning condition. Hannafin and Sullivan (1995) and Hicken, Sullivan and Klein (1992) show that subjects in the learner-control group actually spend more time on-task. There is no evidence of studies involving Web-based instruction where instructional time was
examined. There is a need to investigate instructional time during Web-based instruction.

No studies have examined levels of learning by addressing assessment time. Current best practice in assessment has focused on the rate of responding as a measure of learning (Deno, 1987; Fuchs, Fuchs, Hamlett, & Stecker, 1990; Shinn, 1988). A significant contribution to the literature would be to collect data on assessment time to provide an indication of the level of learning (e.g., acquisition or fluency) during Web-based instruction. None of the studies involving instructional time during CAI included assessment time (Freitag & Sullivan, 1995; Gay, 1986; Hannafin & Sullivan, 1995; Hicken, Sullivan & Klein, 1992; Milheim, 1990; Ross & Rakow, 1981). Assessment time for the current study, begins when the subject receives the paper and pencil test and ends when the subject submits the test and exits the room.

Summary

A review of the literature for self-directed learning indicates that there are few experimental studies measuring for its effects (Barta, 1989; Glaubman, Glaubman, & Ofir 1997). A few studies measure for self-directed learning readiness (Guglielmino & Roberts, 1992; Okabayashi& Torrance, 1984). There appears to be little or no quantitative evidence about self-directed learning readiness and learner-control using the World Wide Web. Further, prior technology ability has not been considered as a variable for learner-control. It seems that students with high prior knowledge of content achieve better under learner-control than individuals with low prior knowledge (Gay, 1986; Hannafin, & Sullivan, 1995; Milheim, 1990; Ross & Rakow, 1981). It is possible that a student with above average knowledge of the content may use learner-control to
reinforce basic knowledge or extend the level of knowledge of the topic. Conversely, students with low prior knowledge may gain academically, but may not be able to extend beyond basic mastery of the material presented. Certainly, the research appears to support prior knowledge as a critical variable in the efficacy of learner-control.

The results of studies investigating learner-controlled sequencing events appear inconclusive. Mager (1961) and Mager and McCann (1961) report that students are able to sequence their own lesson better than an instructor. Gay (1966) and McGrath (1992) indicate that students with high ability or prior knowledge of content, sequence less in a computer assisted learning episode. Hanafin and Sullivan (1995) disclose that students with high ability sequence more. Other authors (Lanza and Roselli, 1991; Milheim, 1990) report no significant differences with sequencing events for students during learner-control. Studies investigating sequencing as a variable for learning appear ambiguous about its effectiveness.

Studies examining instructional time on-task offer few firm conclusions. A few studies show that subjects in the learner-control group spend less time on-task than their counterparts in the program-control group (Gay, 1986; Milheim, 1990; and Ross & Rakow, 1981). While other studies report that subjects spend more time on-task in a learner-control situation (Hannafin & Sullivan, 1995; Hicken, Sullivan & Klein, 1992). Research addressing learner-controlled sequencing and instructional time spent on the Web will contribute to the knowledge base on self-directed learning and Web-based instruction.

Another gap found in the literature, is that no studies include assessment time of students during Web-based instruction. Examining assessment time while learning on the
Web will contribute to the literature and may assist Web course instructors in preparing better test instruments and course activities.

**Purpose of the Present Study**

Although Web-based instruction seems to be growing in availability, research is lacking concerning its effectiveness for providing instruction to students. Additional research is needed to verify its efficacy. Little evidence exists whether self-directed learning readiness and student ability will predict learning outcomes. Prior technology ability and number of sequencing events need to be considered as variables for predicting student outcomes while learning on the Web.

Currently, universities are being challenged to produce technology-proficient graduates in all fields. Nowhere is this challenge more critical than the preparation of teaching professionals. Elementary, secondary, and special education personnel must be comfortable with technology-based applications and utilize them appropriately in their teaching. The experiences they have as teacher candidates may impact their subsequent use of technology. Critical questions investigating whether preservice teachers can control their instruction to achieve positive outcomes has not been answered. What factors contribute to effective instructional control? Learner-controlled sequencing and instructional time on-task seem to be primary factors for obtaining knowledge effectively but do they contribute to effective outcomes during a Web-based lesson? This study is guided by five questions:

**Question One:** What is the relationship between different instructional delivery systems (learner-control versus instructor-control) and the acquisition and application of subject matter for teacher candidates?
**Question Two:** Do self-directed learning readiness and student ability predict student outcomes?

**Question Three:** Do prior technology ability and student ability and the number of learner-controlled sequencing events during Web-based instruction predict student outcomes?

**Question Four:** How much time do subjects spend learning information provided through Web-based instruction?

**Question Five:** How much time do subjects spend completing an assessment test covering Web-based instructional material?

**Definition of the Variables**

The present study investigated the relationship between two different instructional delivery systems and the acquisition and application of subject matter for teacher candidates. The outcome variable was student outcomes. Independent variables were: (a) learner-control, (b) instructor-control, (c) student ability, (d) prior technology ability, and (e) learner-controlled sequencing. Additionally, learning time and assessment time were used as variables. Each term will be defined for purposes of this study.

**Student Outcome.** Student outcome was defined as the score achieved on the posttest of the assessment instrument.

**Learner-control.** Learner-control was defined as individuals seated at computer terminals viewing and listening to instructional content from a lesson module designed by the Online Academy (Meyen, 1997), and simultaneously selecting content provided by submenus and hyperlinks.
Instructor-Control. Instructor-control was the auditory and visual presentation of information by a teacher in a traditional classroom.

Student Ability. For purposes of this study, student ability was measured using the composite score from the American College Testing Program, now called ACT (ACT, 2000). The purpose of the ACT is to measure learning achievement of students entering higher education.

Prior Technology Ability. Prior technology ability was defined as the score that students received on the Profiler Survey: Basic Technology Skills Checklist (SCRTEC, 1999). The survey measured common technology skills and procedures that were identified by the International Society for Technology in Education (ISTE).

Learner-Controlled Sequencing Events. Learner-controlled sequencing events, were defined as the number of lesson events selected by a subject while engaged in the Beginning Reading Module, Lesson One, “The Development of Literacy: As Reading Instruction Begins.” (Glaeser, Lenz, Gildroy, & McKnight, 1999). Every time the student went from one screen to the next screen, was considered a sequencing event.

The Online Academy Reading Module Lesson. A lesson was defined as the learner engaged in listening to and/or viewing content of a level, section, or hyperlink connected to the Online Academy (Meyen, Deshler, Aust, Freeman, & O’Donnell, 1999) Reading Module (Glaeser, et. al., 1999).

Learning Time. Learning time began when the student viewed the computer monitor and simultaneously moved the computer mouse. Learning time ended when the subject requested the assessment test.
Assessment Time. Assessment time began when subjects received the assessment test and ended when they submitted the test instrument and exited the room.
CHAPTER 3: METHODOLOGY

Overview

The primary purpose of the study was to examine the relationship between different instructional delivery systems (learner control versus instructor-control) and the acquisition and application of subject matter for teacher candidates who were on a nonmastery level prior to an intervention. Predicting student outcomes given student ability and self-directed learning readiness were also examined. Further, given prior technology ability and student ability, the number of learner-controlled sequencing events were used to predict student outcomes for subjects in the learner-control group. Time on-task for learning and completion of the lesson assessment were also measured for subjects in the learner-control group. The majority of subjects were 99 undergraduate junior or senior level students enrolled in four sections of a language arts course. Enrollment in each section was limited to 25 students. A quasi-experimental design was implemented. A Web-based lesson developed by the Online Academy (Meyen, Deshler, Aust, Freeman, & O’Donnell, 1999) on early literacy was used as treatment delivery for two class sections in the learner-control group. The instructor-control group consisted of two class sections that received the same information and materials but by lecture from the primary investigator in their normal classroom locations. Both control and treatment groups were administered a pretest and posttest criterion-referenced assessment to measure student outcomes. A raw score of 14 or 70% correct was the criterion level. The Self-Directed Learning Readiness Scale (SDLRS) (Guglielmino, 1977) was administered immediately following completion of the pretest. Technology proficiency,
using the Profiler Survey: Basic Technology Skills Checklist (SCRTEC, 1999), was measured for subjects in the learner-control group. Student ability was measured using the ACT (ACT, 2000) composite score for each student. Learner-controlled sequencing events were measured for each subject completing the Web-based lesson in the learner-control group. A Chi square procedure was used to analyze the lesson assessment data. Logistic regression was used to determine if student ability and self-directed learning readiness predicted student outcomes. Logistic regression was also used to determine whether learner-controlled sequencing events, prior technology ability and student ability predicted student outcomes. A t-test was performed to discern differences in learning time and assessment time between the two class sections in the learner control group.

**Statement of Research Questions**

Five questions identified in the second chapter were:

**Question One.** What is the relationship between different instructional delivery systems (learner-control versus instructor-controlled lecture) on the acquisition and application of subject matter for students enrolled in an introductory undergraduate teaching certification course? Though several studies have investigated instructional delivery systems involving learner-control, none of the studies have used a criterion referenced test to measure mastery levels.

**Question Two.** Do self-directed learning readiness and student ability predict student outcomes? The literature is scarce of studies predicting student outcomes using self-directed learning readiness and student ability as covariates. Self-directed learning has proven to be a vague concept, and self-directed learning readiness and student ability have not been considered as predicting outcomes for teacher candidates.
**Question Three.** Do prior technology ability and student ability and the number of learner-controlled sequencing events during a Web-based lesson predict student outcomes? No studies have linked prior technology ability and student ability with learner-controlled sequencing to predict outcomes.

**Question Four.** How much time do subjects spend completing the lesson? Developers of the Online Academy (Meyen, et al., 1999) predicted that it would take subjects two to three hours to complete the Web-based lesson.

**Question Five.** How much time do subjects spend completing a lesson assessment covering Web-based instructional material? As an extension of question four, this study sought to measure assessment time as an additional part of student learning time.

**Independent Variables.**

To address the first question about the relationship between two instructional delivery systems on the acquisition and application of subject matter for preservice teachers, the independent variables was the instructional delivery mode (i.e., learner-control versus instructor-control). The learner-control group using the Web-based lesson represents the seventh level of the Learner-Control Continuum proposed by Candy (1991). This level is characterized by students taking more control of their learning. Subjects were able to select the lesson content and sequence that they desired to learn. Students made the decision of what, where, and when lesson content was learned. By contrast, instructional lecture, the second level on the Learner-Control Continuum, is characterized by the teacher possessing more instructional control than the learner.

To address the second question, the scores on Self-Directed Learning Readiness Scale (SDLRS) (Guglielmino, 1977) and ACT composite scores (ACT, 2000) were the
independent variables. Overall student scores from the SDLRS and the ACT were used to determine if they predicted student outcomes.

Prior technology ability and student ability and the number of sequencing events made by each student in the learner-control group were the independent variables used to predict student outcomes to address the third research question. The assessment posttest criteria scores represented the dependent variable.

Operational Definitions

**Learner-control.** Learner-control was operationally defined as individuals seated at computer terminals viewing and listening to instructional content from a lesson module designed for the World Wide Web, and simultaneously selecting content provided by hyperlinks and submenus via a computer mouse.

**Instructor-Control.** Lecture was operationally defined as the auditory and visual presentation of information by an instructor with the presence of students, in a classroom situated in an educational facility. Interaction was demonstrated by the instructor asking a question and students verbalizing an answer.

**Student Outcomes.** Student outcomes was defined as the posttest scores achieved on the assessment instrument for the Web-based lesson.

**Student Ability.** For purposes of this study, student ability was measured using the composite score from the American College Testing Program (ACT, 1959), now called ACT (ACT, 2000). The purpose of the ACT is to measure learning achievement of students entering higher education.

**Prior Technology Ability.** Prior technology ability was defined as the overall score that students received on the Profiler Survey: Basic Technology Skills Checklist.
(SCRTEC, 1999). The survey measured common technology skills and procedures that were identified by the International Society for Technology in Education (ISTE).

**Learner-Controlled Sequencing Events.** Learner-controlled sequencing events, the independent variable for the third question, were operationally defined as the number of lesson events selected by a subject while engaged in the Beginning Reading Module, Lesson One, “The Development of Literacy: As Reading Instruction Begins.” (Glaeser, Lenz, Gildroy, & McKnight, 1999). Accessing another link from the present location of instruction was considered a sequencing event. Therefore, when counting events, the initial link was not counted. For purposes of this study, learner controlled sequencing was related to the amount of control that the program designer or instructor relinquished to the student in the form of content selection and the order that content was chosen.

**The Online Academy Reading Module Lesson.** A lesson was defined as the learner engaged in listening to and/or viewing content of a level, section, or hyperlink connected to the Online Academy (Meyen, Deshler, Aust, Freeman, & O'Donnel, 1999) Reading Module. Levels were (a) Orientation, an overview of the module lesson to the student, (b) Support, material that assists the student while completing the lesson (e.g., syllabus, readings, glossary etc.), (c) Lessons, the primary section, features the lesson presentation that may be accessed from the browser via audio streaming and graphics or a printed transcript, and (d) Practice, exercises that provide students the opportunity to apply or practice the interventions that are taught through the Reading modules. There were sections within each level of the module (e.g., glossary, notes, presentation etc.).
**Learning Time.** Learning time was defined as beginning when the seated subject views the computer monitor and simultaneously moves the computer mouse device. Learning time ended when the subject asked to complete the lesson assessment.

**Assessment Time.** Assessment time began when subjects received the assessment test and ended when they submitted the test as they exited the room.

**Dependent Variable**

The dependent variable for this study was the criterion-referenced posttest score for each subject. (see Appendix A for a copy of the lesson assessment instrument). Mastery criterion was set at 70% or a raw score of 14 out of 20. If subjects scored 70% or higher on the pretest or posttest, they had mastered the instructional content that was presented in the lesson. One of the primary purposes of this study was to measure the relationship between learner-control and instructor-control.

**Description of Subjects**

The sample for this study consisted of four class sections of an undergraduate level preservice education language arts course, EDCI 3200: Reading Writing and Oral Communication in the Elementary Schools. There were approximately 23 to 27 students enrolled in each section and were present for the treatment. Because all subjects were already enrolled in their respective class sections, they were not randomly assigned. Assignment was random for the learner-control or instructor-control groups. Two class sections were selected for instructor-controlled lecture, and two class sections were chosen as the learner-control group. Subjects participating in the study were registered as full-time students at Louisiana State University, College of Education.
According to the Louisiana State University General Catalog, 2000-2001, students enrolled in 3000 level courses must be formally admitted to the Teacher Education Program. Admission to this program required that students have acceptable scores on the PRAXIS I: Academic Skills Assessments (ETS, 2000), a normed-referenced test designed to measure reading, writing, and mathematics skills vital to teacher candidates. Students must have completed at least 75 semester hours with a minimum of a 2.50 grade point average. Additionally, an educational foundations course was a course prerequisite prior to enrollment in EDCI 3200.

**Materials**

**Description of the Online Academy.** Subjects in the learner-control group received Web-based instruction at the LSU College of Education Computer Laboratory located in Peabody Hall. They used the Online Academy (Meyen, Deshler, Aust, Freeman, & O’Donnel, 1999) Reading Module, Beginning Word Reading, Lesson One, “The Development of Literacy: As Reading Instruction Begins” (Glaeser et al., 1999). Participants in the learner-control group had control in accessing all four levels of the reading module: (a) Orientation, (b) Support, (c) Lessons and (d) Practice. A complete description of the levels and sections provided by the Online Academy (Meyen et al., 1999) is provided in Appendix B.

**Instrumentation**

**Student Outcomes.** Measurement of student outcomes for Lesson One, “The Development of Literacy: As Reading Instruction Begins” (Glaeser, et al., 1999) was implemented using a lesson assessment developed by the primary investigator.
pretest and posttest instruments consisted of 20 multiple choice questions each. Students were asked to select the best answer from four response items. A scantron sheet was supplied for each student to mark their selected responses. Most questions were designed to measure students' factual knowledge and understanding of the lesson content. Some questions required students to apply what they learned from the lesson. The total point value for the Lesson One Assessment pretest and posttest instrument was 20 points each. Criteria for mastery was set at 70% or a raw score of 14 (See Appendix A for the lesson assessment test).

**Pilot Study for Lesson Assessment Test.** Before the lesson assessment was administered to the learner-control and instructor-control groups, the lesson assessment was administered to an equivalent group of students to determine its reliability as a criterion-referenced test. The pilot study test was administered to undergraduate students enrolled in a language arts course that was equivalent to EDCI 3200, : Reading Writing and Oral Communication in the Elementary Schools. Permission was obtained from the university where the pilot study was being implemented. Permission was also granted by students participating in the pilot study before completing the lesson assessment. The test was administered to 153 students majoring in elementary and special education. All students were enrolled in the Professional Program in Teacher Education and possessed at least a 2.5 GPA, which were the same requirements for students enrolled in the language arts course in the main study. Because it was the first week of class, students had little to no prior knowledge of the content to be presented.

The pretest was labeled “Form A” and the posttest, “Form B”. Tests were distributed to the students by alternating the forms (ABABAB). Students were informed
that the purpose of completing the test was to determine reliability only and that they
would not be penalized for any incorrect responses.

Results indicated that the mean raw scores and standard deviations for both
forms were similar $\bar{x} = 8.80$, SD 2.04, Form A; ($\bar{x} = 8.92$, SD 1.80, Form B). A review
of frequencies indicated that only two individuals obtained a mastery level (70%). This
affirms that the students had little to no prior knowledge of emergent literacy.

