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The effects of a microteaching program upon the critical thinking skills of preservice teachers

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THE EFFECTS OF A MICROTEACHING PROGRAM UPON THE CRITICAL THINKING SKILLS OF PRESERVICE TEACHERS

A Dissertation

Submitted

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Education

Approved:

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May 1990

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ABSTRACT

Critical thinking skills have received considerable attention during the past decade as test scores measuring higher-order thinking abilities have declined (Benderson, 1984). It has been advocated that the responsibility for the development of these skills lies with the classroom teacher (Glickman, 1987; Beyer, 1983; Costa, 1981). Brandt (1984) purports that all teachers need to understand cognitive processes and ways to strengthen them. Yet, many teachers have not had the benefit of "systematic cognitive development in their own schooling; they are unprepared to foster cognitive skills in their own students" (Martin, 1984, p. 68). If thinking skills are a desired outcome of our educational system, the development of those skills must start with those who teach them (Sternberg, 1987).

Preservice teachers must be taught to create learning environments supportive of thinking skills (Beyer, 1983). They need to become familiar with strategies that elicit and model these thinking behaviors (Costa, 1981). Information processing models are effective because they utilize thinking operations like comparing, contrasting, and verifying to build on cognitive structures (Strong, Silver, & Hanson, 1985; Marzano & Arredondo, 1986). Joyce (1985) suggests that opportunities must be provided to study the

theory of information processing models, see them demonstrated, and practice them in learning laboratories.

Microteaching providing direct practice with information processing models allows preservice teachers to acquire a repertoire of these thinking skills. Preservice teachers with similar experiences have been found to make more rational choices (Martin, 1984) and to increase elements of their own critical thinking abilities (Betres, 1971).

This research investigated the effectiveness of a microteaching program upon the critical thinking skills of preservice teachers as measured by the Watson-Glaser Critical Thinking Appraisal (Watson & Glaser, 1980a). A quasi-experimental approach using Design 15: The Recurrent Institutional Cycle Design (Campbell & Stanley, 1963) was employed as the basic research design model. The differences of means of dependent samples were tested through the use of *t* tests of significance at the .05 level. Overall, no statistical significance was found in favor of the microteaching program.

Further research is needed to develop effective programs to assist preservice teachers to become better critical thinkers. This development must provide a more explicit focus on critical thinking skills rather than to rely upon implicit approaches (Beyer, 1987). Test scores from research such as this need to be investigated to

determine if patterns exist among the types of errors which occur most frequently by various teaching majors. Tests are also needed which will focus on actual critical thinking abilities without relying on multiple choice formats. Other areas of thinking, such as creative thinking, must also be researched to strengthen the development of those skills in the teacher education program.

CHAPTER I

INTRODUCTION

The Problem and Its Setting

Critical thinking skills have received considerable attention during the past decade as test scores measuring higher-order thinking abilities have declined (Benderson, 1984). It has been advocated that the responsibility for the development of these skills lies with the classroom teacher (Glickman, 1987; Beyer, 1983; Costa, 1981). Few teachers, however, have had systematic cognitive training to provide them with a solid foundation of strategies to elicit thinking behaviors in their students (Smith, 1988; Beyer, 1987).

The American Association of College Teachers of Education recently passed a resolution to encourage its membership to implement "courses in pedagogy in which future teachers become proficient in applying strategies that will enable learners to acquire higher-order thinking skills of their own" (Davis & Martin, 1989, p. 7). The following research study addressed the need for preservice teachers to receive direct instruction on the nature of learning, information processing models, and lesson planning, with the opportunity to implement these methodologies in a microteaching program. It was hypothesized that preservice

teachers who learned and practiced these fundamental strategies would increase their own critical thinking skills. It was assumed that they would then be better prepared to incorporate the same processes into their own future classrooms.

The Statement of the Problem

The present study investigated the effectiveness of a microteaching program upon the development of critical thinking skills of preservice teachers. It examined the following question: Can the critical thinking skills of preservice teachers, as measured by the Watson-Glaser Critical Thinking Appraisal (Watson & Glaser, 1980a), be improved through a microteaching program?

The Delimitations

All of the subjects in this study were students at the University of Northern Iowa, a mid-sized Midwestern university. Intact classes were used for the study. Typical registration factors, such as the time, day, and availability of the sections, may have influenced the course selection and may have biased the samples. It was assumed that although microteaching occurred at differing times during the semester, timing did not influence the results.

Critical thinking skills were measured on a multiple choice test; the construction of the test did not permit the researcher to measure the actual thought processes utilized to choose the answers.

The Definitions of Terms

Critical thinking skills. Critical thinking skills are viewed as a composite of attitudes, knowledge, and skills. According to Watson and Glaser, critical thinking includes:

> 1) attitudes of inquiry that involve an ability to recognize the existence of problems and an acceptance of the general need for evidence in support of what is asserted to be true;
> 2) knowledge of the nature of valid inferences, abstractions, and generalizations in which the weight or accuracy of different kinds of evidence are logically determined; and
> 3) skills in employing and applying the above attitudes and knowledge. (1980b, p. 1)

For the purpose of this study, critical thinking shall be operationally defined as the use of basic thinking processes to analyze educational content; to generate insight with particular meaning and interpretations; to develop cohesive, logical reasoning patterns; to understand assumptions and biases underlying particular positions; and to attain a credible, concise, and convincing style of presentation.

Information processing. Information processing is "the study of how humans perceive, comprehend, remember, and use the information they gain from the world around them" (Woolfolk, 1987, p. 71).

Information processing models. Information processing models of learning involve

> . . . gathering higher-order thinking strategies and systematic methods for gathering and representing information, called input or

> encoding; holding information, called processing or retention; and getting at the information when needed, called output or retrieval. (Woolfolk, 1987, p. 236)

Higher-order thinking skills. Higher-order thinking involves

> . . . a cluster of elaborative mental activities requiring nuanced judgment and analysis of complex situations according to multiple criteria. Higher-order thinking is effortful and depends on self-regulation. The path of action or correct answers are fully specified in advance. The thinker's task is to construct meaning and impose structure on situations rather than to expect to find them already apparent. (Resnick, 1987, p. 44)

Metacognition. Metacognition is the

> . . . ability to formulate a plan of action, monitor our own progress along that plan, realize what one knows and does not know, detect and recover from error, and reflect upon and evaluate one's own thinking processes. (Costa, 1985a, p. 31)

Microteaching. Microteaching is the videotaped practice of specific information processing skills in a scaled down teaching encounter with supervisor, peer, and self feedback (Allen & Ryan, 1969).

The Assumptions

It was assumed that similar general academic abilities were represented by the relatively homogeneous group of subjects. At the time during which the sample group was admitted, the university enforced an enrollment cap for university admission. A 2.5 grade point average, on a 4-point scale, was also necessary for admission to the teacher education program.

It was assumed that no extreme differences existed in the critical thinking skills between elementary and secondary education majors (Gillett, 1987).

It was assumed that the participating course instructors employed similar approaches in preparing their students for microteaching.

The Importance of the Study

Although schools are beginning to focus on thinking skills for students, there has been little focus on the effect of those skills on their teachers. Many teachers have not had the benefit of systematic cognitive development in their own schooling and are often unprepared to foster higher-order thinking skills in their students. This research specifically addressed the need for preservice teachers to be trained to create learning environments which are supportive of critical thinking. It is believed that this training will enable preservice teachers to nurture fundamental cognitive skills in their future students (Costa, 1985b; Garmston, 1985). The results of this investigation are expected to provide direction for those planning programs for teacher preparation.

CHAPTER II

THE REVIEW OF THE RELATED LITERATURE

Historical Perspectives of Thinking in the Curriculum

The critical thinking movement can be traced to the practice and vision of Socrates, who utilized the probing method of instruction over 2,400 years ago in Greece (Baldwin, 1984). Historically, elite tutors and academies were expected to produce critical thinkers, but the gradual development of mass education resulted in an emphasis on basic skills development and the standardization of educational practices in America (Resnick, 1987).

The curriculum reform movement of the 1960s encouraged concept development, reasoning, and problem solving through specific teaching methods such as "discovery learning" (Bruner, 1963; Dewey, 1966; Taba, 1962). While many teachers continue to value and utilize these approaches, recent trends indicate other priorities. Prompted by the serious concern that students were not mastering fundamental skills, higher-order thinking became secondary to the "basics" during the 1970s. Test scores reflecting declining higher-order thinking skills prompted school reformers of the 1980s to turn national attention toward the infusion of higher-order thinking skills into the curriculum (Benderson, 1984).

The Rockefeller Commission on the Humanities recommended in 1980 that the U.S. Office of Education include critical thinking in its definition of the basic skills (Ennis, 1987). In 1983, the Education Commission of the States listed critical thinking as "a basic for tomorrow." In line with views of futurists, most of the recent reports indicate that future citizens will require higher-order thinking skills, yet many educators lack an understanding of the skills which need to be developed. Much attention has been devoted to correcting this problem, and these intensive efforts are leading toward changes in teacher education programs for the 1990s.

Conceptions of Higher-Order Thinking

There is a great deal of interest in incorporating thinking abilities into the curriculum despite a great confusion regarding which types of thinking to include, how skills interrelate, and which instructional approaches would be most effective (Presseisen, 1985; Ennis, 1987). The terms higher-order thinking, critical thinking, reasoning, problem solving, creativity, metacognition, and intelligence have all been used to describe different aspects of a common set of cognitive processes. The label "critical thinking" is commonly used by those in higher education (e.g., Pace, 1979).

Within the field of philosophy, Dewey (1933) defined reflective thought as the careful, persistent examination of an action, proposal, or belief, and the analysis or use of knowledge in light of grounds that justify it and its probable consequences. Smith (1953) also emphasized the judgmental aspect of thinking. He defined critical thinking as what a statement means and whether to accept or reject it. In his landmark paper, "A Concept of Critical Thinking," Ennis (1962) elaborated on Smith's definition of critical thinking by delineating skills that called for the application of formal and informal logic. Ennis has since expanded his concept of critical thinking considerably. His most recent expanded skill clusters (1985) include clarifying issues and terms, identifying components of arguments, judging the credibility of evidence, using inductive and deductive reasoning, handling argument fallacies, and making value judgments. Watson and Glaser also identify and evaluate the skills used to think critically around three intellectual clusters:

> 1) attitudes of inquiry that involve an ability to recognize the existence of problems and an acceptance of the general need for evidence in support of what is asserted to be true;
> 2) knowledge of the nature of valid inferences, abstractions, and generalizations in which the weight or accuracy of different kinds of evidence are logically determined; and
> 3) skills in employing and applying the above attitudes and knowledge. (1980b, p. 1)

Within the field of psychology, definitions of higher-order thinking skills tend to place the reasoning skills, proposed by philosophers, within broader frameworks. Psychologists studying general intelligence, such as Piaget, Guilford, and Sternberg, have developed theories about how thinking skills develop and interrelate. Piaget's stages of development, particularly the distinction between formal and operational thought, are often used to differentiate among problems requiring logical reasoning (Joyce & Weil, 1980). However, Piaget's framework of discrete, hierarchical stages of mental development has been strongly criticized on definitional and empirical grounds by philosophers and psychologists (Ennis, 1976; Linn, 1982; Phillips & Kelley, 1975). Guilford's (1956) Structure of the Intellect Model was based on the interrelationship of over 126 intellectual functions. Correlational studies of performance on Structure of the Intellect with intelligence test items have also been criticized on statistical and theoretical grounds (Clarizio & Mehrens, 1985). More recently, Sternberg placed the components of intelligence test items into a problem-solving framework. His triarchic model of intelligence includes skills involved in knowledge acquisition, performance, and metacognitive, self-monitoring skills. Sternberg's theory identifies analogical, inductive, and deductive reasoning skills required to perform both novel and familiar tasks (Sternberg, 1983).

Within the field of education, higher-order thinking has been equated with both a number of specific mental operations as well as a frame of mind (McPeck, 1981). The specific mental operations are those discrete skills which may be supplementary to other learning, while the frame of mind reflects the integration of cognitive processes to the character of the person (Paul, 1985). The attainment of these two dimensions of thinking occurs most successfully when

> . . . these cognitive activities are taught not as subsequent add-ons to what we have learned, but rather are explicitly developed in the process of acquiring the knowledge and skills that we consider the objectives of education and training. (Glaser, 1984, p. 93)

McPeck (1981) agrees that thinking cannot be taught in isolation from any body of content. When thinking skills have become an integrated part of the curriculum, test scores have improved in academic areas (Whimbey, 1985). Many curriculum projects have proposed the use of thinking skills (Bruner, 1966; Taba, 1963; Suchman, 1965; Covington, 1968), but teachers must be trained to support these processes in the classroom environment (Brandt, 1984).

Educational Training of Teachers

Little attention has been given to the issue of thinking skills with regards to teachers, many of whom did not have the benefit of

> . . . systematic cognitive development in their own schooling; they are unprepared to foster

> cognitive skills in their own students; can only partially identify the cognitive structures underlying the curriculum; and sometimes fail to apply systematic thinking to their own daily instructional tasks. (Martin, 1984, p. 68)

Many teachers have been prepared to accept traditional programs and teach in the ways in which they themselves were taught (Smith, 1988). Teachers involved in designing and implementing curriculum which focuses on thinking skills must be personally engaged in thinking (Garmston, 1985). Thus, the development of critical thinking must start with those who teach it (Sternberg, 1987; Swartz, 1987).

Teachers need instruction in higher-order thinking since the school is dependent upon them to implement this change process (Joyce, 1985). Glickman (1987) indicates that to be successful, teachers need to be prepared to critically analyze their knowledge and environment and do more than just dispense facts and concepts in the classroom. Although many teachers are trained during inservice sessions, direct comparisons have been made between the competence of teachers and the quality of their preservice education (Murray, 1986). A study by Fontana (1980) explored the relationship between preservice teachers' ability to plan and implement instruction toward the goal of critical thinking by testing some of the relationships in a model of cognitive classroom interaction. The correlational results supported positive relationships between teachers' critical thinking and teachers' cognitive verbal behavior;

teachers' critical thinking and teachers' cognitive planning; teachers' cognitive verbal behavior and students' cognitive behavior; and teachers' academic success and teachers' cognitive planning. Holmgren and Covin (1984) found that scores on the Watson-Glaser Critical Thinking Appraisal (WGCTA) were also a predictor of professional success for teaching candidates. Phelps (1987) found a substantially significant positive relationship between mental ability and critical thinking among preservice teachers as measured by the Henmon-Nelson Mental Ability Test (College Level) and the Cornell Critical Thinking Test (Level Z). Given this empirical support, those who train, select, and supervise teachers must activate improvements to address the necessary changes in teacher preparation programs (Cross, 1987; Honing, 1985).

The American Association of College Teachers of Education recently passed the following resolution:

> . . . all teacher education programs [should] include course work to enhance future teachers' own higher-order thinking skills, and courses in pedagogy in which teachers will become proficient in ways to enable learners to develop those skills of their own. (Davis & Martin, 1989, p. 7)

Preservice teachers must be taught to create learning environments supportive of thinking skills (Beyer, 1983). This information, however, "seems to be extremely slow in filtering into our teacher training programs" (Beyer, 1987, p. xvi). Teachers must have a solid foundation in thinking

skills if they are expected to teach them. They must know how to make rational use of their own mental processes in order to develop critical thinking skills in their students (Bellanca, 1985; Paul, 1985). Beyond having this knowledge, they must integrate critical thinking attitudes and dispositions into the curriculum by modeling desired intellectual behaviors (Swartz, 1987). It is essential for teachers to be familiar with strategies that elicit and model these thinking behaviors which enhance cognition (Costa, 1981; Joyce, 1985).

Information Processing Functions

Information processing models of instruction help teachers to intelligently structure questions and statements which engage students in particular activities that enhance and improve their thinking (Costa & Lowry, 1989). Information processing models ". . . have two goals: 1) to help students acquire bodies of useful information; and 2) to help students develop thinking skills which will help them to learn on their own" (Eggen, Kauchak, & Harder, 1979, p. 4). These models are effective because they blend the instructional skills with metacognitive and transfer strategies (Bellanca, 1985). The needs that students have for advance organizers, integrating concepts and relationships, and organizing material are supplied (Brophy, 1982).

At the input level, information processing involves thinking operations like identifying, selecting, comparing, contrasting, observing, recalling, comparing, and verifying (Strong, Silver, & Hanson, 1985). At the processing level, the data gathered through the senses and retrieved from long- and short-term memory and teachers' questions prompt students to analyze, compare, classify, and summarize. The output level of the information processing models requires students to use the information in new situations (Costa, 1985b).

Direct involvement with students is necessary in order to teach how to store and retrieve information, match information, and build on previously formed cognitive structures (Marzano & Arredondo, 1986). Strong, Silver, and Hanson suggest that

> . . . the pattern of presentation, questioning, and feedback elicits and reinforces thinking patterns and the ability to discriminate among ideas. It also models techniques that students can use to organize information on their own. (1985, p. 10)

Effective teachers use selective and systematic ways of presenting concepts in small steps, pausing to check for student understanding, and eliciting active and successful participation from all students (Seiger-Ehrenberg, 1985; Rosenshine, 1986).

The information processing models provide specific procedures which teachers can be "trained to follow and

which can lead to increased achievement and student engagement in the classroom" (Rosenshine & Stevens, 1986, p. 376). Preservice teachers must be provided with opportunities to study the theory of information processing models, to see them demonstrated, and to practice them in learning laboratories with critical analysis of videotaped practice teaching sessions if mastery is to occur (Haynes, 1987; Joyce, 1985).

Microteaching

A method of breaking the complex teaching encounter into more easily mastered skills is microteaching. Microteaching provides preservice teachers the opportunity to gradually acquire a repertoire of these teaching skills for later use in the actual classroom (Cooper & Allen, 1971). Features of a typical microteaching sequence include three categories of teaching decisions: planning, teaching, and analyzing. Microteaching places an emphasis on the process of the teaching act. Preservice teachers learn how to facilitate learning by identifying objectives, creating lesson plans, developing questioning techniques, and facilitating learning where the student is participating actively.

A specific information processing model is identified, such as the Concept Reception-Oriented Model (Joyce & Weil, 1980). The "microteacher" creates a short lesson of about five minutes in his or her area of specialization, with the

focus on a very specific concept. The "students" may be fellow trainees or real students. The lesson may be structured to incorporate other fundamental elements of teaching, such as stating an anticipatory set, directing teacher input, modeling, checking for understanding, providing for guided practice, and testing through the use of independent practice (Strong, Silver, & Hanson, 1985). The lesson is observed by the microteaching supervisor, who might also make a videotape recording. The trainee is then given feedback from his or her students and the supervisor (Shore, 1976). Self reflection provides opportunity for metacognitive skills to develop when the trainee is provided with a very structured self-analysis worksheet to complete during the later viewing of the videotape (Barell, 1985).

Preparation for microteaching includes studying information processing theories, viewing modeling tapes, and planning effective lessons. As preservice teachers create the lesson plans, they must comprehend, develop, and use concepts and generalizations; they learn to draw reasonable conclusions about the feasibility of their lesson plans and the examples and nonexamples which they choose; and they generate logical conclusions as they design the total lesson plan. In the final analysis, microteaching provides the opportunity to connect all of the complex interactions which occurred during the teaching act. Viewing of videotapes increases participants' metacognition through increased

awareness of the behaviors which they did not notice at the time of the microteaching interaction.