Because reliability was being determined for a criterion-referenced test, a
Livingston $K^2$ ($\chi_1^2$) procedure was used for Forms A and B. This procedure also
measured for the degree or magnitude of classification (mastery/nonmastery). Results
indicated a reliability coefficient of .90 for both forms. This means that scores classifying
students as reaching mastery or nonmastery were consistent in predicting their true score
on either form. If students were to take the test over again, using either form, they
should obtain the same level of mastery or nonmastery.

Self-Directed Learning. The Self-Directed Learning Readiness Scale (SDLRS)
(Guglielmino, 1977) was selected to measure subjects’ readiness for self-direction. The
58 item Likert-scale was a self-report questionnaire that measured eight factors
associated with self-directed learning: (a) openness to learning opportunities,
(b) creative thinking, (c) future orientation, (d) self-concept as an effective learner,
(e) initiative and independence in learning, (f) informed acceptance of responsibility of
one’s own learning, (g) love of learning, and (h) ability to use basic study skills and
problem solving skills. The survey involved rating and listing characteristics considered
important by university professors who were considered experts in self-directed learning.
The SDLRS (Guglielmino, 1977) was initially administered to a sample of 307 individuals representing four groups: (a) high school juniors (b) high school seniors, (c) college undergraduates, and (d) noncredit students enrolled in university enrichment courses. Results of the initial study indicated an acceptable reliability coefficient (.87) for the Self-Directed Learning Readiness Scale using the Cronbach-Alpha coefficient (Guglielmino, 1977).

McCune, Guglielmino and Garcia (1990) indicated a Pearson split-half reliability estimate of .94 for the SDLRS (Guglielmino, 1977). This study used 3,151 respondents. Construct validity reported by Mourad and Torrance (1979) indicated that The Self Directed Learning Readiness Scale was highly correlated with teacher ratings of motivation, skills, and abilities for self directed learning. Torrance and Mourad (1978) also reported statistically significant validity coefficients with measures of creative ability ($r = .71, p < .001$).

The Self-Directed Learning Readiness Scale (Guglielmino, 1977) yields an overall raw score and percentile rank scores of readiness for self-direction. The use of subscores derived from the SDLRS factors were not recommended because factor analysis results may vary by sample (Gorsuch, 1983). Factor analysis research of the SDLRS using LISREL modeling (West & Bentley, 1990), showed a definite underlying factor structure in the SDLRS, but the factors were highly intercorrelated. The use of the total score for the SDLRS appears to be the most interpretable measure. The full SDLRS may be viewed in Appendix C.

**Measurement of Prior Computer Technology Skills.** Subjects in the learner-control groups completed the Profiler Survey: Basic Technology Skills Checklist.
The Profiler Survey was developed by The South Central Regional Technology in Education Consortium (SCRTEC) a federal project funded by the U.S. Department of Education (SCRTEC, 1999). Items on the Web survey are based on standards developed by the International Society for Technology in Education (ISTE). The purpose of the 30-item Profiler Survey is to assess technology proficiency of preservice teachers and faculty members who are members of the Pre-Service Teachers Networking Environments Through Technology (PT.NET) a joint venture of Louisiana State University and Agricultural and Mechanical College, Southern University and Agricultural and Mechanical College, and East Baton Rouge Parish Schools.

Individuals completing the survey are required to read a phrase that describes a specific skill or procedure. They select a descriptor that best reflects their perceived knowledge level for that skill. Subjects select one of the following choices: 1 unable, 2 adequate, 3 unfamiliar, and 4 fluent. Results are graphically displayed to depict the individual's strengths and weaknesses in six specific areas: (a) Application of Technology in Instruction, (b) Basic Computer/Technology Operations, (c) Operating Systems, (d) Productivity tools, (e) Internet, and (f) Multimedia. An overall score is provided immediately upon completing the survey. See Appendix D for an example of the survey.

Measurement of Student Ability. The ACT Assessment (ACT, 2000) is a group norm-referenced test that is designed to measure high school students' educational development and their ability to complete college-level work. The ACT measures four skill areas: (a) English, (b) mathematics, (c) reading, and (d) science reasoning. The Composite score is the average of the four tests.
Student ability was measured using the Composite score from the ACT Assessment. According to the ACT National Press Release (August, 2000), the average Composite score for members of the Class of 2000 is 21. The Composite score has remained the same for the past four years.

Sequencing. The Online Academy (Meyen, Deshler, Aust, Freeman, & O’Donnel, 1999) Reading Module (Glaeser, et al., 1999) was accessed via the World Wide Web (www.onlinacademy.org). Desktop computers in the College of Education Computer Laboratories used Netscape Navigator 4.7 (Netscape Communications, 1999) and/or Internet Explorer, 5.0 (Microsoft, 2000) Internet browser tools. One of the several tools built into both of these browsers is known as “History”. Accessing the “History” button enabled the primary investigator to obtain a list of links made by each subject while engaged in learning the Web-based lesson. Following the conclusion of the posttest for the learner-control group, the primary investigator and assistant collected sequencing events from each computer. The computer’s “History” displayed each lesson, section and level within the reading module that the subject visited. It also provided a list of links visited outside the reading module. Each subject’s browsing history was printed, and all link addresses were identified and labeled. Sequence events were paired with the results of each subject’s technology survey and the composite score of their ACT test (ACT, 2000). This was done to assist in testing for predictability of student outcomes.

Procedures

A pre-posttest control group design was utilized to address questions posed in this study. Gravetter and Wallnau (1996) state that a quasi-experimental method is used
when there are pre-existing groups of subjects and the researcher has no control over assignment of subjects to groups (p. 15). Subjects in this study were enrolled in the targeted language arts course. Because random assignment was not feasible for this study, groups were initially considered nonequivalent.

Cook and Campbell (1979) state that if groups are nonequivalent, a "no treatment control group design with a pretest and posttest" is recommended (p. 103). Cook and Campbell indicate that use of this design will control for four possible threats to internal validity: (a) selection maturation, defined as subjects in one group growing more experienced, fatigued or bored than participants in the other group (p. 104), (b) instrumentation, differences in intervals on one instrument scale compared to other instruments that could be used when comparing nonequivalent groups (p. 105), and (c) differential statistical regression, deliberate selection of low or high scorers for the one group causing the scores to regress to its population mean. Many of these threats were controlled for by the implementation of specific procedures detailed below.

Setting. The study was conducted in university classrooms where subjects normally attended their class for the instructor-control group. The normal setting for subjects in the learner-control group is the traditional classroom. For purposes of this study, subjects in the learner-control group received instruction in the College of Education Computer Laboratory. Because there were more than 20 subjects in each section of the learner-control group, two computer labs were used. Computers in the first lab contained 20 IBM processors. For the most part, computers were arranged in small groups of four that were equally spaced throughout the laboratory. The seven out
of 20 computers used by subjects located in the second laboratory were arranged along the walls. There were 10 computers arranged in an I-shape situated in the middle of the laboratory. Computers located in this laboratory were also IBM processors.

Pretest and Posttest Measures. All participants in the study completed a pretest and posttest that measured desired knowledge from the lesson on the development of literacy. Participants in the learner-control and instructor-control groups were administered a lesson assessment developed by the primary investigator. The pretest and posttest instrument contained 20 objective multiple choice questions. The total point value for the pretest lesson assessment was 20 points. Additionally, all subjects completed The Self-Directed Learning Readiness Scale (Guglielmino, 1977) that measured the degree of readiness for self-directed learning. Subjects in the learner-control group also completed the Profiler Survey: Basic Technology Skills Checklist (SCRTEC, 1999) to measure prior technology skills. Sequencing events were measured only in the learner-control group.

Collection of Data

Pretest/Posttest Data. Subjects were administered a paper and pencil lesson pretest and posttest by the principal investigator. Before test administration began, participants were instructed to write the last four digits of their Social Security number at the top of each answer page. This identification number assisted in matching pretest to posttest scores. It also assisted in organizing and linking SDLRS scores (Guglielmino, 1977), The Profiler Survey scores (SCRTEC, 1999), and ACT scores (ACT, 2000) to each participant.
Upon completion of the reading module lesson pretest, all subjects completed the Self-Directed Learning Readiness Scale. (Guglielmino, 1977) Subjects in the learner-control group also completed The Profiler Survey: Basic Technology Skills Checklist (SCRTEC, 1999). Subjects completed these assessments before any instruction was delivered in their normal classrooms for the instructor-control group and the computer laboratory for the learner-control group.

Posttest data for student outcomes were collected immediately upon completion of the lesson module for subjects in the learner and instructor-control groups. Because subjects in the learner-control group completed the module lesson at various times, the posttest was administered immediately following termination of the lesson by each participant. Posttest data for the instructor-control group were collected at the conclusion of the lecture on the last session day.

Trained Assistant. One trained research assistant was present while the learner-control group completed the reading module lesson in the second computer lab. The research assistant was trained by the principal investigator to: (a) record sequential history for each subject after they finished a session, (b) assist in any technical problems that subjects experienced while learning online, and (c) record learning and assessment time for subjects. Documentation of the number of sequencing events or history for each subject was implemented after all learner-control subjects exited the computer laboratory. The assistant accessed the “History” on each computer and printed the sequencing events made during the lesson time. The last four digits of each subject’s
Social Security number were recorded on each subject’s sequence print-out. Counting sequence events occurred after all print-outs were made.

The research assistant was also trained in navigating through the reading module. Possible technical difficulties and how to rectify the problems were stressed. The assistant was instructed not to provide any instructional information to participants in the learner-control group.

Training for time spent learning consisted of the assistant being instructed to write the time when subjects began using the Web-based lesson and when they finished the lesson. Learning time was considered to begin when subjects started looking at the computer monitor and moving the mouse. Learning time was considered ended when subjects asked to complete the lesson assessment. The assistant was instructed to record only beginning and finishing times in the second computer lab.

Training for assessment time was also completed. The assistant was told that assessment time began when each subject was given the lesson assessment. Assessment time ended as the subject submitted the test and exited the computer lab.

Data Collection for the Learner Control Group

The learner-control group received instruction during their regularly scheduled class time. Instead of meeting in their normal classroom, subjects were instructed to gather in the computer laboratories. Due to the limited amount of computers available, two separate sessions for each learner-control class section were scheduled. There were a total of 47 subjects in the learner-control group. The total number of available computers were 40. Therefore, there were not enough computers available to implement
the Web-based lesson during one session. One session was equivalent to two days. Each
class participated in the study on two successive class days. Normal class time was two
hours, 50 minutes per day. The learner-control group had access to one full class period
to complete the module lesson.

Session One. During the first session for the learner-control group, permission of
consent to participate in the study was obtained. Permission to obtain ACT scores (ACT,
2000) from the University Registrar's office were also secured. Subjects were told that
the lesson content met some of the objectives concerning language arts on their syllabus.
Therefore, they may be tested on the material by their instructor later in the semester.

The lesson pretest, The Self-Directed Learning Readiness Scale (Guglielmino,
1977) and the Profiler Survey: Basic Technology Skills Checklist (SCRTEC, 1999) were
administered during the first session. The remaining time was spent by subjects learning
how to access and navigate around the Web-based lesson.

Session Two. The entire second session consisted of subjects completing the
reading module lesson. Assistance for technical difficulties were provided. At the end of
the session, the sequential history from each computer was accessed and printed.

Data Collection for Instructor-Control Group

Subjects in the instructor-control group received the same information and lesson
options that were provided to the learner-control group. Information provided to the
group included paper copies of the: (a) glossary, (b) lesson outline, (c) readings, (d)
notes, and (e) lesson preview. Subjects in the instructor-control group did not receive
options from the Reading Module related to navigating through the lesson or any information pertaining to completing the lesson online.

There were also two sessions for each class section of the instructor-control group. Class time was utilized in the same as with the learner-control group. Due to differences in class meeting times, the instructor-control group received the lesson presentation during dissimilar times of the day. One class section met during the morning hours and the other met at night.

**Session One.** Subjects in the instructor-control group participated in the same activities as subjects in the learner-control group. Permission for consent to participate in the study and to obtain composite ACT scores were secured. Subjects were also informed that the contents of the lesson met some of the objectives on their syllabus concerning language arts. Therefore, they would be tested on the presentation material later in the semester. After introductory activities, the lesson pretest and The Self-Directed Learning Readiness Scale (Guglielmino, 1977) was administered to subjects.

**Session Two.** The second session was the lecture presentation. Subjects were provided the same material accessible to subjects in the learner-control group. The lecture was delivered using the same visuals that subjects in the learner-control group received during their Web-based lesson. Overhead transparencies were used to provide the information. The Web-based presentation text format was followed as much as possible. Therefore, subjects in the instructor-control group heard and viewed basically the same material as their counterparts in the learner-control group. Immediately following the lecture presentation, subjects completed the lesson posttest.
Data Analysis

Student Outcomes. To address the first question about the relationship between different instructional delivery systems (learner-control versus instructor-controlled) on the acquisition and application of subject matter for teacher candidates, a Chi-square analysis (Gravetter & Wallnau, 1996) was completed to determine the proportion of the relationship between the two instructional systems. A Univariate Analysis of Variance was used to determine variability between groups and class sections. A Scheffe Post hoc analysis determined whether significant differences existed among class sections.

Self-Directed Learning. To determine whether self-directed learning readiness and student ability predict student outcomes, logistic regression was used. Because the dependent variable, the criterion-referenced posttest, was dichotomous (0-nonmastery, 1-mastery), and independent variables were continuous, logistic regression was the best procedure to analyze predictive data (Howell, 2000).

Sequencing Events. Logistic regression was used to determine if the independent variable coefficients of prior technology ability, student ability, and sequencing events predicted student outcomes. Again, the dependent variable, the criterion-referenced posttest, score was dichotomous (1=mastery, 0=nonmastery), and the independent variables were continuous. Therefore logistic regression was also suitable for predicting outcomes (Howell, 2000).

Time Spent on Lesson. To determine how much time subjects in the learner-control group spent learning on the Web, results from duration recording were analyzed. The lesson time began as soon as the subject moved the computer mouse and
simultaneously view the monitor screen. The lesson time ended when the subject asked for the lesson assessment.

Assessment Time. Results from duration recording were also used to address the final question about the amount of time subjects spend completing an assessment test. Assessment time was determined by recording the time that each student was given the lesson assessment and ended when the subject submitted the test and exited the lab.
CHAPTER 4: SUMMARY OF RESULTS

The objectives of this study were to: (a) examine the relationship of learner-control versus instructor-control and the acquisition and application of subject matter for teacher candidates enrolled in an undergraduate language arts course, (b) inquire whether self-directed learning readiness and student ability predicted student outcomes, (c) determine whether the number of sequencing events, given prior technology ability and student ability, statistically predicted student outcomes for subjects participating in the learner-control group, (d) measure time on-task while completing a Web-based lesson, for the learner-control group, and (e) determine how much time subjects in the learner-control group spent on the assessment test.

Results are presented as descriptive data and statistical analysis, and are arranged by research questions. Independent variables were as follows: (a) learner controlled instruction, (b) instructor-controlled lecture (a and b are the value of one variable, e.g., instructional delivery), (c) self-directed learning readiness and (d) learner-controlled sequencing. The dependent variable was the mastery/nonmastery criteria from the posttest assessment test as measured by 70% or above for mastery. Covariates for this study were: (a) the pretest percent correct, (b) prior technology ability as measured by the Profiler Survey: Basic Technology Skills Checklist for subjects in the learner-control group, and (c) the composite scores from students’ ACT assessment test.

Sample Characteristics

The sample were drawn from four sections of students enrolled at LSU in EDCI 3200, Reading Writing and Oral Communication in the Elementary Schools. Because
students were already assigned to specific class sections, random assignment was not feasible. Approximately 52 students were enrolled in the treatment group (Web-based instruction), and 47 students were in the control group (instructor-controlled lecture). As depicted in Table 4.1, most students were female (91%). Of the female subjects, 83% were white and 17% were African Americans. Over half of the nine males (56%) enrolled in the classes were Caucasian, and 44% were African Americans. The majority of students were undergraduates classified as seniors (86%), and 14% were classified as juniors. A small percentage of students were enrolled as graduates (8%). All graduate

<table>
<thead>
<tr>
<th>Table 4.1</th>
<th>Demographic Summary of Subjects Enrolled in EDCI 3200, Reading Writing and Oral Communication in the Elementary Schools (N=99) by Learner-Control and Instructor-Control Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Learner-Control Group (n=52)</td>
</tr>
<tr>
<td></td>
<td>Class 1</td>
</tr>
<tr>
<td>Gender</td>
<td>Females=100%</td>
</tr>
<tr>
<td></td>
<td>Males=22%</td>
</tr>
<tr>
<td>Race</td>
<td>AfAm.=16%</td>
</tr>
<tr>
<td></td>
<td>Caucasian=84%</td>
</tr>
<tr>
<td>Status</td>
<td>UG=100%</td>
</tr>
<tr>
<td></td>
<td>G=7%</td>
</tr>
<tr>
<td>Age</td>
<td>18 - 22</td>
</tr>
<tr>
<td></td>
<td>23 - 27</td>
</tr>
<tr>
<td></td>
<td>28 - 32</td>
</tr>
<tr>
<td></td>
<td>33 - 37</td>
</tr>
<tr>
<td></td>
<td>37+</td>
</tr>
</tbody>
</table>
students were seeking alternative certification in elementary education. Graduate students had earned a Bachelor of Science Degree in areas dissimilar to the education field.