Preservice teachers who have had this opportunity to practice information processing skills in a microteaching setting emerge better prepared to study their own teaching (Mayhew, 1982). Bellanca (1985) also reports that teachers adopt newly learned skills and use those skills significantly more if they observe each other using the skills and then discuss their mutual experiences. They will also be more prepared to handle classroom situations spontaneously during future teacher encounters (Gallimore, Dalton, & Tharp, 1986; Shavelson & Stern, 1981). Preservice teachers with similar experiences have been found to make more rational choices as they continue their study of particular teaching standards. At Gallaudet College in Washington, D.C., preservice teachers were exposed to an enriched program focusing on the need to include critical thinking in lesson plans. Subjects in the experimental group made improvements on the cognitive abilities measured by an instrument designed specifically for that study (Martin, 1984). Another study was implemented at Ohio State University to investigate the development of critical thinking skills of preservice elementary teachers. Subjects were required to observe, design, and implement learning experiences that included teaching units, questioning techniques, and videotaping. Subjects in the study showed

significant gains in the Recognition of Assumptions subtest of the WGCTA. The WGCTA differences between the pretest and posttest total test scores "cogently approached" the level of significance, which indicates that subjects increased elements of their own thinking abilities (Betres, 1971). Research has also shown that students score higher on tests of critical thinking when their teachers use higher-order methods of instruction (Newton, 1978; Redfield & Rousseau, 1981). Preservice teachers who have increased their critical thinking skills should be better prepared to incorporate the same higher-order cognitive strategies into their own future classrooms.

Microteaching will provide preservice teachers with an understanding of

> . . . the types of activity flow that are created by the teacher, the teacher's structuring information handling and feedback patterns, and the nature of the social system which is generated during the teaching encounter. (Joyce, 1978, p. 70)

Teachers who are appropriately taught may be more prepared to "arrive at rational judgments and perform skillfully and effectively" (Fenstermaker, 1978, p. 175). They will be more adept in reasoning ability and conceptual levels, and thus, they will be more likely to use more complex decision strategies than those teachers who have not developed these skills (Shavelson & Stern, 1981).

Summary

Thinking skills have been part of the educational curriculum throughout the ages, yet, during the past decade, there has been a renewed interest in the development of higher-order thinking skills within schools (Education Commission of the States, 1983; Ennis, 1987). Yet few preservice teacher education programs have systematically incorporated the theory of pedagogy with the cognitive skills emphasis into the preparation of future teachers (Martin, 1984).

It is essential for preservice teachers to be familiar with strategies which enhance cognition (Costa, 1981; Joyce, 1985). Preservice teachers need practice in observing, designing, and implementing lessons based on information processing strategies which utilize thinking operations equated with current definitions of critical thinking (Strong, Silver, & Hanson, 1985; Watson & Glaser, 1980b).

Direct practice with information processing models in microteaching situations suggests to preservice teachers that "reasoning does not end when instruction begins . . . the performance consummates all this reasoning in the act of instruction" (Shulman, 1987, p. 17). Critical thinking skills which have been developed will prepare preservice teachers to move their own future students from "thinking dependence to thinking independence, from inability to ability, from reliance on authority to autonomy" (Strong, Silver, & Hanson, 1985, p. 15).

CHAPTER III

THE RESEARCH METHODOLOGY

The purpose of this chapter is to present the methodology employed in this study which includes:

1. Selection of the Sample;
2. Description of the Materials;
3. Experimental Design;
4. Statistical Procedures Employed in the Study.

1. Selection of the Sample

The Institutional Setting

Located in Cedar Falls, the University of Northern Iowa has been well known for its teacher education program since its establishment as the Iowa State Normal School in 1876. There are currently 1,659 students enrolled in programs leading to teacher certification.

A distinctive feature of the education program is its accessibility to the Malcolm Price Laboratory School. Preservice teachers are required to participate for a minimum of 20 hours at the laboratory school after observing in public schools and before student teaching.

All teacher education candidates must maintain a 2.5 cumulative grade point average, on a 4-point scale, to be eligible to apply for state certification with university recommendation.

The Classroom Setting

Physical classrooms utilized for this study at the University of Northern Iowa were similar. Tables for five to six students helped to facilitate group discussion; overhead projectors were present to aid lectures; and television monitors were mounted in classrooms for viewing the modeling tapes.

The Faculty

Five sections of the required three credit hour course entitled "Nature and Conditions of Learning" were taught by regularly appointed teachers. The researcher evaluated microteaching for all sections and gave supervisory feedback to all subjects involved in this study.

The Subjects

The subjects for this research consisted of 138 education majors. All students who were enrolled in five sections for the required education course entitled "Nature and Conditions of Learning" participated. The course was designed primarily for sophomore and junior level students. The five sections were designed for K-12 majors, secondary majors, and elementary majors. For the purpose of this study, the sections were defined as Group A (K-12 majors), Group B (secondary majors), and Group C (elementary majors). Students may have scheduled the course section due to: availability, instructor, or time of day.

Complete usable data were obtained from 125 subjects who participated in all phases of this study, including the pretest, the treatment, and the posttest, at the appropriate assigned times.

Procedures for protection of human subjects. Subjects were informed that microteaching was a requirement for the course and that their test results from the Watson-Glaser Critical Thinking Appraisal (WGCTA) would be used for research purposes. They were asked to sign a consent form which is required for approval by the University Human Subjects Review Board. Subjects were assured that all information would remain anonymous. (See Appendix A for consent form and letter of university approval.) All 138 students signed consent forms to participate in the research study.

2. Description of the Treatment Materials

Treatment Materials

All students enrolled in the course were assigned readings from the textbook entitled Educational Psychology for Teachers, Third Edition, by Anita Woolfolk (1987). The accompanying study guide was recommended but not required. In addition to the textbook and classroom instruction, subjects involved in this research study received a Microteaching Packet with explicit directions (Appendix B). It included information processing techniques and examples which guided them through the procedure of designing a

deductive lesson plan. Requirements for microteaching described in the packet were further clarified by the instructors during class time.

Microteaching was conducted in a separate classroom, especially designed for videotaping, with two permanently mounted videocameras and two microphones. Feedback rooms were conveniently located near the microteaching classroom.

Testing Materials

Instrument. The WGCTA is a standardized test of critical thinking ability which is frequently used "to measure gains in critical thinking abilities resulting from instructional programs" (Watson & Glaser, 1980b, p. 9). It consists of two equivalent, alternative forms. Each form includes 80 items in a multiple choice format. There are five subtests of 16 items each. The test yields six scores including a total score and five subtest scores. The subtests are represented below:

> Subtest 1: Inference. A measure of ability to discriminate among degrees of truth or falsity of inference drawn from given data.
> Subtest 2: Recognition of Assumptions. A measure of ability to recognize unstated assumptions or presuppositions in a given statement of assumption.
> Subtest 3: Deduction. A measure of ability to determine whether certain conclusions necessarily follow from information in given statements or promises.
> Subtest 4: Interpretation. A measure of ability to weigh evidence and decide if generalizations or conclusions based on the given data are warranted.
> Subtest 5: Evaluation of Arguments. A measure of ability to distinguish between arguments that are strong and relevant and those that are weak or irrelevant to a particular function at issue. (Watson & Glaser, 1980b, p. 2)

Questions on the WGCTA deal with neutral ideas regarding weather and facts, as well as controversial issues such as politics, economics, and social issues. These controversial issues help to give a valid measure of critical thinking as biases must be put aside.

Reliability. To determine reliability of the WGCTA, estimates were made of the test's internal consistency (split-half reliability coefficients ranged from .69 to .85), stability of test scores (test-retest at a three month interval was .73 with means and standard deviations "virtually identical" across time), and scores on alternate forms (r = .75). These reliability estimates are sufficiently high to warrant use of the WGCTA in "group WGCTA administration and research studies" (Watson & Glaser, 1980b, p. 10). Helmstadter reports in the Mental Measurements Yearbook (1985) that a reliability problem may exist due to the fact that four of the five subtests are composed of items with only two alternatives.

Validity. Validity of the WGCTA was determined through construct and content analysis as well as from studies using the revised Forms A and B. In determining the test's content validity, Watson and Glaser state that "it should be noted that there is not general agreement on the definition of critical thinking" (1980b, p. 10); the results, therefore, may only measure a sample of the specified objectives of an instructional program. Caution must be

used when interpreting the scores since the restricted multiple choice format does not measure actual thought processes utilized in determining the answers (Sternberg, 1987). Caution is also warranted when making critical decisions affecting individuals on the basis of this 40 minute group test (Berger, 1985).

Test format. In summary, the WGCTA is regarded as a well constructed test with college norms presented by the type of institution, program of study, and level of academic standing. Despite the limitations, the WGCTA is considered one of the best measurement instruments available for critical thinking (Woehlke, 1984).

3. The Recurrent Institutional Cycle Design

This investigation used as a basic model a quasi-experimental approach: Design 15: The Recurrent Institutional Cycle Design (Campbell & Stanley, 1963). This recurrent institutional cycle design provided control over the longitudinal and cross sectional approaches often implemented in developmental research. The idealized form of Design 15, shown in symbolic representation in Figure 1, is appropriate to situations in which the treatment is given to a group of respondents during a cyclical schedule. Maurice Tatsuoka calls Design 15 "an especially ingenious design" (1969, p. 478). He believes it to be a highly realistic design which is applicable to situations in which a treatment is continually being given to new groups of

students on a recurrent cycle schedule. The design was originally conceptualized in the U.S. Air Force when new cadets entered a training program at regular intervals and all cadets had to be involved in the treatment method. Control groups were not possible. A repeatedly offered training program, such as the one used for this research, in which a new group of participants was "processed" every few weeks, is the ideal situation for this design.