The majority of undergraduates (80%) were 18 to 22 years of age. Ranking second in age span, were students between the ages of 23 to 27 (10%). A small percentage of students were ages 28 to 32 (3%), 33 to 37 (1%), and over age 37 (6%). The majority of graduate students (63%) were over the age of 37. Other graduate students were between the ages of 23 and 32 (37%). Therefore, the majority age for subjects in this study were between 18 and 22 years old.

**Criterion-Referenced Pretest and Posttest Results**

Subjects in both groups were required to respond to 20 multiple choice items on the pretest and posttest. Posttest items were similar to the pretest. A few items contained a different scenario from that given on the pretest. Posttest items were arranged in a different sequence from the items on the pretest. The highest possible raw score on both tests was 20. Passing criterion was set at 70% or a raw score of 14 for both tests.

**Pre and Posttest Reliability.** Because the pretest and posttest were criterion-referenced tests, normal statistical reliability procedures were not feasible. Livingston K² (x,t) results indicated a reliability coefficient of .82 for the pretest, and .52 for the posttest. The score of 14 was close to the posttest mean raw score (x =12.98) thus resulting in a lower reliability coefficient. When the cutoff score is close to the mean, consistent mastery/nonmastery classification is less likely.
Results for Question One

Sample means. The mean percentage score and standard deviation for the pretest was 52% (\(\bar{x}= 51.62; \text{SD}= 11.71\)). The mean percentage score and standard deviation for the posttest was 65% (\(\bar{x}= 64.96; \text{SD}= 12.82\)). Table 4.2 provides mean and standard deviation scores for pretest and posttest by instructional class section. Subjects in class sections one and four represent the learner-control group. The instructor-control group consisted of subjects in class sections two and three. Because there were four class sections, A Univariate Analysis of Variance (UANOVA) was used to determine whether differences existed between subject mean percentage scores by instructional class sections. Results suggested significant main effects \([F (3,90) = 4.25; p = .007]\) for instructional class sections. However the effect size (.12) was small. Observed power was calculated at .85. A Scheffe post hoc analysis revealed that differences in mean percentages were evident between Class Sections One and Four (p = .01). Alpha was set at .05. Subjects in Classes One and Four were the learner-control group.

Table 4.2: Pretest and Posttest Percentage Mean and Standard Deviation Scores by Instructional Method

<table>
<thead>
<tr>
<th>Class Section</th>
<th>Method</th>
<th>Pretest Mean(SD) (N=99)</th>
<th>Posttest Mean(SD) (N=96)</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>Learner*</td>
<td>49.35(10.59)</td>
<td>57.39(12.14)</td>
</tr>
<tr>
<td>Two</td>
<td>Instructor**</td>
<td>52.17(13.21)</td>
<td>65.43(14.99)</td>
</tr>
<tr>
<td>Three</td>
<td>Instructor**</td>
<td>50.45(10.46)</td>
<td>67.50(11.31)</td>
</tr>
<tr>
<td>Four</td>
<td>Learner*</td>
<td>54.42(13.14)</td>
<td>69.04(10.00)</td>
</tr>
</tbody>
</table>

*Learner = Learner-control group, **Instructor = Instructor-control group
Pretest and Posttest means and standard deviations for the learner and instructor control groups were calculated. Table 4.3 depicts pretest and posttest percentage mean and standard deviation scores according to each group. Standard deviation scores are reported in parentheses.

To determine differences between the learner-control and instructor-control groups on the pretest, and between groups on the posttest, an Analysis of Variance (ANOVA) was used. Results indicated no significant differences between mean scores for pretest and posttest. To ascertain differences on the pretest and posttest between groups, an ANOVA was used. Results indicated that differences between each group were not significant. However the focus of this study was to determine whether subjects met mastery (70% or above) or nonmastery (below 70%) on the posttest.

**Criterion.** Frequencies were calculated to determine how many students met pretest and posttest criterion. Table 4.4 indicates that few students were successful in meeting a passing criterion in all class sections for the pretest. Because there was a small number of subjects meeting a passing criterion on the pretest, it suggests that most of them had little to no knowledge about early literacy. Table 4.4 also indicates that the

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**Table 4.3 Means and Standard Deviations by Group**

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest Mean(Standard Deviation)</th>
<th>Posttest Mean(Standard Deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(N=99)</td>
<td>(N=94)</td>
</tr>
<tr>
<td>Instructor-control Group</td>
<td>51.33(11.84)</td>
<td>66.44(13.21)</td>
</tr>
<tr>
<td></td>
<td>(n = 47)</td>
<td>(n = 45)</td>
</tr>
<tr>
<td>Learner-control Group</td>
<td>52.04(12.16)</td>
<td>63.57(12.42)</td>
</tr>
<tr>
<td></td>
<td>(n = 52)</td>
<td>(n = 49)</td>
</tr>
</tbody>
</table>
majority of students did not meet passing criterion for class sections one and two on the posttest. However, the majority of students met the required criterion on the posttest in classes three and four.

**Chi Square Analysis.** To determine the relationship between learner-control instruction versus instructor-controlled teaching on subject matter for teacher candidates, a Chi-Square analysis was conducted. Table 4.5 depicts number of subjects who met mastery and nonmastery on the pretest and posttest for both methods. There

<table>
<thead>
<tr>
<th>Class Section</th>
<th>Pretest Mastery</th>
<th>Pretest Nonmastery</th>
<th>Posttest Mastery</th>
<th>Posttest Nonmastery</th>
<th>Subject Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>1</td>
<td>24</td>
<td>7</td>
<td>18</td>
<td>25</td>
</tr>
<tr>
<td>Two</td>
<td>3</td>
<td>20</td>
<td>10</td>
<td>13</td>
<td>23</td>
</tr>
<tr>
<td>Three</td>
<td>1</td>
<td>23</td>
<td>14</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td>Four</td>
<td>4</td>
<td>23</td>
<td>15</td>
<td>12</td>
<td>27</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>9</strong></td>
<td><strong>90</strong></td>
<td><strong>46</strong></td>
<td><strong>53</strong></td>
<td><strong>99</strong></td>
</tr>
</tbody>
</table>

were 28 (54%) subjects in the learner-control group who did not reach mastery on the pretest or posttest. Nineteen (37%) subjects were considered nonmastery on the pretest but reached mastery levels on the posttest. In the instructor-control group, 20 (43%) subjects achieved a nonmastery level on both pretest and posttest. Almost half of the subjects (n= 23, 49%) in the instructor-control group who achieved nonmastery on the pretest, obtained mastery levels of performance on the posttest. A small number of subject (n=3, 6%) in the instructor-control group mastered the pretest but failed the
posttest. One subject (2%) performed at a mastery level on the pretest and posttest for the instructor-control group.

In the learner-control group, two subjects (3%) obtained mastery on the pretest but were considered nonmastery on the posttest. Subjects considered performing at a mastery level on the pretest and posttest were only three (5%). Table 4.5 indicates that there was little increase from nonmastery to mastery levels.

Results of the chi-square analysis \[\chi^2 (1, N = 99) = 1.540, p = .215\] indicated that the relationship between mastery and the two instructional delivery systems were about the same. The Chi Square test was able to correctly classify 60.63% of the subjects as masters/nonmasters, and explained slightly less than 5% of the variation in outcomes. Therefore, it is considered that student outcomes were not significantly different between the two groups.
Results for Question Two

SDLRS Results. Guglielmino (1977) states that the SDLRS measures "an individual's readiness for self-direction" (p. 5). The five-part Likert-type scale offers response choices ranging from 1, "Almost never true of me; I hardly ever feel this way," to 5, "Almost always true of me; there are very few times when I don't feel this way." The highest possible rating is 5.0, and the lowest rating is 1.0.

Guglielmino (1977) reports that the SDLRS raw scores are classified into five levels: (a) low 58 to 176, (b) below average 177 to 201, (c) average 202 to 226, (d) above average 227 to 251, and (e) high 252 to 290. A score of 290 is the highest score. Norms for the SDLRS indicate that the mean score is 214, and the standard deviation is 25.59. Results for the entire sample are reported first.

There were 95 subjects that completed the SDLRS. The mean (M= 202.863) and standard deviation score (SD = 12.415) suggests that students completing the SDLRS are functioning on the borderline of the average range for self-directed learning readiness. Guglielmino (1977) states that individuals scoring within the average range on the SDLRS are likely to be successful in independent conditions, but are not comfortable with handling a learning process that involves: (a) identifying learning needs, (b) planning, and (c) executing their own learning.

Table 4.6 depicts mean and standard deviation scores for each of the four sections of classes. Additionally, the mean and standard deviation scores are given for the learner-control and instructor-control groups. Class sections One and Four were considered the learner-control group. Classes Two and Three were the instructor-control group. An independent measures t-test was used to determine differences between the
Table 4.6 Mean and Standard Deviation Scores for the Self-Directed Learning Readiness Scale

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learner-Controlled (n = 52)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class One</td>
<td>204.80</td>
<td>12.19</td>
</tr>
<tr>
<td>Class Four</td>
<td>203.93</td>
<td>10.10</td>
</tr>
<tr>
<td>Group Total</td>
<td>204.35</td>
<td>11.05</td>
</tr>
<tr>
<td>Instructor-Controlled (n = 43)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class Two</td>
<td>203.89</td>
<td>13.93</td>
</tr>
<tr>
<td>Class Three</td>
<td>198.83</td>
<td>13.59</td>
</tr>
<tr>
<td>Group Total</td>
<td>201.07</td>
<td>13.81</td>
</tr>
</tbody>
</table>

Mean scores for the learner and instructor-control groups. Results indicated no significant differences between mean scores for the two groups $t(93) = 1.285, p > .05$. Alpha was .05. Both groups were homogeneous and scored at the lower range of average on the SDLRS. However, subjects in Class Three of the Instructor-control group scored in the below average range. Guglielmino (1977) states that a below average score on the SDLRS means that an individual ordinarily prefers very structured learning such as lecture and traditional classroom situations.

Descriptive Results of ACT Scores. Composite scores from the ACT Assessment for 82 subjects were obtained from the University Registrar’s Office. Table 4.7 displays ACT means and standard deviations for subjects according to group and instructor. Overall mean and standard deviation scores are also reported. An ANOVA was completed to determine homogeneity of all groups. Results indicated that there were no significant differences in ability among the four class sections $[F, (3,79) = .60, p = .62]$. 

81
Table 4.7  ACT Composite Score Means and Standard Deviations for Subjects According to Class Section and Group.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learner-Control (n = 45)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class Section One</td>
<td>21.86</td>
<td>2.87</td>
</tr>
<tr>
<td>Class Section Four</td>
<td>22.70</td>
<td>4.18</td>
</tr>
<tr>
<td><strong>Group Mean</strong></td>
<td>22.29</td>
<td>3.58</td>
</tr>
<tr>
<td>Instructor-Control (n = 37)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class Section Two</td>
<td>21.53</td>
<td>3.10</td>
</tr>
<tr>
<td>Class Section Three</td>
<td>21.45</td>
<td>3.17</td>
</tr>
<tr>
<td><strong>Group Mean</strong></td>
<td>21.49</td>
<td>3.10</td>
</tr>
<tr>
<td><strong>Grand Mean</strong></td>
<td>21.93</td>
<td>3.38</td>
</tr>
</tbody>
</table>

According to the ACT Inc. 2000 National Press Release (ACT, 2000), the average composite score on the ACT Assessment for college-bound high school students was 21.0. This has been the average score for the past four consecutive years. The mean score for subjects in the learner and instructor-control groups was 21.926. ACT scores for subjects in both groups were commensurate to scores of their normed peers across the United States.

**Results of Logistic Regression.** To determine whether self-directed learning readiness and student ability are useful in predicting assessment outcomes for subjects in the learner-control and instructor-control groups, logistic regression was utilized. The independent variables were results from the SDLRS and individual ACT scores from subjects. The dependent variable was whether posttest criteria was met in the lesson assessment. Results (See Table 4.8) of
Table 4.8  ACT Scores and Self-Directed Learning Readiness as Predictors for Student Outcomes.

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Directed Learning</td>
<td>-.0043</td>
<td>.0184</td>
<td>.0556</td>
<td>1</td>
<td>.8135</td>
</tr>
<tr>
<td>ACT</td>
<td>.0889</td>
<td>.0707</td>
<td>1.5819</td>
<td>1</td>
<td>.2085</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.2042</td>
<td>4.0118</td>
<td>.0901</td>
<td>1</td>
<td>.7641</td>
</tr>
</tbody>
</table>

Logistic regression analysis indicate that the independent variables were not useful in predicting performance outcomes [$\chi^2 (2, n = 79) = 1.673, p = .433$]. Because coefficients were not significantly different from zero, the variables, self-directed learning, and ACT scores did not predict group membership for mastery. This model was only able to correctly classify 50.63% of the subjects as masters/nonmasters, and explained slightly more than 2% of the variation in outcomes.

Results for Question Three

Descriptive Results of Technology Proficiency. Subjects in the learner-control group completed the Profiler: Technology Proficiency Survey. Only 35 (67%) subjects in the learner-control group (n = 52) completed the survey satisfactorily. Results indicated that the group mean score was 68% with a Standard Deviation score of 10.18. The average score for university students completing the survey is 70% with a standard deviation of 10.71. Subjects in the learner-control group were performing within the average range as their university peers. A more specific picture can be seen when separating the scores into categories. Table 4.9 provides percentage mean and standard deviation scores according to categories on the Profiler Technology Proficiency Survey.
Subjects in the learner-control group seemed most proficient in Computer Operating Systems. This skill involves being able to start-up and shut-down a computer. It also includes solving common printing problems and being able to open and close program applications. Subjects seemed to need training most in the area of handling multimedia applications. This skill involves creating presentations with graphics and sound, scanning documents to a specific location, and using extraneous technology devices in conjunction with the computer.

The results of the Profiler: Technology Proficiency Survey (SCRTEC, 1999) suggests that students in the learner-control group possess enough technology skills to navigate through a Web-based lesson. Subjects in the learner-control group were as knowledgeable as their peers.

**Table 4.9 Percentage Mean and Standard Deviations According to Technology Proficiency Category**

<table>
<thead>
<tr>
<th>Category</th>
<th>Multimedia</th>
<th>Application of Instructional Technology</th>
<th>Basic Computer Functions</th>
<th>System Operation</th>
<th>Productivity Tools</th>
<th>Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>.522</td>
<td>.626</td>
<td>.754</td>
<td>.810</td>
<td>.700</td>
<td>.701</td>
</tr>
<tr>
<td>S. D.</td>
<td>.149</td>
<td>.130</td>
<td>.002</td>
<td>.165</td>
<td>.144</td>
<td>.113</td>
</tr>
</tbody>
</table>

Descriptive Results for Sequencing. Results of sequencing events indicated that subjects in the learner-control group accessed 819 links while learning on the Web. The mean number of times that subjects in the group sequenced was 16.07 times per subject. Mean scores for each class section were almost identical (Class One, M=16.25, SD=9.34; Class Four, M=15.93, SD=7.68).

A closer examination of sequencing events for both class sections reveals that most subjects simply browsed around the lesson and the Online Academy (Meyen, et al., 84).
Reading Module (Glaeser, et al., 1999) during the given instructional time. Table 4.10 provides the lesson web links and how many students accessed that link. It also provides the number of students who accessed links outside Lesson One, “The Development of Literacy: As Reading Instruction Begins” (Glaeser et al., 1999). Levels and sections not provided in the table indicate that subjects did not access them.

All subjects in both classes visited the lesson level even if the lesson was from another module. Preferences for how the lesson was viewed varied in both classes. For the most part, subjects (n=32, 62%) preferred to view the lesson using the browser with audio streaming or transcript only, or both browser and transcript. A comparison between class sections shows that (n=7.28%) of the subjects in Class Section One used both browser and lesson transcript for instruction compared to (n=5.19%) in Class Section Four. Some subjects (n=12, 23%) chose to obtain information by viewing material from other levels and sections of the assigned lesson. These subjects viewed the presentation screen, but did not select the browser or transcript for instruction. Three subjects (13%) in Class Section One viewed another lesson instead of the assigned one. They examined the lesson presentation in the browser and transcript for the extraneous lesson. Other levels and sections of the non-targeted lesson were accessed also. These subjects never entered Lesson One: “The Development of Literacy: As Reading Instruction Begins” (Glaeser, et al., 1999).

In addition to the lesson presentation, subjects in both classes examined several lesson support components. Lesson notes were more popular type of support for students in Class Section Four (n=20, 74%) when compared to Class Section One (n=10,
Table 4.10  Number of Students Accessing Links According to Lesson Level and Section, by Instructor

<table>
<thead>
<tr>
<th>Level</th>
<th>Class Section One (n = 25)</th>
<th>Class Section Four (n = 27)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Orientation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Content Map</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Critical Questions</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Structure</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Support</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Syllabus</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Readings</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Research</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Direct Questions</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Lesson</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Activities</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Glossary</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Handouts</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Notes</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Outline</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Readings</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Browser Only</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Transcript Only</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Viewed Both</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Viewed Neither</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Other Lesson</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Viewed Preview</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Practice</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Practice 1</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Practice 2</td>
<td>2</td>
</tr>
</tbody>
</table>

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40%). Half of the subjects in Class Four (n=13, 50%) accessed the lesson outline compared to subjects in Class One (n=9, 36%).

**Logistic Regression Analysis for Sequencing.** To determine if ACT scores, self-directed learning readiness and sequencing predicted student outcomes, a logistic regression model was completed. There were 52 subjects in the learner-control group. Data used for the analysis came from individual ACT scores, results of the technology proficiency survey, and number of individual sequencing events. These were considered independent variables. The dichotomous dependent variable was the assessment posttest criteria scores (1=mastery, 0=nonmastery). Missing data from the independent variables reduced the sample size for this analysis to 35 subjects.