Class A	X	O_1
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Class B		O_2 X O_3

Figure 1. The Recurrent Institutional Cycle Design.

Figure 1 indicates that scheduling is such that a group which has just been exposed to X and a group that is just about to be exposed to X can be measured at the same time. The comparison between O_1 and O_2 corresponds to a static group design. After the second class has completed X, they are remeasured with a posttest. The comparison between O_2 and O_3 corresponds to a one-group pretest-posttest design. The combination of these two designs, the static group design and the one group pretest-posttest design, eliminates most of the problems of internal validity. Where one design

has threats to validity, the other "patches" it up. Design 15, therefore, is also referred to as "the patched-up" design (Campbell & Stanley, 1963, p. 570).

Procedure

Students enrolled in 5 of the 12 sections of the "Nature and Conditions of Learning" course received the microteaching treatment. This treatment entailed the study of information processing, the development of a deductive lesson plan, the implementation of that lesson plan in microteaching, and the observation of and participation in peer lesson plans. Other areas of study in these sections included behavioral theories, cognitive strategies, classroom management, and motivation.

For this study, the design was expanded as shown in Figure 2. Group A represents the first class to participate in the treatment, with O_1 and O_2 representing the pre- and posttests respectively; Group B represents the second class to participate in the treatment, with O_3 and O_4 representing the pre- and posttests respectively; and Group C represents the third class which participated in the treatment, with O_5 and O_6 representing the pre- and posttests. Each treatment extended over an approximate four week time period, with an average of 8.34 hours of classroom contact in addition to the 4.2 hours in the microteaching laboratory (see details in Appendix C).

Group A	O_1	X	O_2		
Group B			O_3	X	O_4
Group C					O_5 X O_6

Figure 2. The design for this study: An expansion of The Recurrent Institutional Cycle Design.

Administration of Instruments

The WGCTA, Form A, was first administered to the subjects. Then the subjects were exposed to the treatment and Form B was administered to the subjects after they had completed the treatment. All tests were administered in the classroom by the researcher, using the directions provided in the WGCTA Manual (Watson & Glaser, 1980b). Selected biographical information was also collected and reported in Table 2 (Appendix D). Students responded on computer scorable answer sheets.

4. Statistical Procedures

Scoring Procedures

Answer sheets for Forms A and B were scored at the University of Northern Iowa Computing Center using the directions given in the WGCTA Manual (Watson & Glaser, 1980b). The total test score and the following subtest

scores were reported: Subtest 1: Inference; Subtest 2: Recognition of Assumptions; Subtest 3: Deduction; Subtest 4: Interpretation; and Subtest 5: Evaluation of Arguments.

Data Analysis

The *t* test for dependent samples was employed to focus on the pre- and posttest differences between the means within the classes. Subscore analyses were also generated, but due to the lack of reliability based on the small number of items on each subtest, generalizations made from the subscore analysis must be interpreted with caution. In Design 15, a cross-sectional comparison is made between O_2 and O_3 and between O_4 and O_5. In this study, that comparison was inappropriate because the groups were distinctively different since enrollment in each section was dependent upon the subjects' teaching major. Two-tailed null hypotheses were tested at the .05 level of significance.

The following sets of null hypotheses were tested:

Null Hypotheses: WGCTA Total Score (see Figure 3).

H_1. There is no significant difference between the mean scores of O_1 (Group A Pretest) and O_2 (Group A Posttest).

H_2. There is no significant difference between the mean scores of O_3 (Group B Pretest) and O_4 (Group B Posttest).

H_3. There is no significant difference between the mean scores of O_5 (Group C Pretest) and O_6 (Group C Posttest).

Group A	O_1	X	O_2		
Group B			O_3	X	O_4
Group C					O_5 X O_6

Figure 3. Design for the testing of the hypotheses.

The three hypotheses were also applied to each of the five subtests: Inference, Recognition of Assumptions, Deduction, Interpretation, and Evaluation of Arguments.

CHAPTER IV

PRESENTATION OF THE FINDINGS

This chapter contains the description and analysis of data which were generated in accordance with the procedures described in Chapter III. The organization of the first part of the chapter is based on the hypotheses tested and is presented in the following sequence:

1. Statement of the Hypotheses;
2. Procedures for Testing of the Hypotheses;
3. Statistical Results of the Testing of the Hypotheses.

The latter portion of the chapter presents a summary of the statistical findings of the study.

1. Statement of the Hypotheses

The results are presented for the following sets of null hypotheses as described in Chapter III: Null Hypotheses: Watson-Glaser Critical Thinking Appraisal (WGCTA) Total Score.

H_1. There is no significant difference between the mean scores of O_1 (Group A Pretest) and O_2 (Group A Posttest).

H_2. There is no significant difference between the mean scores of O_3 (Group B Pretest) and O_4 (Group B Posttest).

H_3. There is no significant difference between the mean scores of O_5 (Group C Pretest) and O_6 (Group C Posttest).

2. Procedures for Testing of the Hypotheses

The differences of means on the WGCTA were tested through the use of dependent group *t* tests. A two-tailed *t* test was computed to test each stated null hypothesis at the .05 level of significance.

3. Statistical Results of H_1, H_2, and H_3

As shown in Figure 4 and Table 1, the dependent groups *t* test between each pretest and its associated posttest was not statistically significant. Therefore, none of the null hypotheses of no significant differences between the means were rejected.

Group A	O_1 X O_2	H_1:	t = -.06 p = .952
Group B	O_3 X O_4	H_2:	t = -.35 p = .725
Group C	O_5 X O_6	H_3:	t = +1.56 p = .121

Figure 4. Summary of the *t* tests of the differences between pretest and posttest means.

Table 1

Statistical Results of the Hypotheses

H	Pre/Post	n	Mean	SD	t value	df	p value
H_1	O_1	28	54.57	7.33	-.06	54	.952
	O_2	28	54.46	5.82			
H_2	O_3	50	57.84	9.38	-.35	98	.725
	O_4	50	57.20	8.76			
H_3	O_5	47	53.36	8.97	+1.56	92	.121
	O_6	47	55.96	7.01			

The dependent group t tests between the subtests of the pretests and the associated posttests were also not statistically significant (Appendix E). None of the null hypotheses were rejected and no significant analysis was made.

Summary

An analysis of the findings generated in the investigation of Hypotheses One, Two, and Three indicated that the microteaching treatments did not significantly increase the critical thinking skills associated with the WGCTA total score. The hypotheses applied to the subtest scores also did not significantly increase the critical thinking skills associated with inference, recognition of assumptions, deduction, interpretation, or evaluation.

CHAPTER V

SUMMARY

The purposes of this chapter are to present:

1. Summary of the Problem, Methodology, and Results Employed in This Study;
2. The Conclusion;
3. The Interpretations;
4. Recommendations for Future Studies.

1. Summary of the Problem, Methodology, and Results Employed in This Study

The major purpose of this study was to investigate the effectiveness of a microteaching program upon the critical thinking skills of preservice teachers. A sample was selected of 125 subjects enrolled in the course entitled "Nature and Conditions of Learning" at the University of Northern Iowa during the Fall 1989, semester.

The treatment entailed the study of information processing, the development of a deductive lesson plan, the implementation of that lesson plan in microteaching, and the observation of and participation in peer lesson plans (Appendix B).

The Watson-Glaser Critical Thinking Appraisal (WGCTA), Form A, was administered to the subjects prior to their exposure to the treatment. Form B was administered to

subjects after they had completed their information processing instruction, lesson plans, and microteaching.

Dependent *t* tests were employed to test the differences between the pretest and posttest mean scores. No statistically significant differences were found; neither were meaningful patterns found among subtest means.

2. Conclusion

The data of this study do not indicate that a microteaching program will increase the critical thinking skills of preservice teachers.

3. Interpretations

The theoretical basis for the treatment, as indicated in Chapter III, supports the belief that the microteaching program could increase the critical thinking skills of preservice teachers. The actual treatment utilized for the study, however, was not explicitly designed to improve critical thinking. Only one portion of the microteaching packet was specifically designed to focus upon deductive reasoning. Other aspects of critical thinking, such as interpretation, recognition of assumptions, interpretation, and evaluation of arguments, were not emphasized (Appendix B).

The WGCTA is considered one of the best measurement instruments available for critical thinking (Woehlke, 1984), yet multiple choice tests do not enable a careful study of "critical thinking generalizability and dispositions which

are theoretically and educationally significant" (Norris, 1988, p. 26).

The four week time period during which the treatment was offered may not have been a sufficient length of time to expect a significant change in the WGCTA scores of the subjects.

4. Recommendations for Future Studies

Further research is needed to develop effective programs to assist preservice teachers to become better critical thinkers. This development must provide a more explicit focus on critical thinking skills rather than to rely upon implicit approaches (Beyer, 1987). In addition, it is recommended that future research should determine whether teachers' critical thinking skills relate to their students' subsequent performance. Immediate, as well as long-range efforts, need to be considered. Other areas of thinking, such as creative thinking, must also be researched to strengthen the development of those skills in the teacher education program.

Test scores from research such as this need to be investigated to determine the types of errors which occur most frequently. The errors made by the subjects should then be analyzed to identify whether particular patterns of misguided reasoning are associated with various teaching majors. Tests are also needed which will focus on actual critical thinking abilities without relying on the multiple choice format.

Educators must take a comprehensive approach to the improvement of teachers' cognitive behaviors and prepare preservice teachers to teach higher-order skills to their own students.

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Appendix A

CONSENT FORM

LETTER OF APPROVAL FROM HUMAN SUBJECTS REVIEW BOARD

CONSENT FORM

I hereby agree to participate in a dissertation research study regarding the critical thinking abilities of preservice teachers. I understand that my test scores from the Watson-Glaser Critical Thinking Appraisal will be kept confidential. Furthermore, my student identification number will only be used to match my pretest scores with my posttest scores, and the use of those scores will in no way identify me as an individual. In addition, it has been made clear to me that refusal to allow my scores to be used in this study will not involve loss of course credit.