Results (See Table 4.11) of logistic regression analysis indicate that the three independent variables together were not useful in predicting student outcomes [$\chi^2 (3, n=35) = 5.34, p = .15$]. This model was able to correctly classify 66% of the observations and explained 14% of the variation in outcomes. However, at alpha level of .10, the regression coefficient for ACT is significantly different from zero. Thus, with technology proficiency and sequencing events included in the model, a single point increase in Composite ACT scores is associated with a greater likelihood (1.26 times) of mastery classification. Mastery classification is 3.7 times more likely with a five-point increase in ACT scores.

Given ACT scores and technology proficiency, adding sequencing did not improve the logistic model. Therefore, data indicate that given student ability and technology proficiency, the number of sequencing events does not statistically predict student outcomes for groups learning on the World Wide Web.
<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>S.E</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>.0157</td>
<td>.0375</td>
<td>.1756</td>
<td>1</td>
<td>.6752</td>
</tr>
<tr>
<td>ACT</td>
<td>.2326</td>
<td>.1233</td>
<td>3.5607</td>
<td>1</td>
<td>.0592</td>
</tr>
<tr>
<td>Sequencing</td>
<td>-.0547</td>
<td>.0497</td>
<td>1.2097</td>
<td>1</td>
<td>.2714</td>
</tr>
<tr>
<td>Constant</td>
<td>-5.8850</td>
<td>3.6497</td>
<td>2.6000</td>
<td>1</td>
<td>.1069</td>
</tr>
</tbody>
</table>

**Results for Questions Four and Five**

**Class Section One.** Data collection for rate began as soon as each subject simultaneously viewed the monitor and moved the computer mouse device. When the subject asked for the lesson posttest, the time was written down again to denote that learning the contents of the lesson had ended. The mean score for time spent on the lesson for subjects in Class Section One was 40.16 minutes (SD = 10.32).

Time recorded for the lesson assessment began when subjects received the test instrument and ended when the subject exited the room. The mean for time spent on the lesson assessment was 6.64 minutes (SD = 2.10).

**Class Section Four.** Data collection began when subjects looked at the monitor and moved the mouse. The mean for subjects in Class Four was 54.63, (SD = 17).

Assessment rate times began when subjects received the lesson assessment test, and ended when subjects exited the computer lab. The mean time for completion of the assessment test in Class Section Four was 9.67 minutes (SD = 3.20).

**Group Differences.** There were noted differences in instructional time and assessment time for subjects in both class sections. On average, subjects in Class Four spent 14.50 more instructional minutes and 3 minutes more completing the assessment.
than subjects in Class One. To determine if there were significant differences in time spent on the lesson and assessment a t-test was completed. Alpha was set at .05. Results indicated significant differences between the two classes for instructional time $t(24) = -4.026, p < .05,$ and time spent on the lesson assessment $t(24) = -3.909, p < .05.$ Differences in instructional and assessment time may have contributed to significant differences in percentage scores for Classes One and Four in the learner-control group.

**Time Summary.**

Differences were observed for learning rate exhibited by subjects in the learner-control group. Subjects in Class Section Four spent statistically significant more time on learning and completing the lesson assessment.

**Summary**

Results for Question One indicates that there was little increase from nonmastery on the pretest to mastery levels on the posttest for subjects in the learner-control and instructor-control groups. The use of different instructional delivery systems was not related to the acquisition and application of instructional content for teacher candidates.

The second question addressing self-directed learning readiness and student ability, indicated that the two variables did not significantly predict student outcomes. Because coefficients were not significantly different from zero, the variables, self-directed learning, and ACT scores did not predict group membership for mastery.

Results for Question Three indicate that prior technology ability and student ability, and learner-controlled sequencing events did not significantly predict student outcomes. However, in this model student ability was useful in predicting outcomes. If alpha level is .10, the regression coefficient for ACT is significantly different from zero.
When technology proficiency and sequencing events are included in the model, a single point increase in Composite ACT scores is associated with a greater likelihood of mastery classification. Mastery classification is more likely with a five-point increase in ACT scores. Sequencing by itself did not improve the model.

To answer the fourth and fifth questions about time spent on learning and assessment for subjects in the learner-control group, results indicated significant differences in rate of learning and assessment between class sections in the learner-control group. Subjects in Class Section Four spent more time learning and completing the lesson assessment than subjects in Class Section One. Time engaged in learning and completing the lesson assessment appear to have a significant influence on student outcomes.
CHAPTER 5: DISCUSSION

The purpose of this study is to bridge some of the gaps found in the literature about self-directed learning and learner-control. It examines the relationship between two instructional delivery systems (learner-control versus instructor-control) on the acquisition and application of subject matter for teacher candidates. A criterion-referenced pretest and posttest measured outcomes for students receiving Web-based instruction and classroom lecture. Further, this study examines whether self-directed learning, student ability and technology proficiency predicts student outcomes. SDLRS scores (Guglielmino, 1977) and ACT composite scores (ACT, 2000) were examined to determine whether they predicted criterion-referenced posttest scores. The Profiler Survey: Basic Technology Skills Checklist (SCRTEC, 1999), ACT scores and sequencing events were analyzed for predictability of posttest outcomes. Finally, learning and assessment time were ascertained for subjects in the learner-control group.

This chapter includes a discussion of the findings and how they relate to the present literature. Limitations to the study and implications for teacher training and educational technology are provided. Suggestions for future research are also included.

Discussion of Results

The first question addressed the relationship between different instructional delivery systems (learner-control versus instructor-controlled lecture) on the acquisition and application of subject matter for teacher candidates. Outcomes were measured by a criterion-referenced pretest and posttest. Results indicated that there was little increase in mastery between the pretest and posttest scores for subjects in the learner and
instructor-control groups. Results suggest that instructional delivery systems were not related to student outcomes.

Results for question one of this study support findings by Jones (1999) and Shulman (1999), who found no differences between traditional class and Web-based instruction groups. Subjects in all three studies participated in undergraduate classes. Sample size was larger in Jones' study and may contribute to the ability to generalize the results to undergraduate students. It is possible that undergraduate students may be able to participate in Web-based courses with some measure of success. However more studies are needed before stronger inferences about instructional delivery systems can be made.

Results of this study do not support The Learner Control Continuum (Candy, 1991) or any of the models about self-directed learning as an instructional method (Candy, 1991; Gibbons & Phillips, 1982; Grow, 1991; Millar, Morphet & Saddington, 1986). Given that students did not appear to differentially respond under dissimilar conditions, it is possible that there were not enough differences between the two instructional methods. Though instructional control was given to subjects while completing the Online Academy (Meyen et al., 1999) Web-based lesson, subjects may not have been exposed long enough for the treatment to make a difference. Another study providing more exposure to, and clearer discrimination of, treatment conditions appears warranted.

Results of the SDLRS (Guglielmino, 1977) and ACT scores (ACT, 2000) indicate that neither variable contributed to predicting learner outcomes. Results of the SDLRS showed that subject scores were in the average range to be ready for self-
directed learning (Guglielmino, 1977). A t-test indicated no significant differences between the learner-control and instructor-control groups. Subjects in both groups possessed similar ability. The results of an ANOVA indicated that there were no differences between the learner-control and instructor-control groups for ACT composite scores (ACT, 2000). Results of the logistic regression indicated that self-directed learning and student ability were not contributing variables together or by themselves for predicting student mastery. While it appears that self-directed learning readiness and student ability are not determining factors for learning outcomes, it is possible that other unidentified factors contribute to predicting outcomes. To date, this is the only study that has examined self-directed learning readiness and ACT composite scores for predicting student outcomes of Web-based instruction.

Prior technology ability and student ability, and learner-controlled sequencing events during a Web-based lesson also failed to predict student mastery. Results from the Profiler Survey: Basic Technology Skills Checklist (SCRTEC, 1999) suggests that subjects in the learner-control group were average in technology ability compared to their peers at the university that they attended who had taken the technology survey. ACT scores (ACT, 2000) imply that subjects are average in ability compared to their peers across the nation. Sequencing events for subjects in both learner-control classes were equivalent.

Again, to date, this is the only study that attempts to determine whether prior technology, student ability and sequencing events predict student outcomes. Additional studies are needed to determine whether student ability and sequencing events contribute to student outcomes.
An examination of learning and assessment time for subjects in the learner-control group revealed that subjects in Class Section Four spent statistically significant more time on learning and assessment than subjects in Class Section One. Results appear to support Hicken, Sullivan, and Klein (1992) and Hannafin and Sullivan (1995), who imply that students spend more time when given control of their learning. However, several authors report that when students are given control of their learning, they spend less time on-task (Freitag & Sullivan, 1995; Gay, 1986; Milheim, 1990; Ross & Rakow, 1981). This study does not offer convincing support for either set of findings. Additional research with extended exposure to treatment conditions is needed to address engagement under the differing treatments.

Limitations to the Study

Several limitations may have contributed to the outcomes of this study. A discussion of overall and specific restrictions with a prescription for how to address the limitations in future studies is presented.

Sampling. A quasi-experimental design was implemented, and random sampling was not employed in this study. Subjects were already assigned through enrollment in the language arts classes. Statistical tests for homogeneity revealed that the groups were equivalent. However there is always a chance that differences noted in the study may be due to lack of random sampling. Therefore, an internal threat to validity may exist. Random sampling may control for differences between groups.

Time span. To insure that subjects had little or no prior knowledge of reading, data collection began at the beginning rather than the middle or end of the semester. Instructors for the language arts courses had planned the course sequence of study for
students prior to the semester. They were willing to provide a maximum of two class sessions per instructor during a one week period. The instructor for the night class provided one class meeting for data collection. To remedy this limitation it may be easier if the primary investigator provided the course(s) for the study. This would allow for more data collection time, and may eliminate additional problems that this study encountered.

A subsequent time constraint was that three of the class sections met at the same time and on the same days. Instructors did not want to provide part of their class time to data collection. They wanted to provide two full class sessions during one week instead of a portion of the class session over a two week time span. Data were collected on one class section per week. Therefore an internal threat of imitation of treatments existed. There was a possibility that subjects talked to their peers from one of the other classes, who were participating in the study. Subjects in other class sections may have obtained information about the study prior to its implementation.

Another primary limitation of this study was that only one lesson was used to determine outcomes. Because data were collected at the beginning of the semester, and subjects had little or no prior knowledge of subject matter, examining results from one lesson may not have given an accurate picture of student outcomes. Data collected over a longer period of time may provide a clearer picture of the relationship between different instructional delivery systems.

**Sequencing.** This study provided results from one lesson at the beginning of the semester. There is a possibility that subjects in the learner-control group may have become more adept at navigating around the lesson and utilizing the lesson supports.
Data from sequencing events suggested that subjects in the learner-control group were interested in browsing through lesson sections, rather than focusing on one particular section of the lesson presentation. A longer orientation period so that subjects may explore the components of the module lesson more thoroughly, before data collection began, may diminish some of the sequencing activity that occurred while learning on the Web. Providing more opportunities for exploring the Online Academy Website (Meyen, 1997), may foster better data collection of sequencing events during a Web-based lesson.

Technology Difficulties. Nearly one-third of the subjects (31%) in the learner-control group experienced technological difficulties. Subjects experienced difficulty logging-on to the Online Academy Web Page (Meyen, 1997). It took several minutes before the Academy Web site was downloaded to the computer terminal in the lab. Subjects became frustrated and wanted to quit. A discussion with the College of Education technology liaison indicated that the University system had been experiencing problems. This may have contributed to the slow download speed. Further, all subjects were accessing one Website at the same time. It may have contributed to the slow speed. Several subjects had less time to practice navigating around the Academy Web site. Lack of opportunity to browse and orient themselves to the Academy Website may have contributed to the random sequencing observed during data collection.

The most common technology problem was related to the computer stopping and subjects not being able to continue the Web-based lesson. To correct the problem, subjects were required to shut down computer and reboot. This caused a break in learning time and may have contributed to low scores on the posttest for some subjects.
Additional technical difficulties involved fuzzy graphic displays on some of the computer monitors. Pictures and graphics were distorted. Colors were muted or no color could be seen on the monitor. Subjects were offered the choice to move to another computer, but they refused. They stated that they could still learn despite the distraction of a clear and sharp visual display. There were two computer monitors that displayed vertical lines for every screen. Subjects using these two computers relocated to another computer to complete their lesson. Some computer terminals displayed an illegal function notice while subjects were engaged in learning. This notice immediately closes the program. Therefore, subjects spent time beginning the lesson again. The illegal function occurred three consecutive times for one subject, before a decision was made to relocate to a computer in the other lab.

These subjects spent more time solving technical difficulties than engaging in learning. Evidence of technology problems are found throughout the literature (Davis, Odell, Abbitt, & Amos, 1999; Harasim, 1991; Moore & Kearsley, 1996) and continue to be an issue in Web research. Eliminating all technology problems may be difficult. Preventative measures, such as checking equipment prior to learning events, may reduce the number of technical incidences.

History. On the day that data were collected for Class Section One, the University was staging their annual Fall Fest. The combination of Fall Fest and class occurring on a Friday, may have influenced subjects to terminate the lesson earlier and complete the posttest more quickly than they would have at another time. There is a possibility that history influenced posttest scores for subjects in Class Section One. As an added procedure for future studies, the university events calendar should be consulted.
before scheduling days for data collection. Again, extending the length of exposure to
treatment conditions will allow these threats to validity to be addressed.

**Testing.** One class section convened on a week night. This was an instructor-
control class. Due to scheduling difficulties, administration of the pre and posttest
occurred during the same class meeting. At the end of the instructional time, the posttest
was administered. An internal threat to testing existed due to the fact that subjects had
taken the pretest three hours prior to the posttest. Cook and Campbell (1979) stated that
familiarity with test items may have an effect on posttest scores.

**Instrumentation.** Reliability for the pretest and posttest instrument should be
considered when analyzing the results of the lesson assessment. Though the reliability for
the pretest was strong (.82), the posttest reliability was much lower (.52). The cut-off
raw score (14) was too close to the posttest mean score (x = 12.98). This resulted in a
lower reliability coefficient. Raising the criterion on the assessment test in future studies
will remediate this difficulty.

Several limitations in this study can be easily rectified in future studies. If the
course instructor is the primary investigator for the study, a few internal validity threats
will be resolved. Random sampling will assist in correcting the internal validity threat of
sampling. Further, data collected over a longer period of time may strengthen the results
of the study considerably. Eliminating data collection for pretest and posttest during the
same session will correct the internal threat of testing.

Other limitations that may be resolved involve checking university events
calendar to insure that history is avoided during data collection. Technological
difficulties are the most difficult limitation to overcome. Most computer terminals
located in a university computer laboratory are connected to its main server. Control over when the main server has technological problems or when the computer terminal in a laboratory setting fails, is limited. This may be a limitation for future studies also.

Implications of the Study

Results of the study suggest that a Web-based lesson and traditional lecture may yield the same type of learner outcomes. Instructional delivery systems may not be the determining factor that influences student outcomes. Instructional design as opposed to mode of delivery is probably the most pressing issue to be addressed.

Lewis and Doorlag (1995) state that there are five steps for instruction to be effective. These five steps involve the teacher providing active direction and students becoming actively involved in the learning process. The first step is curricular decision. The teacher selects the learning task from the curriculum, and provides a goal and objective for the student’s successful performance. The second step, presentation, involves the teacher presenting the skills and information needed for the task and providing directions on how to complete it. Students during this stage should be attending to instruction and directions. Practice is the third step. The teacher’s role changes to monitoring the performance of the newly acquired skill. The student performs the task under the supervision of the teacher. Feedback is immediate. Supervision gradually is diminished as the student becomes more competent of the skill, and feedback becomes delayed. The fourth step is mastery. A skill is considered mastered when the student performs the task independently and correctly at a later time. During the final step, application, the student performs similar tasks to the original learning task. A review of the literature and current research may suggest that we not abandon thirty
years of effective instructional research in favor of technology for technology’s sake. For learners to learn effectively, they should be systematically exposed to information as well as given the opportunity to explore and discover information.

Many of the five components for effective instruction (Lewis & Doorlag, 1995) were present in the Web-based lesson offered by the Online Academy. The lesson on early literacy provided students with explicit instruction. The Web-lesson stated explicitly the objectives and expected outcomes for the lesson. Lesson supports were provided in the form of hyperlinks to words that may have been unfamiliar to students. A lesson outline, notes, and readings for further understanding were additional lesson supports. The lesson presentation contained essential structural features such as a beginning with an overview, advanced organizers, and stated objectives. The lesson also signaled transitions between parts and called attention to main ideas. Further, subparts of the lesson were summarized as it proceeded, and main ideas were reviewed at the end (Brophy, 1988). There were opportunities for students to check their learning through lesson activities, directed questions, and practice. If the lesson was utilized as intended by the Academy, an opportunity to seek feedback from the instructor and the lesson in the form of modeled answers, was provided. It is possible that due to time constraints, subjects in the learner-control group chose not to participate in the activities and practice provided in the lesson. Opportunities for mastery and application were not provided during the study. However, if subjects had the opportunity to participate in other lessons of the Reading Module, they would find that these components were present.

The lecture for subjects in the instructor-control group featured only the first two components for good instruction: (a) curricular choice, and (b) presentation. Due to time
constraints, subjects were not afforded opportunities for guided and independent practice, mastery, and application. All subjects were expected to apply what they learned in the lesson assessment.