I am fully aware of the nature and extent of my participation in this project as stated above and the possible risks arising from it. I hereby agree to participate in this project. I acknowledge that I have received a copy of this consent statement.

_____ _____

(signature of subject) (date)

_____ _____

(printed name of subject) (signature of researcher)

For further information, contact:

Mrs. Trent-Wilson
Education Center 158
University of Northern Iowa

University of Northern Iowa
The Graduate College
Cedar Falls, Iowa 50614
Telephone (319) 273-2748

February 28, 1989

Ms. Vickie Trent-Wilson
Educational Psychology
University of Northern Iowa
Cedar Falls, IA 50614

Dear Ms. Trent-Wilson:

Your project, "The Effects of A Microteaching Program Upon the Critical Thinking Abilities of Preservice Teachers", which you submitted for human subjects review on February 17, 1989 has been determined to be exempt from further review under the guidelines stated in the UNI Human Subjects Handbook. You may commence participation of human research subjects in your project.

Your project need not be submitted for continuing review unless you alter it in a way that increases the risk to the participants. If you make any such changes in your project, you should notify the Graduate College Office.

If you decide to seek federal funds for this project, it would be wise not to claim exemption from human subjects review on your application. Should the agency to which you submit the application decide that your project is not exempt from review, you might not be able to submit the project for review by the UNI Institutional Review Board within the federal agency's time limit (30 days after application). As a precaution against applicants' being caught in such a time bind, the Board will review any projects for which federal funds are sought. If you do seek federal funds for this project, please submit the project for human subjects review no later than the time you submit your funding application.

If you have any further questions about the Human Subjects Review System, please contact me. Best wishes for your project.

Sincerely,

Norris M. Durham, Ph.D.
Chair, Institutional Review Board

cc: Dr. John Somervill, Graduate Dean
Dr. Mary Nan Aldridge

Appendix B

MICROTEACHING PACKET

1989 Revision Fall

MICROTEACHING I

Developing Deductive Reasoning Through Learning Concepts

Information/Processing Theory

Informative Packet
Nature and Conditions of Learning

Dr. J. A. Trout
Dr. S. K. Gable
Ms. V. Trent-Wilson

Table of Contents

II. Procedures

Before you teach, you will need to determine what concept you will be using for your lesson, to plan your visual/auditory materials, and to create a post-test.

1. The name of your concept will be your title. To choose your concept, you will need to identify a particular strand of your content area that you wish to teach. For example, if reading is your general content area, you may wish to teach for reference skills. If science is your major, you may choose a concrete concept.

   Your concept should come from your subject matter area, that is your major or concentration area. The concept should be one that at least four people in your group do not know. You can determine this quickly by asking each member of your microteaching group to select an example of your concept from a group of nonexamples.

2. Prepare an anticipatory set to introduce your lesson. This will focus student attention and develop a readiness for the instruction to follow. This may include how the new material could be used in daily life, or it may be a quick review of material that has already been mastered and is necessary for understanding the new information. (See page 10.)

3. List your behavioral objectives in the manner learned in Measurement and Evaluation class, and then label each one in terms of its category using Bloom's Taxonomy: Cognitive Domain. This should also be communicated to your students so that they will know what it is that they are to be able to accomplish at the end of your lesson. Let students know the purpose of the objectives so that they will know why those accomplishments are important, useful, and relevant to present and future situations.

4. For your instruotional input, list the information (new or already processed) that is needed by the student to accomplish the objectives. Then select the attributes, examples and non-examples, analogy, and mnemonic device which you will use to facilitate memory and understanding. Order your examples according to the principles on page 9.

5. Determine how you will model the concept for the students. Will they get to see examples of a finished product (story, poem, graph) or of a process (kicking a ball, weaving, aerobic exercising)? It is important that your students relate to the examples <u>both</u> visually and verbally and sometimes kinesthetically. Use as many sensory modalities as you can.

6. List, in order, the questions that you will be asking your students. This will check for understanding to determine if the students are truly learning the information essential to achieve the objectives. Get students involved in the learning process by asking questions about the examples and non-examples. (See pages 7 and 8.)

7. Be sure that your mnemonic device and analogy are included in your lesson plan at the <u>best places to assist</u> your students in the learning process. (See page 12.)

8. Allow the students to participate in guided practice. Give them some new examples and non-examples to test after you have already taught the concept. Make sure that responses are accurate and successful before allowing them to take the post-test.

9. The post-test needs to include more <u>new</u> examples and non-examples which are mixed on a separate sheet of paper. (See page 16.)

10. Your method of closure is also very important. <u>Ask the students</u> questions designed to review mnemonic, analogy, and the concept which you have taught. Ask students to participate in the review. You may remind them of how the concept can help them in future activities if there is time.

11. You need to have your visual and/or auditory materials prepared in advance; they must be readable and professional. The more sensory modalities which you can involve, the better your students will be able to learn and remember. Please have visuals on posters, handouts, or on the overhead ... <u>you may not</u> list the attributes on the board due to the time restrictions. Also, remember <u>not</u> to have your examples pre-labeled ... allow for learning to take place "on the spot."

12. Make yourself a name tag using the name you wish to be called by the micro-teachers. The tag should be large enough to be read from a distance of six feet. How will you affix this to your chest, or whatever?

Preparations for Evaluation

13. At least five days before you microteach, please hand in the following materials stapled together for pedagogical approval:

___ 1. Checklist for preparation.
___ 2. Checklist for presentation.
___ 3. Lesson plan as modeled on pages 5 and 6.
___ 4. Post-test, Teacher's Copy. See p. 14.

14. Type or print in ink all papers. Be sure printer ribbon is DARK. Use only one side of each paper.

15. The teaching event:

___ 1. Preparation checklist.
___ 2. Presentation checklist.
___ 3. Lesson plan.
___ 4. Post-test.

Give these to the supervisor when it is your turn to teach. Be sure they are assembled in order and fastened together. They will be returned to you at an announced time and day.

16. Before viewing your tape, it is helpful to have completed the post-test analysis. It may provide helpful clues for determining why a student missed a particular question.

Your tape will be available upon request in the Curriculum Lab at the desk. VCR's are there for your viewing. The tape will be kept there for five class days after your taping session. If you would like a copy of your tape, see Mr. Marchesani in Ed. Center 012 in the basement before the five days are up because the tapes will be erased. Do not remove your tape from the Curriculum Lab because it is the property of ONI.

17. After you have taught, plan to analyze your tape using the form provided. There are some questions about your evaluation of yourself after you have completed the analysis. Also, combine all of the comments of your students on a student evaluation form. Do the same for your observers. Attach your lesson plan and test analysis to the top and hand them in no later than five class days after video taping. Please observe the following order:

___ 1. Presentation Checklist (on top)
___ 2. Preparation Checklist
___ 3. Lesson Plan
___ 4. Post-test (Teacher's Copy)
___ 5. Test Analysis/Conclusions
___ 6. Compilation of Students' Remarks
___ 7. Compilation of Observers' Remarks
___ 8. Task One
___ 9. Task Two
___ 10. Task Three

III. Grading and Attendance

Grading

Your grade for the microteaching project will be the total number of points you acquire on the preparation checklist, the presentation checklist, and points given for all of the components of the lesson which are handed in together with your write up.

Attendance

In order to function as a microteacher and support group, it is imperative for you to attend all video-taping sessions. Your microteaching grade will be _____ points less for each session you miss. Sometimes it is necessary to miss a class. If so, inform your professor well in advance. A letter will be sent to a professor to confirm your attendance at the video sessions at your request. If you work, plan to trade time with someone or make up the time. Your support group is depending on you to serve as student and observer, just as you will need their cooperation while you teach to fulfill all of the requirements of the project.

If you have any questions or are having troubles with your assignment, please make an appointment to talk it over. I am here to guide and assist if the need arises. Please come with your efforts in hand so that I will know "where you are coming from".

Please be aware that there will be some questions I should not answer. You have a model plan, and you will be expected to make some teaching decisions about your material. It is not fair to the class to ask your professor to do your work for you.

I hope the microteaching experiences will facilitate your growth as an educator!

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Name _____

Concept Basement Block Fault

TITLE: Content Outline	Behavioral Objectives Bloom's Classification**	Lesson Plan Example and Non-Example Testing Questions, Analogy, Mnemonic Device, Material, and Review Questions in teaching order
Attributes 1. The rocks are in layers. 2. The bottom or two bottom layers have a normal fault. Define "fault".* 3. The top layers of rock have folded over this fault; they did not break.* Examples: (Pictures) Big Horns Grand Tetons Panamints Non-Examples: (Pictures) Alps Appalachian ranges Himalayas Analogy: The basement block fault is: "Like a fancy table broken from underneath—the table cracks and breaks, and the tablecloth pad, tablecloth, placements, and doilies just slither along. Mnemonic Device: Three words; three "attributes. They are: 1. Basement: Only the bottom layers; doesn't affect the top layers 2. Block: Up and down; no slithering 3. Fault: What it says!	1. The student will be able to list the 3 attributes of a basement block fault. (fill in)** 2. Given four geologic cross sections, the student will be able to tell with 100% accuracy the difference between examples and non-examples of basement block faulting. (fill in)** ** Be sure to classify your objective!	Anticipatory Set: Show postcards of the Tetons and map-fronts of the Himalayas. ("Today we are going to talk about the secret underground life of mountains.") ========== Lesson: 1. Have students read the attributes poster; explain attributes with cross sections of Tetons and Himalayas. 2. Explain an example and non-example using attributes. 3. Present Panamints: Is this Basement Block faulting or not—how do they know? (Reinforce!) 4. Present Alps — Is this a Basement Block Fault? How do you know? (Reinforce!) 5. Present Grand Teton — Are any attributes present in this picture? Is it an example of a Basement Block Fault? (Reinforce!) 6. Present Himalayas — Does this picture illustrate a Basement Block Fault? Why? (Reinforce!) 7. Present Big Horn — Are any attributes present in this picture? What are you saying the Big Horn is? (Reinforce!) 8. Take poster down. ========== Closure: 1. What is the name of the concept that you learned today? 2. What is the mnemonic device? 3. What are the attributes of the concept that you've learned today? 4. What is the analogy? Decide where you will use your analogy and mnemonic device to facilitate student learning.

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Name _____

Concept Palmately Compound Leaf

TITLE: Content Outline	Behavioral Objectives Bloom's Classification**	Lesson Plan Example and Non-Example Testing Questions, Analogy, Mnemonic Device, Material, and Review Questions in teaching order
Attributes 1. One leaf. 2. More than one leaflet. 3. Leaflets come from one specific point. Examples: (Pictures) Horsechestnut leaf Buckeye leaf Non-Examples: (Pictures Basswood leaf Honeylocust leaf Sugar Maple leaf Analogy: The palmately compound leaf is like the hand; it has leaflets which meet at one specific point, just as the fingers meet at the palm. Mnemonic Device: 1 + 1 + 1 = palmately compound 1 = one leaf 1 = more than one leaflet 1 = one specific point	1. The student will be able to list the three attributes of a palmately compound leaf. (fill in)** 2. The student will be able to discriminate between examples and non-examples of palmately compound leaves. (fill in)** ** Be sure to classify your objectives!	Anticipatory Set: 1. Knowledge about nature can be used to impress your guy or girl. Lesson: 1. Read the attributes and explain them (using a poster). 2. Explain an example and non-example using attributes. 3. (Present maple leaf) Is this an example or not? How do you know? 4. (Present buckeye leaf) Which attributes does this meet? (Reinforcer!) 5. (Present honeylocust leaf) Is this an example of a Palmately Compound Leaf? Why? (Reinforcer!) 6. (Present horsechestnut leaf) Does this leaf have any attributes present? (Reinforcer!) 7. (Present basswood leaf) Does this leaf have some attributes present? Which ones? (Reinforcer!) Closure: 1. Take the poster down. 2. Ask a student to repeat the mnemonic device. 3. Ask each student to tell one characteristic of the concept we just learned. (Ask all the different students.) Decide where you will use your analogy and mnemonic device to facilitate student learning.

Practice Exercise: Concept Attributes

An English professor was lecturing on the need to define words more effectively. "Young man," he commanded a student, "define a mammal for me."

"A mammal, sir," the student replied nervously, "has a hard skeleton . . . er, it's hairy . . . and, er, provides milk."

The professor considered this, and fixed him with an icy stare. "So far," he snapped, "you haven't eliminated the coconut."

Practice Exercise: Listing Concept Attributes

We have listed a series of concepts below. Read them and then list the defining attributes of each concept. You may check your responses against ours at the bottom of the page.

1. envelope

2. clock

3. distillation

4. opera

5. referendum

6. over

7. estrange

8. harmony

Answers:

1. encloses other objects, nonrigid.
2. tells time.
3. uses heat, separates chemical substances.
4. staged play, major part of story conveyed by song.
5. popular vote, decides public issue.
6. immediately above another object, not touching other object.
7. alienated, removed from.
8. agreement, pleasant arrangement.

As you can see, the defining attributes of these concepts vary from very simple to moderately complex. If you want to consider one that is really complex, try to obtain your class's consensus on the defining attributes of "love."

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Name _____ Section _____

Concept _____

Selecting Attributes, Examples, and Non-Examples

1. List the critical attributes, only those necessary to identify an example.

Critical Attributes

2. Select six examples, write them out, and provide a rationale for each selection. Use additional paper if necessary. Do not write on the back of this sheet. (See Use of Examples. p. 9)*

Examples*	Rationale

3. Select five non-examples, write them out, and provide a rationale for each selection. (See Use of Examples, p. 9)*

Non-Examples*	Rationale

*If you have objects, use the names of the objects like the lesson plans on pages 5 and 6.

Use of Examples in Concept Learning

When a teacher is explaining a difficult idea to a group of students, he is likely to be asked for examples and illustrations. An abstract idea is easier to understand when it is related to a concrete illustration. If the teacher cannot provide an illustration, the students may be unable to comprehend the idea, and they may wonder if the teacher understands it.

Because concrete images are necessary for understanding new and difficult concepts, the use of examples is basic to good teaching. The purpose of this exercise is to enable you to practice the use of examples and illustrations when conveying new concepts to students.

The deductive approach consists of three basic steps. First, the teacher states the concept or principle he/she wants the students to understand. Second, the teacher gives examples which illustrate, clarify, or substantiate the idea. The teacher may do this orally, by way of analogy or metaphor, or may use a written or visual illustration, such as a book, a picture, an experiment, or the solving of a problem. Third, the teacher relates the example back to the main idea; or he may ask the students to give examples and relate them back to the main idea if it is relevant.

Guidelines: The following are guidelines for the effective use of examples:

1. Start with the simplest examples. Work from simple examples to complex ones. A basic principle of concept formation is that examples given to illustrate a concept confront the learner with a complex sorting task. Some of the information conveyed by the example is relevant; some is not. If you begin with complex examples, the students may become confused by excess information and miss the point. Therefore, begin with simple examples and work up to complex ones, emphasizing only the relevant aspects of each.

2. If examples are not within the range of the student's experience and knowledge, then they are useless as illustrations of a concept. How do you know that an example is appropriate for your students? This information is a function of your familiarity with your students' backgrounds. The more you know about your students, the more you will be able to select relevant examples.

3. After presenting some examples, sharpen your students' understanding by offering an irrelevant example--one that has no relation to the concept. In other words, once the students have acquired a basic understanding of the concept, present them with examples that do not illustrate the concept. This use of "non-examples" helps students discriminate between the concept you are teaching and other, similar concepts. However, do not include a non-example too early in the presentation. Wait until the students are likely not to be confused by it.

4. Don't assume that the more examples you give the better the students will understand the concept. Unless the additional examples illustrate new aspects of the concept, or provide more information about it, they will add nothing to the students' understanding.

5. Remember that the point of using examples is to illustrate, clarify, or substantiate an idea. Therefore, you must relate the examples to the idea. Don't assume that students will automatically connect examples they are given with an idea. One way is to relate the examples to the idea yourself, then have the students do it.

6. One way to make sure that students have understood a concept is to ask them to give you additional examples of it, only when appropriate. If their examples are good, they have probably grasped the concept. If their examples are faulty, they have probably misunderstood, and you can adjust the lesson accordingly.

Anticipatory Set

Definition

A set is a pre-disposition to respond. An anticipatory set is your introduction to the day's lesson. Its general purpose is to elicit attending behavior (deliberate focus) and a mental readiness for the remaining instruction.

The anticipatory set has several, more specific functions:

1. It may arouse curiosity or snag student interest.
2. It may help students to remember previously-learned information.
3. In many cases, it provides a link between familiar, known, or already learned material and new, difficult, or more abstract information.
4. It can connect material to be learned with the learner's cognitive structure. This purpose acts like a cognitive road map which guides the student over the new content to be learned.

Examples

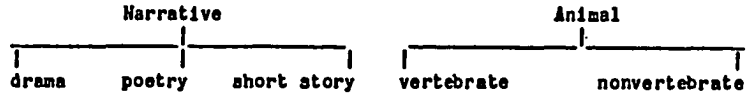
1. Advanced Organizers

   a. An analogy upon which the rest of the lesson is based. (e.g., Rationalization is like armor because it is a defensive, protective cover of the individual's self-esteem.

   b. A broad concept defined upon which the lesson is based. (e.g., Landforms are land surfaces that have characteristic shapes and composition. Today we are going to learn about several types of land forms.

   c. A broad generalization which will be discussed during the lesson. (e.g., The more technology and knowledge that humans acquire, the less limiting are the influences of nature on human life.

   d. A concept map:



   e. A brief outline which breaks down major ideas into smaller related ideas.

   f. A brief practice or review on previously achieved and related learning. (e.g., Yesterday we learned that power is the ability to control or influence the behavior of others, and it is derived from the possession of resources such as money, communication skills, and the control of information. Today we are going to talk about a kind of power--legitimate power.)

   g. Brief review or information about a word that occurs in the fact, concept, or generalization which students do not know. (e.g., Sphere, vertex, subordinate, assimilation, corrosion.)

2. The Use of Interest or Attention Grabbers

   a. Use of curiosity-arousing materials. (e.g., Picture of life in other countries, art, music.)

   b. A curiosity-provoking experiment or paradox. (e.g., An experiment in which food coloring is added to a beaker of hot and cold water. A simulation or simple game.)

   c. Humor, such as a cartoon, joke, or riddle, etc., which is related to the material. (e.g., Flatworms are lowest of all the worms! Today we are going to learn more about one of UNI students' favorite pastimes ... looking at body types.)

   d. Demonstration. (e.g., How to dribble a ball effectively [or ineffectively], hem a garment, set up an experiment, write a poem, or solve a problem.)

   e. Ways in which material may be useful in real life. (e.g., "If you go to a garage sale and purchase a plate for 25 cents, it might be worth $200; today we are going to talk about a type of china." "Today's lesson may help you pass these very important and equally dreaded writing competency exams.")

When creating your anticipatory set, be sure to remember these three criteria:

1. Keep in mind you will seldom include all the possible purposes of anticipatory sets. You will need to determine which purpose(s) you want to include.

2. Your decision should be based on:

   a. difficulty of content.

   b. students' readiness level.

   c. how motivated you feel the students are to learn the material.

3. The anticipatory set should be brief so that the major portion of instructional time is available for the accomplishment of your objectives for the lesson.