It is possible that instructional delivery systems should not be the feature of studies examining instruction for student outcomes. When comparing two not very effective instructional delivery systems, it seems plausible that results of the study would yield not differences. Instead, emphasis should be placed on pedagogy. Several have stressed the idea of pedagogy as the focus for studies involving Web-based instruction (Berge, 1997; Bonk & Dennen, 1999; Lawhead, Alpert, Bland, Carswell, Cizmar, DeWitt, Dumitru, Fahraeus, & Scott, 1997; Myen, Lian, & Tangen, 1999). Components of effective instruction in the presentation formats of Web-based lessons should be considered in future studies.

Results of this study may suggest that all subjects in the learner-control group were not suited for Web-based instruction when proper hardware and software support in a computer laboratory setting is not provided. Rouet and Levonen (1996) state that students may not have had the opportunity to develop effective strategies for working with hypermedia. Hypermedia represents an unfamiliar text structure to which students must adjust their traditional reading methods. In this non-linear environment, students must keep track of where they are, where they want to go, and what they want to access next, as they process new information. Students must be equipped with requisite skills of how to use hypermedia successfully in relation to their own learning goals. Therefore students must: (a) know about themselves as learners, (b) be aware of the properties of
the task, and (c) possess strategies that enable them to implement the necessary skills to reach their learning objective (Sweany, 1999, p. 1476).

It is not known if any of the subjects had participated in a Web-based course prior to this study. It is possible that this was a first-time experience for subjects, and they were not aware of their own instructional needs. Further, they may not have been aware of, or possessed strategies, to engage in learning via the Web. These factors may have contributed to the random sequencing observed in the history report of each participant.

Subjects may not have possessed several of the personal characteristics for self-directed learning. One of the characteristics of a self-directed learner is the ability to control learning. Students must be able to select content, sequence their own instruction, and pace the lesson while learning material on the Web. Subjects may not have been exposed to other instructional formats as presented by Candy (1991), Gibbons and Phillips (1992) or Grow (1991). If Mezirow's (1991) Transformation Theory is applied, it is possible that subjects did not possess sufficient learning skills as described in the practical domain (i.e., student selects goals and content, decides learning approaches, and monitors its use) and emancipatory domain (i.e., student selects goals and content, decides learning approaches, and monitors its use). It is possible that students have been exposed only to Mezirow's technical domain (i.e., teacher selects goals and content, decides learning approaches, and monitors its use) throughout their formal school years. Therefore, it is conceivable that students have been exposed only to instructional formats involving total teacher control, lectures or lessons using Candy's Learner Control Continuum (1991). Teachers may have served as an authority/coach as suggested by

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Grow (1991), and students never had the opportunity to experience learning with the teacher functioning as a guide, facilitator or consultant. Perhaps subjects in this study have never made the transition from teacher-directed to student-directed learning as suggested by Gibbons & Phillips (1982). It is likely that students were only exposed to the instructor telling, selling and testing as suggested by Millar, Morphet and Saddington (1986). If this is true, it is conceivable that students have not been exposed to other types of instruction, and may not possess the requisite skills to learn in technology environments.

**Implications for Teacher Training.** Given that limited differences were noted between treatments, results may indicate that teacher training programs may need to provide methods and strategies to promote teacher candidates becoming self-directed learners. Wang (1987) states that student involvement in instructional activities and decisions (e.g., setting goals, selecting activities for practice, self-monitoring, and independent study) promotes independent learning. Some authors propose that exposing teacher candidates to different instructional methods and strategies through modeling and learning experiences, may foster the same types of instruction in the classroom for students (Gagne', 1985; Cochran, Deruiter, & King, 1993). It is possible that by exposing teacher candidates to learner-control, we can improve their use of these strategies in their classrooms. Further, research is needed to verify the impact of modeling instruction on teachers’ subsequent use of instructional procedures.

**Implications for Technology.** Because Web-based instruction is being offered more frequently as a learning alternative to traditional classroom lecture, teacher candidates need to learn how to use technological applications for teaching youngsters.
The results of the Profiler Survey: Basic Technology Skills Checklist (SCRTEC, 1999) indicated that subjects possessed about the same skills as their peers in six categories of computer technology. However there were several skills within each category that subjects possessed little to no knowledge. For instance, several subjects indicated that they were unable to: (a) communicate orally or in writing knowledge of assistive technology devices, (b) reduce, enlarge or crop a graphic and convert graphics from one file to the other, (c) use terminology of computer technology appropriately in written and oral communication, (d) configure a computer to connect with a network, and (e) evaluate software or Internet resources for relevancy, accuracy, and validity. Further research is needed to verify the impact of modeling instruction on teachers' subsequent use of instructional procedures.

Designers of Web-based courses need to consider that in order for learners to complete a course on the Web successfully, learner-control should be considered. In addressing learner-control, course designers might begin with tighter instructional control and gradually introduce learner-control activities over time. This developmental approach may allow students to become more comfortable with Web instruction and learner-control. For example, course designers may consider Candy's Learner-Control Continuum (1991) as a guide for different levels of instructional control. At the beginning of the semester, the instructor may possess almost total control of the course, especially if the course content is new to the learners. As students develop more knowledge, the instructor may advance to lessons or personalized instruction. Certainly discovery learning and independent learning would occur toward the end of the semester.
By that time, students would possess more knowledge and developed more skills so that they could successfully engage in more independent learning.

It is possible that some students engaged in Web-based instruction need the presence of a teacher for successful outcomes. Often Web-based instructional modules are designed to provide additional learning opportunities by furnishing an overabundance of hyperlinks. Too many hyperlinks offered in a lesson or course may result in a “cognitive overload” (Nelson, 1990, p. 295). Certainly the results of the SDLRS for this study suggests that undergraduate teacher candidates may not be comfortable with a learning process that involved planning, identifying their learning needs or executing their learning. Students engaged in Web-based instruction may need to possess skills for self-directed learning and learner control before engaging in these courses. Some of those skills may involve the ability to select relevant content and pace and sequence the lesson (learner-control).

Future Research

Future studies investigating learner-control should use gain scores in their statistical analyses. Comparison of scores between individual pretest and posttest may result in significant differences. Analyses in this study focused on whether subjects met mastery or nonmastery. An examination of gain scores between pretest and posttest may yield different results.

It is apparent that more studies should attempt to examine self-directed learning readiness and learner control during Web-based instruction. Self-directed learning also needs to be examined more in classroom settings. Descriptive data determining whether teachers are cultivating self-directing learning by abdicating control is needed. Further,
how much control is abdicated and when instructional control should be given to the student has not been determined. Perhaps Mezirow's (1991) Transformation Theory and models posited by Gibbons and Phillips (1982), Millar, Morphet and Saddington (1986), Grow (1991) or Candy (1991) should be considered in future studies.

Reeves (1993) states that one factor missing in several quantitative studies about learner-control is the lack of a theoretical foundation. Research about learner-control originate in the computer science or educational technology fields. Studies pertaining to self-directed learning come from the adult education field. Future studies need to incorporate theory from disciplines and areas other than their own. Studies regarding learner-control may need to include self-directed learning as an added consideration. Therefore, self-directed learning literature from adult education, needs to be infused into learner-control research from computer science and educational technology. Perhaps extending research to include information on similar topics in other fields and disciplines may help to provide stronger theoretical foundations.

This was the first study that considered technology proficiency as an independent variable. Future studies involving Web-based instruction need to include technology proficiency as a variable. Results of the Profiler Technology Proficiency Survey (SCRTEC, 1999) indicated that subjects in the study were performing at about the same level as other students who completed the survey from their university. It is not known how subjects in this study compare to their peers in other parts of the country. The development of a normed survey using a sample from across the United States is plausible. The survey should be tested for and reflect acceptable levels of reliability and validity.
Future studies should address a large scale comparison of varied instructional approaches for Web-based instruction. Studies should identify the relative efficacy of various approaches. Additionally, student characteristics associated with course success should be identified.

From a theoretical perspective, research should be open to the possibility that current educational philosophy and theory may need to be revised to capture the intricacies and dynamics of Web-based instruction. Qualitative studies are needed to gain insights into what students' perceptions of how they learn on-line. As theories are proposed, they should be subjected to rigorous quantitative examination prior to their adoption as learning models.
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APPENDIX A
LESSON ASSESSMENT
PRETEST
AND POSTTEST
SELECT THE CORRECT ANSWER
1. The experiences that enable you to read usually begin during ages:
   A. birth to 2 years old.
   B. 2 to 3 years old.
   C. 3 to 4 years old.
   D. 4 to 5 years old.

2. All of the following are part of teaching story understanding EXCEPT:
   A. The teacher encourages parents to re-read books read in class with their child.
   B. The teacher models self-questioning techniques while reading aloud to children.
   C. Students' progress in reading is monitored on a bi-weekly basis.
   D. Students practice re-telling stories to help with comprehension.

3. Which of the following activities contributes BEST to a child's oral language development?
   A. Going to movies.
   B. Watching TV
   C. Participating in interactive conversation(s)
   D. Listening to adult conversation(s)

4. The following activities characterize a strong first grade reading program EXCEPT:
   A. Children are provided listening experiences using a variety of literature.
   B. Children are provided opportunities to apply their reading skills by reading to learn in science.
   C. Children are provided explicit instructional opportunities each day in word reading and spelling.
   D. Children are provided writing opportunities that address a variety of situations.

5. Which of the following is a behavior demonstrated by children during the logographic phase of literacy development?
   A. The child reads the word, “hamburger” written on a blank sheet of paper.
   B. The child yells out “Pizza Hut” to everyone after passing the Pizza Hut Restaurant.
   C. The child reads aloud to parents from a book.
   D. The child sings, “Have it your way, Burger King!” repeatedly while riding in the car.

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6. A child misses seven words out of a twenty word passage while reading aloud. This is characteristic of a child reading on a(n):
   A. Independent reading level
   B. Dependent reading level
   C. Instructional reading level
   D. Frustrational reading level

7. The following are examples of activities that may be occurring in a language-rich kindergarten classroom EXCEPT:
   A. Children are performing puppet plays.
   B. Children are playing rhyming games.
   C. Children are sitting in a reading corner looking at big books.
   D. Children are seated writing about a topic of interest with all words spelled correctly.

8. A balanced literacy program that is appropriate for all children can be achieved by:
   A. Using a basal reading program to address a variety of learning styles.
   B. Teaching the phonetic approach for a variety of learning styles.
   C. Using a variety of materials and literature for reading, listening and writing.
   D. Teaching comprehension by using a variety of materials and literature.

9. Which of the following phases of reading development involves reading at an automatic rate?
   A. Logographic
   B. Alphabetic
   C. Orthographic
   D. Transitional-alphabetic

10. Reading experts have identified key factors of effective intervention programs. All of the following are key factors EXCEPT:
    A. Provide sufficient time for implementation of intervention programs.
    B. Provide continuous assessment of children on a daily and weekly basis
    C. Provide sufficient time for teachers to work together on a school-wide level.
    D. Provide training for parents to serve as reading assistants for intervention programs.

11. Reading becomes more centered on content area subjects in the:
    A. First grade
    B. Second grade
    C. Third grade
    D. Fourth grade
12. **Good reading comprehension requires all of the following EXCEPT:**
   A. Background knowledge of the topic
   B. Decoding knowledge
   C. Knowledge of word meanings
   D. Automatic word recognition

13. **The phase of literacy development that children begin recognizing letters, using letter names and some letter sounds for word recognition is the:**
   A. Logographic phase
   B. Transitional-alphabetic phase
   C. Alphabetic-decoding phase
   D. Orthographic phase

14. **When a child can read with ease and without assistance from teachers or family members, he/she is reading on a(n)**
   A. Independent reading level
   B. Dependent reading level
   C. Instructional reading level
   D. Frustrational reading level

15. **Basal reading programs may be supplemented to help students with reading disabilities by:**
   A. Providing more systematic instruction in phonological awareness
   B. Providing more systematic instruction in reading comprehension
   C. Providing students with reading disabilities more time to read books
   D. Providing students with reading disabilities more individualized instruction

16. **Which of the following early childhood experiences BEST influence literacy development?**
   A. A child watches television.
   B. A child shops for food at the grocery store.
   C. A child reads books at the library.
   D. A child watches his/her parent read a recipe to prepare a meal.

17. **Which of the following factors influences a child’s oral language development?**
   A. Cognitive ability
   B. Gross motor ability
   C. Fine motor ability
   D. Spatial ability
18. **Emergent literacy is promoted by all of the following EXCEPT:**
   A. There are several opportunities for a child to hear stories and read aloud.
   B. There are several opportunities for a child to increase reading fluency.
   C. There are wide choices of books at the child's independent reading level.
   D. There are oral language exercises comparing sounds in words.

19. A child decodes the word, "man" by sounding it out, [mmm]aaa[nnn], "man". This is characteristic of which phase of literacy development?
   A. Logographic phase
   B. Transitional-alphabetic phase
   C. Alphabetic-decoding phase
   D. Orthographic phase

20. During the emergent literacy phase, children learn to understand and use:
   A. Written language and the functions of print
   B. Oral language and the functions of print
   C. Print and the functions of oral and written language
   D. Print and the functions of written language
7. The experiences that enable you to read usually begin during ages:
   A. 4 to 5 years old
   B. 3 to 4 years old
   C. 2 to 3 years old
   D. birth to 2 years old

8. Which of the following is a behavior demonstrated by children during the logographic phase of literacy development?
   A. The child reads a paragraph written in class.
   B. The child says “Coke!” after passing the Coca Cola Billboard.
   C. The child reads aloud to parents from a book.
   D. The child sings, “Have it your way, Burger King!” repeatedly while riding in the back seat of the car.

9. Which of the following activities contributes BEST to a child’s oral language development?
   A. A child browses through a magazine.
   B. A child interacts in conversation with parents and other family members.
   C. A child listens to conversation between parents and other family members.
   D. A child watches television.

10. Which of the following phases of reading development involves reading at an automatic rate?
    A. Logographic
    B. Orthographic
    C. Transitional-alphabetic
    D. Alphabetic

11. Basal reading programs may be supplemented to help students with reading disabilities by:
    A. Providing more systematic instruction in reading comprehension
    B. Providing students with reading disabilities more individualized instruction
    C. Providing more systematic instruction in phonological awareness
    D. Providing students with reading disabilities more time to read books

12. The following are examples of activities that may be occurring in a language-rich kindergarten classroom EXCEPT:
    A. Children are seated at tables composing their own stories and poetry.
    B. Children are acting out scenes from their favorite stories.
    C. Children are sitting in a class library looking at big books.
    D. Children are playing alliteration and rhyming games.
13. Emergent literacy is promoted by all of the following EXCEPT:
   A. There are many opportunities for a child to hear stories read aloud.
   B. There are interactive book discussions that include open-ended questions.
   C. There are oral language exercises comparing sounds in words.
   D. There are wide choices of books at the child’s independent reading level.

14. If a child mispronounces six words out of a twenty word passage while reading aloud, he/she is most likely reading on a(n):
   A. Instructional reading level
   B. Frustrational reading level
   C. Dependent reading level
   D. Independent reading level

15. The child says [bbbb]aaaat, “bat”. Which phase of literacy development is demonstrated?
   A. Alphabetic-decoding phase
   B. Orthographic phase
   C. Transitional-alphabetic phase
   D. Logographic phase

16. The focus of reading becomes more content related in the:
   A. First grade
   B. Second grade
   C. Third grade
   D. Fourth grade

17. All of the following activities characterize a strong first grade reading program EXCEPT:
   A. Children are provided listening experiences using a variety of literature.
   B. Children are provided writing opportunities that address a variety of situations.
   C. Children are provided explicit instruction each day in word reading and spelling.
   D. Children are provided opportunities to apply their reading skills by reading to team in science.

18. All of the following are required skills for reading comprehension EXCEPT:
   A. Knowledge of word meanings
   B. Automatic word recognition
   C. Ability to read words fluently
   D. Background knowledge of the subject area
19. The phase of literacy development that begins around age three or four and is characterized by children recognizing letters, using letter names and some letter sounds for recognizing words is the:
   A. Logographic phase
   B. Orthographic phase
   C. Alphabetic-decoding phase
   D. Transitional-alphabetic phase

20. Which of the following early childhood experiences may BEST influence literacy development?
   A. A child watches television.
   B. A child visits the mall to shop for clothing
   C. A child reads a book at the library.
   D. A child observes his/her parent read a recipe to prepare a meal.
APPENDIX B
DESCRIPTION OF ONLINE ACADEMY
AND
READING MODULE LESSON
Description of the Online Academy Reading Module

Reading Module. The purpose of the Reading Module is to educate preservice teachers on prevention and intervention strategies for students with high incidence disabilities experiencing problems in reading. It begins with early emergent literacy and provides preventative teaching strategies. The focus then changes to reading intervention methods and strategies beginning in the primary school grades and continuing through adulthood. A detailed description of each module level and their sections is provided.

Level I: Module Orientation, provides an overview of the module to the student. Sections within the module include: (a) Content Map, (b) Introduction, (c) Critical Questions, (d) Structure, and (e) Help. The Content Map provides the student with a visual map of the components of the module and how it relates to other modules within the reading content area. The Introduction explains the focus of the module which is to help teachers meet the educational needs of their students in reading. Critical Questions assist the student in focusing on specific issues and content that the module addresses. The Structure Section introduces the student to how the module is organized. Finally, the Help Section provides technical assistance if students experience difficulty navigating through the module. The Help section does not address problems related to institutional list servers or the student's personal computer.