Teaching with Analogies: Bridges from Known to Unknown

Analogies

An analogy is a way of explaining something by comparing it to something else. Most Americans know what a baseball game is. A baseball game is an easy idea for us to understand. An author may point out the similarities between games and life, specifically, how the rules of baseball are similar to the culture of a society. Both the rules and culture have to be understood by everyone if baseball and society are to be "played." By comparing culture in society to something simple, the author helps us to learn more about a complex subject.

If you look at an analogy very closely, it will not always make sense. Comparing every aspect of the rules in a baseball game to culture in society will be confusing. A baseball game is not identical with life. Can you think of how they are different? Does life have nine innings? A seventh-inning stretch? Does life stop when it begins to rain? Of course not. Although there are many differences between games and societies, there are enough similarities to compare them. Because they both need rules in order to work properly, they can be compared in a general way.

A teacher who is using an analogy will try to point out as many of the similarities as possible. The teacher will stress all the ways in which the two things being compared are alike, rather than different. The teacher may mention that each rule is important to the entire baseball game, just as each aspect of culture is important to the entire society. Then the teacher can state that you cannot play baseball with someone who doesn't know the rules. You then have to change the game. The teacher can use this idea to show how culture changes because of new "players" arriving. If the culture changes, then so does society. Someone using an analogy will mention as many points of comparison as possible.

To be effective, analogies must be simple. Similes, metaphors, even jokes are very simple kinds of analogies. Have you ever used the simile "I am as hungry as a bear"? or heard the metaphor "The flu bug is all over school"?, or asked the joke "Why is an unglued book like a tree?" All three try to describe something by comparing it to something else. That idea is the basis of all analogies. An analogy is like trying to match up a square to a rectangle. Although they don't match exactly, they meet in most places.

We must also think of something else when we are using analogies. A teacher should make sure that whatever he or she is using as a comparison is recognizable to everyone expected to read it. Would you have understood the analogy if the teacher had compared life to jai alai? Maybe not. If you knew that jai alai was a game, you could have assumed it had rules like other games. But if you had never heard of it before, the analogy would be useless. If you are going to use an analogy, make sure the thing used as the comparison is recognizable. Which is easier to understand: "Life is like basketball" or "life is like tlachtli"? If you have to look tlachtli up in a reference book, forget about using it in an analogy!

What do we know about analogies?

We know they are comparisons that help us understand something difficult. We know that although there can be differences, the similarities between the two things should be easy to identify. We know that the teacher using an analogy will mention as many similarities between two things being compared as he or she can, and that the analogy must be simple as well as recognizable to all the students.

Read this analogy. The human heart works like a pump.

Do you think this is a good analogy? Would you like to know more about the similarities of the heart and the pump? Do you know how a pump works? Do you think some people would understand this analogy easier than other people? In what ways are the heart and a pump different?

"The shell of a crustacean is like an armored tank. Just as the tank protects the man inside, the shell protects the animal inside." This analogy highlights similarities between a thing that is already understood and a thing that is not, thus, bridging the gap between the known and the unknown.

Post-Test and Test Analysis

Have you taught?
Did your students learn?
If they did NOT learn, did YOU teach?

Post-Test

In order to answer these important questions, it will be necessary to construct a post-test. The questions must tell you if your students met your objectives (see your lesson plan). Do not use true-false or multiple choice items for this brief test. Refer to your text in 25:050 for helpful suggestions to assist you.

You will need enough typed copies of your post-test for each of your students (4). In addition, a teacher's copy, with answers written in, should be submitted in advance with the rest of your preparation materials.

Test-Analysis

In order to analyze your test results, it will be necessary to use a matrix like the example on the next page. You will note that the questions are listed at the left of the grid, and the students' names are given across the top of the matrix. Also at the top of your test analysis, you will list your first behavioral objective and its classification according to Bloom's Cognitive Taxonomy. Do the same for the remainder of your test items and objectives. Then indicate which questions were missed by which students. Use a plus symbol (+) to indicate correct responses and a minus symbol (-) to indicated incorrect responses. By marking which questions were missed (-) and which ones were not missed (+) by each student, you should be able to write your conclusions about your test.

Conclusions

You are now ready to write your conclusions about the test, your students, and your teaching by answering the following questions on a separate sheet of paper.

1. Was each student able to respond correctly to all of the items? If you answered the above question with yes, describe the reasons why this was true. Some ideas may come from student, observer, and supervisor comments as well as your own.

2. If all students were not able to respond correctly to all the items, describe which questions were missed and which students missed questions.

3. Give several reasons why items may have been missed and/or why students may have missed items based on analysis of tape, observations, etc.

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Behavioral Objectives

Behavioral Objectives	Classification & Test Question (Bloom's Taxonomy)		Student Name	Student Name	Student Name	Student Name	Total Correct
1. At the end of the lesson the student will correctly list the 3 attributes of woven fabrics.	Knowledge 1. List the attributes of woven fabrics.		+	+	+	-	3
2. At the end of the lesson the student will be able to discriminate between new examples and non-examples of woven fabrics and will be able to indicate which attributes are present.	Comprehension 2. Indicate which of the samples are examples of woven fabric and which are not. Tell why.						
		a. wool	+	+	+	+	4
		b. polyester	+	-	+	+	3
		c. silk	+	-	+	-	2
		d. linen	+	+	+	+	4
		e.					
		Total Correct	5	3	5	3	16

Conclusions:

Answer the questions on page 15 in this packet on a separate sheet of paper.

Cueing Strategies

A requirement for cueing is that sufficient time and content be given to allow the student to respond correctly. The goal is to give the minimum amount of time and information the student needs. But the exact minimum is rarely known. If the teacher is in doubt, remember that it is better to over-cue than to under-cue. Instead of an unsuccessful experience, the student will have a successful one.

1. Individual vs. Group: The teacher can decide whether to cue individuals or the group. The advantage of cueing an individual is that the teacher can select the individual who needs a successful learning experience and the benefits of peer recognition. If the teacher wants to cue the class as a group, he might start using successive approximations. In other words, he might cue the group as a whole and ask each person to raise his hand when he is ready to respond. He could then continue to give cues until a certain percentage of the group feels confident about answering the question. At this point, he might ask one of the students to respond. Or he might ask all the students to write out their answers and hand them in. There are many possible variations to this procedure.

2. Public vs. Private: The teacher must decide whether to cue individuals in public or in private. If the teacher is going to call on a shy student, he might want to cue in private. The teacher should experiment with both public and private cueing.

3. General vs. Specific: The cues a teacher gives may be highly specific or very general in nature. With poorer students, the teacher probably would want to use specific cues. With good students, general cues will force them to root out the specifics for themselves.

4. Successive Approximation: Employing this strategy, the teacher offers more and more cues to the student until he gives a correct response. For example, if after receiving several cues the student still does not respond, either correctly or incorrectly, the teacher continues to give cues until the student responds. Once the student responds, the teacher still gives cues to shape the student's thinking. All the while, the student is reinforced for favorable aspects of his response, even if the response is generally incorrect. As a result of this process, the student will eventually respond correctly. At this time, the teacher should reinforce the student with praise. Because this strategy is often a long process, it tends to be more feasible in tutorial situations than in classroom situations.

5. Best Guess: Using this strategy, the teacher makes guesses concerning how much time and how much information the student needs in order to make a correct response. Cues may be given the day before or on the same day the teacher wishes the student to respond.

In a seven-minute lesson, it is difficult to use each of the cueing strategies. The teacher should select one or two techniques for each micro-teaching session. Perhaps, more than any other skill in this package, cueing requires knowledge of the students for its fullest effectiveness. However, the techniqus can still be practiced in a microteaching situation. When a student doesn't know an answer or responds incorrectly, CDR and reinforce!

Probing.

Teacher: Would you say that nationalism in Africa is greater or less than it was 20 years ago?
Student: Greater.
Teacher: Right. Why is that so?
Student: Because there are more nations now.
Teacher: That's right, too, but that's only part of it. Can anyone else give some more reasons?
Class: (Silence)
Teacher: Well, basically, it's because ...

A teacher wants the class to discuss a topic. When asking a question and receiving a cursory answer, it adds next-to-nothing to the discussion. The discussion drags. It evolves into an unprepared lecture. In many cases, this is the teacher's fault. The questions asked may be embarrassingly simple. However, it may be that the students are shy, afraid of answering incorrectly, or just naturally taciturn.

Effective teachers keep discussions going by asking questions that require more than superficial answers. The teacher does this in two ways. One is to <u>forestall</u> superficial answers by asking questions to which such answers cannot be given. This is what higher order questions do. The other approach is based on techniques that may be used <u>after</u> a student has given a superficial response. By probing, the teacher requires the student to go beyond his first response. His cue is the student's response. Once it has occurred, the teacher, instead of advancing to another question, probes the student's response by means of one of the techniques outlined below.

More than any other skill in this cluster, probing will require you to give an unrehearsed response. Because the probe depends on the student's response, you will rarely be able to prepare probing questions in advance of the lesson. However, by practicing probing questions with a variety of responses, you can develop a repertoire of question formats to apply, when appropriate, in the classroom.

The probing techniques outlined below can be used in any situation where student participation is necessary to realize the goals of the lesson. A given technique, of course, may be appropriate in one situation but not in another.

1. <u>The teacher seeks clarification</u>. He may ask the student for more information, or clarification, by saying:

   a. "What, exactly, do you mean?"
   b. "Please rephrase that statement."
   c. "Could you elaborate on that point?"
   d. "What do you mean by the term ...?"

2. <u>The teacher wants the student to justify the response</u>. Examples of appropriate probing questions are:

   a. "What are you assuming?"
   b. "What are your reasons for thinking that is so?"
   c. "Is that all there is to it?"
   d. "How many questions are we trying to answer here?"
   e. "How would an opponent of this point of view respond?"