Level II: Module Support, contains sections that assist the student while learning. Sections include: (a) Syllabus, (b) Readings, (c) Research, (d) Directed Questions, (e) Glossary, and (f) Assessment. The Syllabus provides an overview of the content, goals, content map outline, readings, time estimates, and navigational tips. It
serves the same function as a syllabus in a traditional course. The Readings are a list of required reading from the module lessons. The Research Section provides the student a brief review of the literature that pertains to the topics discussed in the module lessons. When students complete a module lesson, they can review summaries of research vital to that area. The Directed Questions Section provides problems that allow students to assess their comprehension of the concepts in the module lesson. Definitions to instructional reading terms are located in the glossary at the Module Support Level. Reading terms can be found throughout the presentation content of each Module lesson and are highlighted with a link for the student's convenience. The final section in the Support Level is Assessment. The exam found at the Support Level is comprehensive. Therefore, students are not able to take the exam until they complete all of the lessons in the module.

Level III, Lesson, is the primary focus of the module, and is divided into three main sections: (a) Support, (b) Instruction and (c) Assessment. Students receive support in the form of lesson outlines, notes, glossary and readings. The instructional component contains the lesson preview, presentation and activities. Assessment at this level consists of directed questions and a lesson assessment.

The outline found in the Support section of the Lesson Level, provides the student with a detailed account of the main topics and related concepts. An outline is given for each lesson. The Notes feature provides a review of information that appears during the instructional presentation. Students may access the notes whenever they desire. The Glossary feature includes only terms germane to the presented lesson. A highlighted link is provided for the words in the text that are included in the glossary.
Readings is the final feature of the Support Section of the Lesson Level. Students may access the readings at any time. They are allowed to print copies or read the selection from their monitor.

The Instructional section consists of the lesson preview, presentation, and activities. The Preview feature introduces the module lesson. It is very similar to an advanced organizer, because it provides an outline of topics that are important to the lesson. Lesson objectives are also included in the preview. The lesson Presentation feature is a multimedia lecture with audio streaming and graphics. Both audio and text versions contain the exact same content and graphics. Audio and text versions are provided to accommodate for learner preferences. The Activities feature of the Lesson Level are designed to provide students with an opportunity to apply what they learn from the presentation. Some of the activities require students to collect and/or analyze data, participate in a simulation, or develop a product.

Two types of assessment are provided in the Lesson Level: (a) directed questions and (b) lesson assessment. Directed questions offer students the opportunity to check their understanding of what they learn. It is not as comprehensive as the lesson assessment. The lesson assessment is more in-depth and assesses the student’s ability to recall, apply, analyze, synthesize, and evaluate.

The final level of the Reading Module is Level IV, Practice. The Practice level is completed after students finish all of the lessons in the Module. For example, there are four lessons in the Reading Module. Students access the Practice Level after completing all four lessons. Practice exercises provide students the opportunity to apply or practice the interventions that are taught throughout the Reading Module. A model answer is
available to help students determine if they are implementing the interventions in an appropriate manner. Several of the practice exercises require students to generalize or apply solutions in classroom situations.

The structure of the Online Academy Reading Module is self-contained. The instructor does not have to respond to assessments, practices, or activities. Criteria and measures are designed to meet students' needs through immediate feedback from the Module. However, if the instructor desires to grade some of the activities, practices, or assessments in the module, students are able to: (a) email their work, (b) send a hard copy of their products by regular mail, or (c) meet with the instructor face-to-face to turn in activities and practices or participate in assessments.

**Validity and Reliability of the Reading Module.** Content validity for the Reading Module is built into the development process. From the moment of its inception, the focus for the team developing the Reading Module was to identify research-based interventions that were validated by the literature for teaching students with disabilities reading. This process began when the content area of reading was identified by the Office for Special Education Programs (OSEP) as one of the three areas for module development. Meyen (1999) indicates that the Academy follows four steps for selecting the interventions for the module: (a) develop standards for research-based interventions, (b) conduct a literature review, (c) engage experts from the reading field in a juror process, and (d) select the interventions (p. 4).

Jurors for the Reading Module are leading experts in the field of reading from several institutions of higher education and represent various perspectives. Their function is to: (a) assist the content team in reviewing the literature, (b) advise the team
in how to select research-based interventions, and (c) advise in the development and implementation of the module. Jurors also analyze the content of the module and lesson assessments and provide input on any revisions that are needed.
Welcome to the Online Academy

The Academy is funded as an initiative by the Office of Special Education Programs to develop instructional modules in reading, positive behavioral support, and technology in education for preservice teacher education programs across the nation. Please use this site to access information about the work of the Online Academy and the people involved, review Academy products, and learn how you can influence the work of the Academy.

While the focus of the Online Academy is on preparing teachers of students with disabilities, the movement toward inclusion makes the modules relevant for all teachers. Currently in its second year of development, this site features instructional modules for delivery online based on research interventions.

Thanks for visiting our site! We invite you to register so that you can automatically be alerted about new postings. If you have inquiries, please contact us!
The Online Academy gratefully acknowledges the dedication and assistance of those people who have contributed to the design and development of the online modules. Following is a comprehensive list of these persons and their contributions. Citations for attribution are also included.

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In this module, you will learn several research-based interventions to develop phonological awareness, beginning word recognition, and beginning spelling. The use of these interventions has been shown to not only help students with reading disabilities but also reduce the number of students with reading disabilities.
The Development of Literacy: As Reading Instruction Begins

I. What is Reading?
   A. Simple view of reading
   B. Reading a difficult passage: "Proteins and Phospholipid Measurements"
   C. Good reading comprehension requirements

II. Lesson Objectives (4:33)
   A. To learn about factors that influence early literacy development
   B. To learn about developing a balanced literacy program within the classroom
   C. To understand the overlapping word recognition phases
   D. To learn how to supplement basal reading programs
   E. To understand the characteristics of effective intervention programs

III. Literacy Development (5:53)
   A. Begins in infancy
   B. Influenced by later experiences
   C. Literacy - the ability to read and write in ways that enable communication, enhance understanding of ideas, and enrich lives

IV. Emergent Literacy (9:26)
   A. Earliest stage of literacy development
   B. Influenced by many factors
   C. Language experiences a key factor
   D. Occurs at any age, especially for individuals with disabilities
   E. Involves learning about functions of print
   F. Logographic phase of reading development
   G. Transitional-alphabetic phase of reading development

V. Alphabetic Decoding and Orthographic Knowledge for Word Recognition (19:34)
   A. Alphabetic principle understood
   B. What does reader actually do?
   C. Orthographic knowledge

VI. Preventing Reading Difficulties Before Kindergarten Begins (23:37)
A. Teachers can support community programs
B. Teachers can share information

VII. Kindergarten: The First Formal Literacy Experience (27:19)
A. Continues expansion of literacy
B. Provides context for instructional activities

VIII. Basal Reading Programs in Kindergarten (34:12)
A. Can be valuable for helping with development of overall reading program
B. Can guide instruction and monitor progress
C. Need to be supplemented to address needs of all students

IX. Creating Readers: The First Grade Reading Experience (35:05)
A. Activities and instruction
B. Reading levels
C. Basal reading programs

X. The Second and Third Grade Reading Experience (40:57)
A. Frequent writing opportunities with more use of conventional spelling
B. Explicit instruction in reading and spelling of more complex word types
C. Introduction to root words, prefixes, suffixes
D. Practice with reading of continuous text
E. Sensitivity to student's reading level
F. Prepares students for more demanding reading in fourth grade

XI. Characteristics of Effective Interventions for Students with Reading Disabilities (44:02)
A. Integration of intervention program
B. Professional development
C. Allocation of sufficient time for implementation by teachers
D. Increase in amount of time for students
E. Explicit, systematic instruction in reading skills
F. Explicit, systematic instruction in spelling
G. Use of high quality materials
H. Continuous assessment

XII. Review and Preview (49:07)
A. Objectives for Lesson 1
B. Objectives of next lesson
Lesson 1: Notes

1. Reading is the product of decoding and comprehension.

2. Good reading comprehension requires automaticity, relevant vocabulary, background knowledge, and the use of comprehension strategies.

3. Literacy is the ability to read and write in ways that enable communication, enhance understanding of ideas, and enrich lives.

4. Literacy development is the result of the combination of an individual’s developmental processes, learning experiences, and life experiences.

5. Emergent literacy is the developmental process of literacy acquisition lasting from birth until letter-sound associations are used to sound out words. It involves oral language development and learning about the functions of print.

6. Oral language development is influenced by innate cognitive abilities, health issues, rate of overall development, and types of language experiences.

7. Activities associated with emergent literacy should be maintained until a person makes the transition from "learning to read" to "reading to learn."

8. During the logographic phase, the associations between printed symbols and words are based on visual cues, and there is a lack of understanding that letters represent the sounds in words.

9. During the transitional-alphabetic phase, the associations between letter-names and letter-sounds are beginning to be made, although there is still a limited ability to use letter-sound association to decode words.

10. Alphabetic decoding requires using letter sounds to sound out words.

11. Orthographic word recognition is the immediate recognition of specific letter patterns and words.

12. Early identification and screening programs screen for hearing and language impairments and developmental delays; provide lists of community resources; and monitor programs or interventions.

13. Young children need to SEE language, HEAR language, and USE language to have the language experiences which will help them enjoy learning to read.

14. 

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14. Basal reading programs are valuable for guiding instructional decisions, but do not sufficiently emphasize skills for students with disabilities.

15. The 1st grade reading experience should include lots of reading opportunities and practice with sight word recognition of frequent words; invented spelling should be encouraged and conventional spelling should be taught.

16. During the 2nd and 3rd grade reading experience, reading and spelling instruction should be provided to strengthen an understanding of the alphabetic principle and should be sensitive to the student’s reading level.

17. During the 4th grade reading experience, students have to read content words not in speaking vocabularies, read science and social studies, and be evaluated on what was learned from their readings.

18. Independent reading is for exploratory and fun reading, while instructional reading is for topics and units being studied.

19. Some characteristics of effective interventions are the integration of the intervention program, professional development, the allocation of sufficient time for implementation, and increase in the amount of time students are engaged for reading activities.

20. An intervention is effective when there is explicit, systematic instruction in reading and spelling skills, when high quality materials are used, and when assessment is on-going.


Lesson 1: The Development of Literacy: As Reading Instruction Begins

I. What Is Reading?

A. Simple view of reading includes

1.

2.

B. "Proteins and Phospholipid Measurements" is difficult because

1.

2.

C. Good reading comprehension requires

1.

2.

3.

II. Lesson Objectives (4:33)

A. To learn about factors that influence early literacy development
B. To learn about developing a balanced literacy program within the classroom
C. To understand the overlapping word recognition phases
D. To learn how to supplement basal reading programs
E. To understand the characteristics of effective intervention programs

III. Literacy Development (5:53)

A. Begins in infancy with
B. Influenced by later experiences such as

1.
2.

C. Literacy is

IV. Emergent Literacy (9:26)

A. Is earliest stage of literacy development and includes understanding of

1.
2.

B. Is influenced by many factors such as

1.
2.
3.

C. Language experiences are a key factor and are influenced by

1.
2.
3.

D. Occurs at any age, especially for individuals with disabilities
E. Involves learning about functions of print
F. Characteristics of logographic phase include

1. 
2. 
3. 
4. 

G. Characteristics of transitional-alphabetic phase include

1. 
2. 
3. 
4. 

V. Alphabetic Decoding and Orthographic Knowledge for Word Recognition (19:34)

A. Alphabetic principle understood
B. What does a student actually do during these phases?

1. 
2. 
3. 
4. 
5. 

C. Orthographic knowledge and automaticity

1. orthographic knowledge is
2. "orthographic" means

145
3. automaticity is

VI. Preventing Reading Difficulties Before Kindergarten Begins (23:37)

A. Teachers can support community programs such as

1. 
2. 
3. 
4. 

B. Teachers can share information such as

1. 
2. 

VII. Kindergarten: The First Formal Literacy Experience (27:19)

A. Continues expansion of literacy
B. Provides context for instructional activities such as

1. 
2. 
3. gaining "story understanding" by
   a. 
   b. 
   c. 

VIII. Basal Reading Programs in Kindergarten (34:12)
A. Advantages

1. 

2. 

B. Disadvantages

1. 

2. 

X. Creating Readers: The First Grade Reading Experience (35:05)

A. Activities and instruction include

1. 

2. 

3. 

B. Reading levels

1. instructional level characteristics
   a. 
   b. 
   c. 

2. independent level characteristics
   a. 
   b. 

3. frustration level characteristics
C. Basal reading programs

1. valuable because

2. necessary to supplement

X. The Second and Third Grade Reading Experience includes (40:57)

A.

B.

C.

D.

E.

F.

XI. Characteristics of Effective Interventions for Students with Reading Disabilities include (44:02)

A.

B.
C.

D.

E.

F.

G.

H.

XII. Review and Preview (49:07)

A. Objectives for Lesson 1

B. Objectives of next lesson
The Development of Literacy: As Reading Instruction Begins

What is reading?
In order to be able to teach people how to read, you first need to understand what reading is and how people learn to read. So, what is reading? One theory, called the Simple View of Reading, describes reading as the product of decoding, which is translating sequences of letters into words, and comprehension, which is understanding what is read (see Gough & Tunmer, 1986). While being able to decode words automatically will not ensure comprehension, without automatic decoding, comprehension is extremely difficult.

Take a moment to read the passage on your screen.
"Proteins and Phospholipid Measurements
To normalize for variations in the number of cells extracted, the data from scintillation counting densitometry may be normalized to protein or phospholipid content" (Bilderback, Hoffman, & Debowsky, 1999, p. 239).

While you may have been able to recognize most of the words automatically, you probably had to slow down to figure out a few words and even then may have been unsure how to pronounce them. There are 28 words in that passage. You may not be familiar with the meanings of three of the words, one of which was used twice. Even though you understand 24 of the 28 words, or 86 percent of the words, do you understand what the sentence means after one reading? Can you explain it to someone else? Unless you're going to be measuring the lipid molecule ceramide, it's not really important that you understand what that sentence means. However, the sentence can help you understand that reading is more than just saying the words. It's not really reading unless there is comprehension.

You should have learned two other things from reading that sentence. The first is that slowing down to decode or sound out words makes it harder to remember the rest of the sentence. Also, not having the necessary vocabulary and background knowledge makes it very difficult, if not impossible, to understand what you are reading even if you recognize most of the words and can sound out the rest. Good reading comprehension requires automatic word recognition as well as the relevant vocabulary and background knowledge, which includes understanding language usage. Comprehension also requires having and using a repertoire of strategies to interpret and understand what you read.
You use reading comprehension strategies all the time. After determining your purpose for reading, you use different sets of strategies for different types of reading. A strategy for pleasure reading would be different from one for studying for a test or for gaining information. You monitor your understanding of what you are reading, if you don’t understand something, you probably go back and re-read it. You ask yourself questions. You make predictions. You think about what you are reading in relation to what you already know. And, you summarize what you’ve learned. So, we can say that good reading comprehension requires recognizing words at a nearly automatic rate, having relevant vocabulary and background knowledge, and using comprehension strategies to interpret and understand what is read. In order to teach students to read, you need to offer a rich, balanced literacy program that addresses both the decoding and the reading comprehension processes (see Pressley, 1998 for a discussion). The focus of this lesson is on how to develop these types of beginning reading programs.

To teach students to read and write, you need to begin by understanding what they already know about these processes. Beginning readers come to school with a wide range of experiences and knowledge about the reading and writing processes so you will need to provide a program that is sensitive to the types of experiences and challenges your students have had. You will need to provide your students with many different types of opportunities to listen, discuss, read, and write while simultaneously providing the types of explicit, systematic instruction to enable them to begin to read and spell words.

In this lesson you will learn about factors that can influence early literacy development before formal reading instruction begins and how you can take these factors into consideration as you conceptualize and develop a balanced literacy program. We will discuss how to create classrooms that foster literacy development for children who come to school with limited preschool literacy and how to supplement basal reading programs for children with learning disabilities. We will also discuss the characteristics of effective reading intervention programs. Finally, we will provide a brief review of this lesson and a preview of the next lesson.

At the end of this lesson you should be able to:

1. Explain emergent literacy.
2. Explain how early childhood experiences can influence literacy development.
3. Describe what you would hear and see in a rich, balanced literacy program and how you would create one.
4. Describe the overlapping word recognition phases (logographic, transitional-alphabetic, alphabetic, and orthographic).
5. Identify how basal reading programs might be supplemented to help students with reading disabilities, and
Describe the key characteristics of effective intervention programs.

Let's talk about how people become literate

**Literacy Development**

How did you become a literate person? You may recall experiences from your first years of schooling, or maybe you remember favorite books or rhyming songs, but you probably don't remember most of the important experiences that led up to the development of your ability to read and write. The experiences that enabled you to learn to read started years before you knew what school was, while you were still an infant.

As an infant and toddler, you began to learn about language as you watched and listened to your parents, siblings, and other adults. You learned from watching them and listening to them speak to you and to others. Your first attempts at communicating with others were probably quite effective as you cried, babbled, and gestured to make your thoughts and needs known. Over time, your babbling became more word-like as you began to imitate the words you heard. Your parents probably were delighted and encouraged your efforts.

As you explored your world by crawling and then walking, your family encouraged your attempts at learning the language by naming and describing objects you encountered in your environment. Your parents probably talked to you about your daily routines such as bath time, meal times, and of course, bedtime. Maybe you had some favorite bedtime stories or books that you wanted your parents to read to you again and again. As your language abilities increased and you interacted with your family and your playmates, you discovered that you could express your ideas, needs, and wants in a lot of different ways. It was probably during this time that you learned that some methods of communication are more socially acceptable than others.

As you entered school, you began to think about language differently. You learned that the sounds in words can be represented by letters, and letters can be combined to form written words. Written words, your own and others, became powerful! You learned about the richness of language as your reading swept you off to faraway places and times. Some stories moved you, while others tickled your imagination or aroused your curiosity. You found that you could learn things from books that you couldn't learn elsewhere. Your horizons were expanded because you could read.
You also learned that you could communicate your own ideas through writing and discussion. It was all of these experiences with different forms of spoken and written language that enabled you to become the literate person you are today. Your literacy continues to develop as you learn new vocabulary and new forms of communication such as those being developed as a result of the World Wide Web.

So what is literacy? Literacy is defined many different ways. The definition we will use here is that literacy is the ability to read and write in ways that enable communication, enhance understanding of ideas, and enrich lives.

So how does one develop literacy? The process of developing literacy is very different for every person. Literacy development is the result of the combination of an individual's developmental processes, and life experiences. Individuals with little exposure to language-rich experiences, who have developmental delays, or a disability that affects their ability to learn, have greater challenges learning to read and write.

Emergent Literacy
The earliest stage of literacy development is called emergent literacy (Sulzby, 1991). Emergent literacy is the developmental process of literacy acquisition generally lasting from birth until children begin to use letter-sound associations to sound out words. During the emergent literacy stage, children learn two major things. They learn to understand and use oral language, which is the foundation for understanding written language (Snow, 1991), and they learn about the functions of print. Let's take a look at those two different areas of learning.

A child's oral language development is influenced by many factors. It can be influenced by the child's own innate cognitive abilities as well as the rate of a child's development. It can also be influenced by the presence of sensory impairments, such as blindness or hearing loss, and a child's health, including prenatal care, the frequency of ear infections, and any major illnesses or allergies. While many of these factors cannot be controlled, the one factor that can be controlled is the type and quality of experiences that a child has with language.

Good language development occurs when children have multiple opportunities to hear and use language in safe supportive contexts (Bates, O'Connell, & Shore, 1987). Children's experiences with language are a result of cultural traditions and values, community support, and family characteristics (see Gunn, Simmons, & Kameenui, 1995). For example, on the global level, in some cultures in the world, literacy is valued more highly in males than it is in females. In fact, in some countries, girls aren't even allowed to go to school. At a more
local level, the community expectations and the level of support for 
early childhood education also influence children's emergent 
literacy. Some communities support children's literacy by providing 
story hours at the public library; others have programs in which parents 
are coached on how to help their children develop strong language 
skills.

At the family level, it's the family characteristics that most influence 
children's literacy development. Regardless of family income, children 
are well prepared for reading instruction when they enter school if they 
have grown up in homes in which literacy is nurtured and education is 
valued. In these homes, children are engaged in conversations with their 
parents, are frequently read to, and are exposed to cultural events. (See 
Gunn, Simmons, & Kameenui, 1995.) Although there certainly are 
families with low incomes in which literacy is nurtured, poverty is often 
associated with low levels of literacy.

In a recent study, it was found that children from families with middle-
to-high incomes experienced 4 million verbal utterances per year. In 
contrast, children in families with low incomes were exposed to only 
two-hundred-and-fifty-thousand utterances in a year (Hart & Risley, 
1995). The differences can be vast. In homes with low incomes, 
children at the age of five will have experienced approximately one-
and-a quarter-million utterances; five-year-old children from higher 
income homes will have experienced approximately 20 million 
utterances. While exposure to television and movies can also influence 
a child's language development, it is the interactive nature of 
conversations that provides the types of language development that 
lead to good oral language comprehension and usage. The richer the 
language and vocabulary that children are exposed to, the richer their 
own language usage becomes and, once they begin decoding words, the 
better they will be at comprehending what they read.

Children come to school with very different life experiences. Some 
children will have had a great deal of exposure to rich vocabulary and 
language usage through exposure to books, stories, songs, nursery 
rhymes and conversations. Other children may not have had 
experiences with stories and books. Some children will come to school 
with greater world knowledge and are familiar with different cities, 
museums, zoos, forests, or farms. A few children, even those who live 
short distances from a zoo, an ocean, or the mountains, may never have 
been to these places. Still other children may experience the world 
through disabilities that shape how their language develops and their 
literacy emerges. Children come to school with different vocabularies 
and world knowledge, both of which will affect their reading 
comprehension.

When these individuals become your students, you must be able to 
develop a reading program that is sensitive to their unique vocabularies 
and types of life experiences. You must provide the types of literacy
experiences they may have missed, provide opportunities for them to
develop their vocabularies and background knowledge, and provide the
types of activities that will help students begin to decode words and
understand what they read.

For individuals with disabilities, or for those who are not or have not
been exposed to print, emergent literacy can take place at any age, even
through adulthood. In fact, for many individuals, the activities that are
typically associated with emergent literacy development, such as being
read aloud to, continue to be important well beyond the preschool
years. Being read to can nurture background knowledge and
vocabulary development, and sets an example for reading processes,
including phrasing and expression. Activities that promote emerging
literacy should continue until the individual makes the transition from
learning to read to reading to learn. The curriculum in elementary
school usually demands that students make this transition by fourth
grade when mastery of specific core content areas becomes important.

During the emergent literacy phase, children are also learning about the
functions of print. They are watching and learning about all of the
different ways that adults use their reading skills. They see how to
handle books, magazines and newspapers. They learn how to hold
books and how to turn the pages. And, they begin to understand that
symbols can be used to represent spoken words and ideas.

The Logographic Phase of Development

The recognition of the purpose of symbols happens during the
logographic phase of development, which usually begins about the age
of two (Dickinson & Snow, 1987). During this phase, associations
between printed symbols and words are based on visual cues. For
instance, a child might begin to associate the golden arches with
McDonald's (TM) and Happy Meals (TM). Or a child might recognize
the word 'Pizza' when it's in large red letters on a pizza box. Children in
the logographic phase would not be able to recognize these same words
when typed on a page.

Even though children may be learning the names and shapes of letters
during this phase, they do not understand that the letters represent the
sounds in words. While they may remember a few words by their
distinctive shapes, individuals in the logographic phase don't have a
method for sounding out unknown words.

Young children in this stage, who have had experience with books,
might pick up a favorite story book and pretend that they can read. As
they carefully turn each page, they scrutinize the pictures to remember
the sequence of events. Then they provide their own version of the
story using the same excited or scary expressions they have come to
love seeing and hearing their parents use. To a child in the emergent
literacy stage, this is reading. Children in this phase may practice
writing as well. They may string together a combination of letters and
numbers or make up their own personal scribble writing. Because individual letters have little meaning during this phase, some people don't consider this to be a part of decoding development.

During this phase, children from literacy-rich homes also begin to be able to think about words as sequences of sounds as they notice the similarities and differences between the sounds in words. They often play with words and take time to think of lots of words that start with the same sounds or that rhyme. Songs and nursery rhymes are memorized and joyfully repeated over and over.

The Transitional-alphabetic Phase of Reading Development
Some reading experts believe that the first phase of decoding development is the transitional-alphabetic phase or the phonetic cue reading stage. (See Ehri, 1991 for a discussion.) This phase often begins around the age of three or four when children begin to recognize letters and use letter names and some letter sounds for recognizing words. Often only the first and last letters in a word are considered, so this is not yet true reading. For instance, a child could see the word 'jail' and, by simply saying the names of the first and last letters, she would end up saying the word 'jail' (Ehri, 1991). This isn't a very effective way of reading words. Too many words share the same beginning and ending letters to enable accurate word recognition. A child in this stage would probably have a difficult time telling the difference between the words 'cat', 'cot' and 'cut'.

You might see a little girl in this phase opening a picture book, pointing to the words, and trying to figure out what the picture labels say based on the first letters of the words. Those actions would show us that she already knows a lot about the reading process. She just hasn't figured out a way to approach unknown words.

Alphabetic Decoding and Orthographic Knowledge for Word Recognition
Once readers recognize that the letters in written words represent the sounds in spoken words, they have come to understand the alphabetic principle. Understanding the alphabetic principle gives the reader a relatively effective way of being able to approach unknown words and is the beginning of true reading. There is some disagreement about how this stage should be described, so let's talk about what the reader actually does. When readers encounter a new word, whether they are beginning readers or mature readers, they slow down, look for familiar letter patterns, and translate the written word into its spoken equivalent. Beginning readers, who are not familiar with very many letter patterns, most often use a sequential decoding strategy in which they look at each letter from left to right as they translate the letters into their spoken equivalents and sound out the word. Each time readers encounter a word they have already decoded, the process of recognizing the word becomes faster until the word is recognized at an automatic rate. For instance, a beginning reader may see the letters 's' and 'a'
‘t’ and sound them out. After seeing this word a few more times, the reader may begin to recognize the word ‘sat’ as soon as he sees it, without having to sound it out.

You probably experienced a similar process at the beginning of this lesson when you read the word ‘phospholipid’. When you read this word for the first time, you looked for the largest recognizable parts. You probably recognized the ‘phos’ as one chunk, ‘pho’ as another chunk, and ‘lipid’ as the final chunk of the word. You then linked them together to make the word ‘phospholipid’. If you were to see this word another three or four times, you might come to recognize the whole word automatically. Recognizing specific sequences of letters as whole words, without having to sound them out, is called orthographic knowledge.

The word "orthographic" refers to the correct sequence of letters within words. When readers use their orthographic knowledge to automatically recognize specific sequences of letters, they can read words much faster because they don’t have to sound them out letter by letter. As teachers of reading, our goal is to have students use orthographic knowledge for reading. However, students first need to learn the regularity of how letters represent sounds in words and to sound out words sequentially. With sufficient practice, students will actually begin to teach themselves to automatically recognize larger word parts and whole words (Share, 1995; Share & Stanovich, 1995). This process is called developing automaticity which is the ability to read words with no noticeable effort. When people are able to read words automatically, they can then devote their attention to understanding what they are reading.

Automaticity can be likened to a skilled driver who does not have to think about each action like shifting gears or operating turn signals, but does each action with a fluid motion, allowing conscious thought to be focused on the more immediate problems of navigating the roadways. In the case of reading, automatic recognition of letter patterns in words allows the reader to focus conscious effort on the more complex task of comprehension.

While the ultimate goal is for readers to be able to use orthographic knowledge to decode most words, beginning readers first need to understand the relationship between printed letters and the sounds in words. They then need to learn to decode words sequentially by sounding them out before they can develop the speed of recognition that will enable good reading comprehension (Ehri & Robbins, 1992). You will be learning how to teach these two aspects of reading development in the following lessons in this module.
Now that you have a basic understanding of the phases that people go through to learn to recognize words, let's talk about what teachers can do to foster literacy development in beginning readers.

**Preventing Reading Difficulties Before Kindergarten Begins**

Teachers can make a great deal of difference in students' successes in learning to read by promoting early literacy experiences both within and outside the school environment. While teachers can shape such experiences within their classroom, they can also support effective literacy programs within their communities. Parents and community members will look to teachers for advice about programs and activities that have been shown to promote emerging literacy. Through community literacy programs, parents can develop their own knowledge about how literacy develops, and they can learn how to expand upon their children's language development using a variety of pre-reading activities including reading frequently to their children.

As is often the case in communities today, early childhood education and adult education are integrated through family literacy efforts. Programs like the federally-funded Even Start Program offer parents the opportunity to further develop their basic skills or to earn a high school equivalency diploma while their young children are cared for in a nursery school environment. Parents also participate in parent education programs and receive home visits to help them develop good parenting skills and promote literacy. These and other community programs need to be sensitive to the family's primary language and culture. In addition, prenatal, perinatal, and postnatal services, developed by hospitals, clinics and community centers, should be included in community programs to ensure the healthy development of the child.

Early identification programs to screen children for sensory impairments, language impairments, and developmental delays are also extremely important. For children who are identified as being at risk for reading problems, literacy-based early childhood experiences and interventions should be readily available. Professionals who are involved with the early identification and screening programs should provide parents with comprehensive lists of the resources within the community that will address the needs of children identified as being at risk. Oftentimes, children who have been identified as having sensory impairments, language or developmental delays will be referred to the local school district for early intervention services. Any intervention services should be continuously evaluated to ensure that the child's needs are being met as they change (Committee on the Prevention of Reading Difficulties in Young Children, 1998). All these efforts enable children to do their best once they enter kindergarten.
One would hope that every child entering school would have good health care, a fine literacy background, and would come to school ready to develop formal reading skills. As a teacher, you may be asked what children should be able to do to be considered “ready” for school and what literacy skills a child should have upon entering school for the first time. The developmental accomplishments list that you printed out with the handouts from the preview section of this lesson identifies some of the milestones of normal literacy development. This list may also help you provide guidance to preschool literacy programs and may alert you to the types of literacy experiences that you may need to provide in your classroom.

Kindergarten: The First Formal Literacy Experience
Entering kindergarten is a major step in a young child’s life. It should continue the expansion of a child’s literacy horizons. Kindergarten should be an exciting bridge between early literacy experiences and more formal schooling. Marlene and Robert McCracken (1982) give us a wonderful description of the context in which instructional activities should be provided:

Kindergarten children need to be filled with language, the totality of language. They need to hear the fine language of good literature, they need to hear standard speech patterns and begin to use those patterns to describe their understanding of the world. They need to be filled with the various story patterns of the English language, to retell these stories in their own words, to dramatize their understanding of these stories and to illustrate them in many different ways. Kindergarten children need to sing and chant every day. They need to HEAR language, SEE language, and USE language. We believe that a child comes to the act of reading with much more joy, ease, and success when the teacher has spent his kindergarten time filling him with language and allowing or encouraging him to use that language in as many ways as possible (p. 9).

From this description, we get a vivid, but general, picture of a lively and language-filled kindergarten. If we were to be able to zoom into this picture, what would we see on the walls and in the nooks and crannies?

Seeing Language Used in the Kindergarten
The teacher has created a classroom environment that celebrates literacy. In one corner, filled with comfortable cushions, we see a class library with a variety of books and materials — big books, chart poems, patterned and predictable books. Large letters of the alphabet are stretched across one wall. Colored yarn connects each letter with pictures of animals and everyday items that begin with that letter. Large labels show the written names of the objects in the room. A colorful
display shows off her students' illustrations, stories, and poems. In a corner we see a box of costumes for plays. There is a well-used puppet stage made out of painted cardboard boxes and decorated with favorite storybook characters. Puppets are being made on a project table nearby and will be part of a presentation for parents about the different stories the children are reading in class. This is what a literacy-rich kindergarten environment looks like. What would this classroom sound like? What would we hear?

**Hearing Language Used in the Kindergarten**

During a week-long visit to this same classroom we would hear the teacher helping her students develop an awareness of language and an appreciation for the written word. She does this by reading frequently to and with her students. She reads from a rich variety of genres, storybooks, poems, newspapers, and informational material. She helps her students reflect on language by defining new words and concepts (Dickinson and Snow, 1987) and talking about the different ways that language is used. As she reads the big books, she points to each word, as another way to help her students understand what printed words are and that they represent spoken words. Students are encouraged to "read" to themselves. Although they can't yet read very many words, her students pretend they are reading by turning the pages and retelling the stories in their own words.

In this classroom, they play with the sounds in words, the syllables and the phonemes. The teacher emphasizes these components by reading nursery rhymes and poetry. Rhyming and alliteration games lead to discussions about the sound structures of words (Griffith & Olson, 1992). We might hear children singing the alphabet song as the teacher points to the letters. They will talk about the associated sounds, the relationship of the letters to the pictures below them, and the words the pictures represent. During a practice for the program for parents, we will hear students express themselves through stories they have read and written.

In addition, teachers should emphasize "story understanding" (Dickinson, Temple, Hirschler, & Smith, 1992). So, over the weeks and months, as the children in this kindergarten mature, the teacher makes sure they understand that using language helps them learn new words, new language patterns, and new thoughts. The children are encouraged to think about how reading helps them learn. They talk about stories and retell them to each other. They sometimes act out favorite stories or dramatize favorite parts with puppets. They are immersed in gaining "story understanding," learning about the typical components of a story and developing a set of expectations about how stories unfold.

**Teaching Story Understanding**

How do you teach story understanding? Try to visualize the kindergarten class we have been talking about and watch as the teacher
and the children interact

- The teacher always makes certain that each child can see the book being read whether she is reading to all of the children or just a small group. She reads with expression and encourages active involvement in understanding the story.
- As she reads the stories she models her own thinking as she asks herself questions about the story and tries to find the answers.
- She encourages the children to reflect on the story, to analyze and speculate. She challenges her students to think deeply about the stories. She asks them to make predictions about the story and to explain the reasons for their predictions. She helps them confirm or make new predictions. She also helps her students link different stories with each other and also to their own experiences.
- She incorporates books into the different subject areas, thereby providing continuous exposure to and discussion about new vocabulary words and concepts. She makes sure that she varies the type and challenge level of the books. She discusses story structures and includes stories with complex plot lines.
- She facilitates group discussions by listening to children's comments and questions and encourages them to listen to and respond to each other's comments.
- She has students practice re-telling stories
- She encourages parental reinforcement at home and has parents reread books read in class. She provides models and ideas for parent-child discussions about books and gives parents a handout that explains some of the characteristics of good story reading.

**Basal Reading Programs in Kindergarten**

Surrounding kindergartners with literacy is not enough, they also need systematic instruction to be able to learn to read. A well-designed basal reading program can be a valuable tool for helping teachers develop an overall reading program. It can provide a developmental structure to guide instruction and monitor progress. However, because many basal reading series fail to promote reading success for all learners, teachers must supplement with additional literacy-rich experiences like the ones we just talked about. To meet the needs of students at risk for or who have reading disabilities, most basal series also need to be supplemented with much stronger and systematic instruction in phonological awareness (Simmons & Kameenui, 1995). You will be learning how to provide that type of instruction from the other lessons in this module.
Creating Readers: The First Grade Reading Experience

Students who have had the types of kindergarten experiences that were just described should be well prepared for first grade. And, by the end of first grade, students should be reading. Based on an extensive review of the research on reading development, the Committee on the Prevention of Reading Difficulties in Young Children (1998) has identified activities that should characterize strong first grade reading programs. First-grade reading programs should build on kindergarten activities by emphasizing more challenging levels of phonological awareness activities and language games. Students should be encouraged to use invented spelling in their writing. Teachers should continue to read a variety of genres aloud to students and provide explicit instruction in reading comprehension strategies to monitor comprehension, summarize main ideas, predict events, and draw inferences.

In addition, students should have daily opportunities to receive explicit instruction in word reading and spelling. Once students learn to read and spell specific words, they should receive support in reading these words in meaningful sentences and stories that are written at the students' instructional reading level. Students should have frequent opportunities to write for a variety of purposes. By encouraging students to use a combination of standard spelling and invented spelling, students are more willing to express their ideas more freely rather than be constrained by having to spell each word correctly. Invented spelling also helps students learn to pay more attention to the sounds in words and the letter patterns in the words they learn to read.

A student's instructional reading level is the level at which the material is written so that the student is able to read 95% of the words accurately and understand at least 75% of the material. When a student is trying to read material written at his instructional reading level, he will still need the help of the teacher or para-professional to be able to understand almost all of what he reads.

A student can be expected to independently read and learn from materials that are written at his independent reading level. The student's independent reading level is the level at which he is able to read 99% of the words accurately. That means that the student should make no more than one mistake in a hundred-word passage and should understand almost all of what is read. Students should have lots of different opportunities to practice reading, such as choral reading, reading with a partner, and reading with a trained peer-tutor, or volunteers. The more students practice reading, the better they become. Frequent practice opportunities enable students to develop their orthographic knowledge, become faster at word recognition, and become more fluent readers as they learn to read passages smoothly.

Students should never be expected to read at their frustration level which is the level at which they have less than 95% accuracy in word
identification, or less than 75% understanding of the passage. If a student is missing more than one word out of 20, the material probably requires her to use skills that she has not yet mastered.

At the beginning of this lesson you were asked to read a couple of sentences that were probably at your frustration reading level. Even if you could identify all of the words in the passage you probably wouldn't be able to learn how to measure proteins and phospholipids from reading the rest of the passage because you probably don't have the relevant vocabulary and background knowledge. You would need help from someone who is more knowledgeable about the subject. If you were asked to independently read an entire chapter that was written at your frustration level, most likely you would quickly decide that the effort was not worth the gain. The same is true for beginning readers. To ask beginning reading students to read texts written at their frustration reading level will quickly teach them that reading is difficult and unrewarding. Therefore, teachers need to be very careful in selecting the appropriate reading material for their beginning reading students. In recent years, much greater efforts have been made to develop interesting and fun early reading books with controlled vocabularies so even beginning readers can be successful in reading them.

First Grade and Basal Reading Programs
For teaching reading at the first grade level, well-developed and research-informed basal reading programs can provide a valuable developmental structure to guide instructional decisions, just as they can for kindergarten. However, in a 1993 study that examined fifty different basal reading programs, most were found to lack sufficient emphasis on the very reading and writing skills that are the most difficult for students with disabilities (Stein et al., 1993). Most basal programs need to be supplemented with more systematic instruction in phonological awareness and in applying the alphabetic principle to reading and spelling words. You will be learning how to provide this type of instruction in the remaining lessons in this module. First grade and beginning reading teachers also need to provide more opportunities for students to develop accurate and fluent oral reading skills. In recent years, several publishers have tried to incorporate these types of activities in their basal series. Several research-informed reading curriculum guides and basal series that emphasize these areas are listed in the handout in Lesson 4.

The Second and Third Grade Reading Experience
During the second and third grades, students should continue to be surrounded by rich literature as well as other types of reading materials. They should continue to have frequent writing opportunities and begin to use more standardized spellings and writing patterns. Students entering second grade should have a firm understanding of the alphabetic principle, that is, understanding how the sounds in words relate to various letter combinations in printed words. Explicit
instruction in reading and spelling increasingly complex word types should continue. Students should be introduced to root words, and learn how prefixes and suffixes can change word meanings. There should be more emphasis on reading continuous texts as students work to increase their accuracy in reading words, and their fluency in reading phrases, sentences, paragraphs, and stories. To accommodate students' skills and interests, reading materials written at various levels of difficulty should be made available. Teachers should continue to be sensitive to students' reading levels by providing support for students when they are reading texts at their instructional levels and by providing alternate means for them to gain information if texts are written at their frustration levels. Reading that is related to the topics and units being studied in the classroom should be provided at a student's instructional reading level. Exploratory and fun reading should be promoted by providing reading materials at a student's independent level. With these different levels of support, students can learn to read increasingly sophisticated texts with more complex wording and story structures. So, if students are actively involved in studying the ocean, a variety of books on oceans, written at different levels of reading difficulty, should be available so that each student can find a book that is just right.

During second and third grade, teachers must build another bridge between the beginning word reading introduced in first grade and the complex reading skills needed for the more demanding reading comprehension expected in fourth grade. Beginning in fourth grade, students will have to begin reading unfamiliar words and terms that are not in their speaking vocabularies. Reading will become centered on content area subjects such as science and social studies. Students will be tested, graded, and given feedback on how much they learned from what they read rather than how well they read it. Students will be given tasks that begin to resemble the types of tasks that they will be given in secondary school such as answering chapter questions and writing reports. Therefore, it is during second and third grade that students must learn the comprehension skills necessary to make a crucial transition, the transition from "learning to read" to "reading to learn."

In addition to regular reading instruction, students who make slow progress in learning to read within the general education classroom will require interventions that can provide a higher level of support for reading development. Let's spend a few minutes and talk about the characteristics of effective reading interventions.
Characteristics of Effective Interventions for Students with Reading Disabilities

Some interventions for students with reading disabilities are targeted to specific areas and can be used with a student who is having difficulty in one particular area of reading. Others are broader, more comprehensive, and can be used for all students in grades one through three. Regardless of the type of intervention, there are factors which seem to make them more effective than traditional forms of instruction for students with reading disabilities. The Committee for the Prevention of Reading Difficulties in Young Children has identified key factors in, or characteristics of, effective intervention programs (1998).

The first characteristic is the integration of the intervention program.
All educators who are involved with the students who are receiving the intervention services need to coordinate their efforts to build a solid foundation for reading development. Simply sending a student to another classroom for reading instruction with no regular communication between teachers can confuse the student even more.

The most effective reading programs involve teachers at all grade levels working together to implement cohesive, research-based programs to provide the necessary levels of reading support for all their students. Schools with high numbers of students who are at risk for reading difficulties have been shown to be able to halt, and even reverse, the trend by adopting or adapting school-wide programs that have been shown to be effective with students from similar communities (The Committee on Preventing Reading Difficulties in Young Children, 1998).

The second factor is professional development. The school staff needs to be well trained and should receive ongoing support to be able to implement effective programs and utilize materials that are known to benefit students with difficulties in learning to read.

The third factor is the allocation of sufficient time for implementation. Sound interventions will take longer to implement. Programs that make a difference with at-risk readers require more time for the teachers to carefully match the interventions to the needs of the students and coordinate the intervention with other literacy activities.

The fourth factor is an increase in the amount of time that students are engaged in reading activities. Students who are having difficulty learning to read and write will need more time to master the skills. A common practice has been for teachers to move on to teaching new things when most students have learned a particular skill. Struggling readers were assumed to be able to learn the skills later. That time never comes. These students need to be given the time to learn the skills as they are introduced so they too have the opportunity
to build their reading knowledge on a solid foundation.

The fifth factor is explicit, systematic instruction in reading skills. Students having difficulty learning to read need to be taught specific decoding and comprehension strategies. They need frequent opportunities to practice these skills in reading and rereading connected text. They also need to receive immediate corrective feedback and encouragement.

The sixth factor is explicit, systematic instruction in spelling. Spelling and reading are complementary processes. As students learn to pay attention to letter sequences in words for spelling, they also learn to recognize the words more easily for reading.

The seventh factor is the use of high quality materials. The choice of student materials can make a great difference. The decision about which materials work best with which students should be based on each student's needs and interests. Students should be working with materials that they can be successful with - materials that are neither too easy nor too difficult.

The eighth factor is continuous assessment. Students' progress should be monitored on a daily and weekly basis. In addition to helping guide instructional decisions about what the student needs to work on next, continuous assessment enables teachers to evaluate their own instruction and make changes as necessary. With highly trained teachers of reading, cohesive research-based reading programs, and high quality materials, the number of students who become successful readers will increase.

Let's do a quick review and a preview of the next lesson.

The goals for this lesson were for you to be able to explain emergent literacy and how early childhood experiences can influence children's literacy development. You now know that literacy development is affected by each child's own development as well as his or her experiences with language and literacy. You should also be able to describe the overlapping phases of word recognition development including the logographic, transitional-alphabetic, alphabetic, and orthographic phases. You should also be able to describe what you would hear and see in a rich, balanced literacy program, tell how you could create such a program and be able to explain how basal reading programs might be supplemented to help students with reading disabilities. Finally, you should be able to describe the key
characteristics of effective intervention programs.

In the next lesson, you will be learning about the characteristics of phonemes. This will help you to learn about and be able to provide the type of intensive, explicit instruction in phonological awareness and beginning word reading and spelling that struggling readers require.


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APPENDIX C
SELF-DIRECTED LEARNING READINESS SCALE
QUESTIONNAIRE

INSTRUCTIONS: This is a questionnaire designed to gather data on learning preferences and attitudes towards learning. After reading each item, please indicate the degree to which you feel that statement is true of you. Please read each choice carefully and circle the number of the response which best expresses your feeling.

There is no time limit for the questionnaire. Try not to spend too much time on any one item, however. Your first reaction to the question will usually be the most accurate.

RESPONSES

ITEMS:

1. I'm looking forward to learning as long as I'm living.
   - Almost never true of me: 
   - Not often true of me:
   - Sometimes true of me:
   - Usually true of me:
   - Almost always true of me: 
   - When I don't feel like learning
   - 1 2 3 4 5

2. I know what I want to learn.
   - 1 2 3 4 5

3. When I see something that I don't understand, I stay away from it.
   - 1 2 3 4 5

4. If there is something I want, I figure out a way to learn it.
   - 1 2 3 4 5

5. I love to learn.
   - 1 2 3 4 5

6. It takes me a while to get started on new projects.
   - 1 2 3 4 5

7. In a classroom, I expect the teacher to tell all class members exactly what to do at all times.
   - 1 2 3 4 5

8. I believe that thinking about who you are, where you are, and where you are going should be a major part of every person's education.
   - 1 2 3 4 5

9. I don't work very well on my own.
   - 1 2 3 4 5
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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tr>
<td>10. If I discover a need for information that I don't have, I know where to go to get it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>11. I can learn things on my own better than most people.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<td>12. Even if I have a great idea, I can't seem to develop a plan for making it work.</td>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>5</td>
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<td>13. In a learning experience, I prefer to take part in deciding what will be learned and how.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
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<td>14. Difficult study doesn't bother me if I'm interested in something.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>15. No one but me is truly responsible for what I learn.</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
<tr>
<td>16. I can tell whether I'm learning something well or not.</td>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>5</td>
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<tr>
<td>17. There are so many things I want to learn that I wish that there were more hours in a day.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
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<td>18. If there is something I have decided to learn, I can find time for it, no matter how busy I am.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19. Understanding what I read is a problem for me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>20. If I don't learn, it's not my fault.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>21. I know when I need to learn more about something.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>22. If I can understand something well enough to get a good grade on a test, it doesn't bother me if I still have questions about it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>23. I think libraries are boring places.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>24. The people I admire most are always learning new things.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Almost never true of me.</td>
<td>Not true of me.</td>
<td>Fairly true of me.</td>
<td>Sometimes true of me.</td>
<td>Usually true of me.</td>
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<tr>
<td>25.</td>
<td>I can think of many different ways to learn about a new topic.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
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<td>26.</td>
<td>I try to relate what I am learning to my long-term goals.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>27.</td>
<td>I am capable of learning for myself almost anything I might need to know.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<td>28.</td>
<td>I really enjoy tracking down the answer to a question.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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</tr>
<tr>
<td>29.</td>
<td>I don't like dealing with questions where there is not one right answer.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>30.</td>
<td>I have a lot of curiosity about things.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>31.</td>
<td>I'll be glad when I'm finished learning.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>32.</td>
<td>I'm not as interested in learning as some other people seem to be.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>33.</td>
<td>I don't have any problem with basic study skills.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>34.</td>
<td>I like to try new things, even if I'm not sure how they will turn out.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>35.</td>
<td>I don't like it when people who really know what they're doing point out mistakes that I am making.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>36.</td>
<td>I'm good at thinking of unusual ways to do things.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>37.</td>
<td>I like to think about the future.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>38.</td>
<td>I'm better than most people are at trying to find out the things I need to know.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>39.</td>
<td>I think of problems as challenges, not stopsigns.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>40.</td>
<td>I can make myself do what I think I should.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
41. I'm happy with the way I investigate problems.

42. I become a leader in group learning situations.

43. I enjoy discussing ideas.

44. I don't like challenging learning situations.

45. I have a strong desire to learn new things.

46. The more I learn, the more exciting the world becomes.

47. Learning is fun.

48. It's better to stick with the learning methods that we know will work instead of always trying new ones.

49. I went to learn more so that I can keep growing as a person.

50. I am responsible for my learning — no one else is.

51. Learning how to learn is important to me.

52. I will never be too old to learn new things.

53. Constant learning is a bore.

54. Learning is a tool for life.

55. I learn several new things on my own each year.

56. Learning doesn't make any difference in my life.

57. I am an effective learner in the classroom and on my own.

58. Learners are leaders.
APPENDIX D
PROFILER SURVEY: BASIC TECHNOLOGY
SKILLS CHECKLIST

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Experiment with Profiler

Follow the instructions below and complete the survey. Then, click on the submit button to see your graphic profile. Your data will not be saved, but you should have some idea of the potential of this tool for use in your building or district.

Survey: Basic Skills Checklist

User: Joe Generic
You last took this survey on July 11, 2000.

Share survey results within your building? [ ]

Please complete the survey below by selecting one of the choices (indicating your best estimate of your skill or knowledge level) about each of the technology related indicators. A 4 means that you are very knowledgeable and fluent with a particular skill indicator whereas a 1 means that you are unfamiliar or have little knowledge about that topic or skill. After completing the survey click on submit survey. You will then be able to see the results of your survey along with a building level profile.

1. Solve common printing problems
2. Use advanced features of a word processor (tables, headers and footers, macros, table of contents, columns, etc.)
3. Copy a graphic from a Web site
4. Create and use bookmarks/favorites
5. Cut, copy, and paste text within an application and between multiple open applications
6. Merge information from a database into a word processing document (mail merge)
7. Download and decompress files
8. Subscribe and unsubscribe from a mailing list (listserv)
9. Scan a document
10. Create a Web page
11. Create and maintain backups
12. Open a file from a floppy disk or a local or network hard drive; save a file to a floppy disk or to a specific location on a local or network hard drive
13. Configure computer to connect with network
14. Reduce, enlarge, or crop a graphic and convert graphics from one file format to another
15. Format/initialize a disk

http://profiler.cscuec.org/profiler/cgi-bin/1.1/take.pl?lastname=generic&pin=1731&sid=1
4. Setup computer system and connect peripheral devices
5. Record an audio file or capture a video clip
6. Access a specific Web page (URL) and search the Web using a variety of tools
7. Install application software
8. Create an electronic presentation
9. Manage names and groups in an address book
10. Create, copy, move, rename, and delete folders
11. Send e-mail messages and send/receive attachments
12. Install/reinstall system software and printer drivers
13. Use formulas and/or functions in a spreadsheet
14. Create a graph from spreadsheet data
15. Allocate memory to an application (Mac only)
16. Start up and shut down the computer; open and close an application/program; insert and eject a removable disk (floppy disk, CD-ROM)
17. Create a report (query/find request) in a database and sort the results
18. Correct a locked-up computer

Submit Survey | Clear Survey
VITA

Ellen Ratcliff is currently an Assistant Professor in the Department of Teaching and Learning at Southeastern Louisiana University. She teaches undergraduate and graduate courses in special education. She also supervises student teachers and undergraduate practicum students. Current professional activities include serving as the department Graduate Coordinator and state treasurer for the Louisiana Federation of the Council for Exceptional Children. Her past professional experience includes teaching children with high incidence disabilities at the elementary and middle school levels. The degree of Doctor of Philosophy will be awarded to Ellen Ratcliff on May 18, 2001.
DOCTORAL EXAMINATION AND DISSERTATION REPORT

Candidate: Martha Ellen Ratcliff

Major Field: Curriculum and Instruction

Title of Dissertation: Self-Directed Learning and Learner-Control Sequencing: An Examination of the Relationship Between Two Instructional Delivery Systems and the Acquisition and Application of Subject Matter for Teacher Candidates

Approved:

[Signature]

Major Professor and Chairman

[Signature]

Dean of the Graduate School

EXAMINING COMMITTEE:

[Signatures]

Date of Examination:

19 March 2001