3. The teacher refocuses the response. If a student has given a satisfactory response, it might seem unnecessary to probe it. However, the teacher could use this opportunity to refocus on a related issue. Examples of probing questions that might also refocus the response are:

   a. "Can you relate this to ...?"
   b. "Let's analyze that answer."
   c. "If this is true, what are the implications for ...?"
   d. "How does John's answer relate to ...?"

4. The teacher prompts the student. The teacher gives the student a hint to help him answer the question.

   Teacher: "John, is this an arachnid?"
   John: "No." (Incorrect answer.)
   Teacher: "Which of the attributes are present?"
   John: (After going through each) "All of them."
   Teacher: "Then, what can you conclude?"
   John: "It's an arachnid!"

5. The teacher redirects the question. This is not a probing technique, per se, but it does help bring other students into the discussion quickly, while still using probing techniques. The teacher changes the interaction from him/herself and one student, to him/herself and another student:

   Teacher: "Is this a mammal?"
   Sam: "Yes."
   Teacher: "Mary, do you agree?"
   or
   "Mary, can you add to Sam's answer?"

These techniques have two main characteristics in common:

1. They are initiated by the teacher immediately after the student has responded.

2. They require the student to think beyond the initial response.

Kinds of Positive Reinforcement

Several kinds of positive reinforcement are available to the teacher:

1. Positive verbal reinforcement occurs when the teacher immediately follows a desired student response with such comments as "Good," "Fine," "Excellent," "Correct," or other statements indicating satisfaction with the response.

2. Positive nonverbal reinforcement occurs when the teacher, in responding to a desired student response, nods his head affirmatively, smiles, moves toward the student, or keeps his eyes on the student while paying close attention to the student's words. The teacher may write the student's response on the chalkboard or otherwise nonverbally indicate pleasure at the student's response.

3. Positively qualified reinforcement occurs when the teacher differentially reinforces, either verbally or nonverbally, the acceptable parts of a response, as in the following example:

   Teacher: John, how is yellow fever transmitted?

   John: I think it is transmitted by flies.

   Teacher: You're right, it's an insect that carries the disease, but it isn't a fly. What is it?

4. Delayed reinforcement occurs when the teacher emphasizes positive aspects of students' responses by redirecting class attention to earlier contributions by a student, as in this example:

   Teacher: Class, which side would you have expected the English industrialists to support during the Civil War: the South or the North?

   Class: The South. The North. (Class is divided.)

   Teacher: Jane, do you remember earlier in the class you mentioned one of the leading industries in England?

   Jane: Yes, it was clothes-making.

   Teacher: Does that give anyone a hint? (Cue)

   Sam: They supported the South because they wanted the cotton the South grew for making clothes.

5. Teacher: Good, Sam. That was a good deduction. (Praise with a reason.)

Note here that both Jane and Sam have been reinforced by the teacher--Jane, because the teacher drew the student's attention to her earlier contribution and asked her to repeat her statement; Sam, because the teacher praised him for deducing the answer to the original question.

Skill Drill: Reinforcement

Directions

Listed below are a number of classroom situations in which student responses require some kind of reinforcement. After studying each of the situations, write the reinforcing comment(s) you would make and any nonverbal reinforcement you would use. Think up three different reinforcers for each situation. Do not use a reinforcement you have used for a previous situation. Practice a variety.

Situation 1

You have been discussing with the class the technique for bisecting an angle. For the last 15 minutes you have been circulating around the room while the students practiced the technique. You arrive at John's chair. He is a "C-" student who is easily discouraged. He has completed more practice exercises than anyone else, and all of them are neat and correct. John looks up and asks, "Teacher, how are these?"

Situation 2

Three weeks ago you assigned book reports. They were turned in yesterday. Last night you read five. Among them was one by Sue, one of the brightest girls in the class. It was an analytical essay on Joseph Conrad's Lord Jim. It was well written and quite perceptive. Today, before the class begins, you are sitting at your desk when Sue walks into the room.

Situation 3

During a class discussion, a shy, withdrawn student named Jim starts to raise his hand to make a comment, but then changes his mind and lowers his hand.

Situation 4

During a class discussion, Mary, an average student with no known emotional problems, attempts to answer a question. Her answer is generally on the right track, but it includes several errors.

Situation 5

You are handing back a homework assignment. When you get to Sue, you remember that she didn't do very well on it. She seems to have ignored some basic points. You have been concerned with her work for some time, for it has been sloppy and irregular.

Situation 6

During a class discussion, Kim asks a very pertinent question. You remember that Frank wrote a report last semester on that very topic. (Reinforce both students.)

Situation 7

A student is attempting to answer a question you asked the class. He is doing a good job, and you want him to know that you think it's a good answer. But you don't want to interrupt him.

Situation 8

Alex has come up to your desk after class and volunteered to do an oral report on an esoteric topic mentioned briefly in class. He doesn't usually do this sort of thing. You want to take advantage of his interest.

Some Social Reinforcers

(That can be delivered immediately to children and young adults)

Children	Young Adults and Adults
Nod	Nod
Smile	Smile
Pat on shoulder, head, knee	Laugh (with, not at)
Wink	Wink
Signal or gesture to signify approval	Signal or gesture approval
Touch cheek	Orient glance directly towards his face
Fulfill requests	Give assistance when requested
Tickle	Comment positively on appearance
Say:	Pat on back
yes	Ask individual to discuss something before group
good	Ask individual about items of interest to him
fine	Ask him to demonstrate something
very good	Say:
very fine	very good
excellent	O.K.
marvelous	beautiful
at-a-boy	good for you
good boy (girl)	_____ is excellent
right	yeah
that's right	right
correct	I agree
wonderful	good idea
I like the way you do that	fine
I'm pleased with (proud of) you	what a clever idea
that's good	you really are creative, innovative, and so on
wow	see how you're improving
oh boy	that looks better than last time
very nice	keep up the good work
good work	you've apparently got the idea
great work	little by little we're getting there
great going	see how _____ has improved
good for you	mmmmmm
that's the way	you're really becoming an expert at this
much better	do you see what an effective job _____ has done
O.K.	you are very patient
you're doing better	I admire your persistence, courage, idealism, enthusiasm, dedication, and so on
that's perfect	
that's another one you got right	
you're doing very well	
look how well he (she) did	
watch what he (she) did. Do it again	

Revised Spring 1989

Name _____ Section _____

Tape Numbers _____ Date _____

Checklist - Deductive Lesson Concept

Preparation: Lesson Plan and Post-Test

___ 1. Did I list a concept?

___ 2. Did I list the attributes?

___ 3. Did I list examples and non-examples?

___ 4. Were my examples and non-examples mixed together?

___ 5. Did I list an analogy that helps students go from concrete to abstract understanding?

___ 6. Did I list a mnemonic device?

___ 7. Did I insert the analogy and the mnemonic device into the lesson where they would best facilitate learning?

___ 8. Did I list behavioral objectives?

___ 9. Did I classify them using Bloom's Cognitive Taxonomy?

___ 10. Did I include an anticipatory set?

___ 11. Did I list questions in sequential order to enable students to test examples and non-examples?

___ 12. Did I include an effective closure?

___ 13. Did I include a copy of my post-test with new examples and non-examples?

___ 14. Have I provided for a student-involved review for closure?

Name _____ Section _____

Tape Numbers _____ Date _____

Checklist - Deductive Lesson Concept

Presentation:

___ 1. Did I have visual, hands-on, and/or oral materials (attribute poster, examples and non-examples) to help the learning process?

___ 2. Are my visual/oral materials readable/audible/professional?

___ 3. Did I use an anticipatory set?

___ 4. Did I communicate the objective(s) and its purpose to the student?

___ 5. Did I use a mnemonic device?

___ 6. Did I incorporate the mnemonic device and analogy to promote recall?

___ 7. Did I use an analogy?

___ 8. Did my analogy facilitate understanding?

___ 9. Did I provide guided practice by allowing the students to test examples and non-examples?

___ 10. Were my examples and non-examples arranged in an order to facilitate understanding?

___ 11. Did I reinforce student's responses?

___ 12. Did I use a variety of reinforcers? Did they sound genuine?

___ 13. Did I check for understanding?

___ 14. Did I cue students (when appropriate) by giving hints to help students answer correctly?

___ 15. Did I ask the students to review the attributes at the close of my lesson? (Take down poster!)

___ 16. Did I have a meaningful closure to my lesson?

___ 17. Did I have any distracting personal mannerisms?

___ 18. Did I generate enthusiasm about learning? About teaching?

Warm Fuzzies:

3

Concept _____ Name _____

Section _____

Selecting Attributes, Examples, and Non-Examples

1. List the critical attributes.

Critical Attributes

2. Select six examples, write them out, and provide a rationale for each selection. Use additional paper if necessary. Do not write on the back of this sheet. (See Use of Examples, p. 9)

Examples	Rationale

3. Select five non-examples, write them out, and provide a rationale for each selection. (See Use of Examples, p. 9)

Non-Examples	Rationale

Concept _____ Name _____

Lesson Content	Behavioral Objectives Bloom's Classification	Lesson Plan Example and Non-Example Testing Questions, Analogy, Mnemonic Device, Material, and Review Questions in teaching order.
Attributes:		Anticipatory Set:
Examples		
Non-Examples		
Analogy		
Mnemonic Device		

over

5

Concept _____ Name _____

Lesson Content	Behavioral Objectives Bloom's Classification	Lesson Plan Example and Non-Example Testing Questions, Analogy, Mnemonic Device, Material, and Review Questions in teaching order.

Closure

6

Name _____

Post Test

Directions:

7

Post Test Analysis Matrix

Behavioral Objectives	Classification & Test Question (Bloom's Taxonomy)	Student Name	Student Name	Student Name	Student Name	Total Correct
1.						
2.						
4.						
	Total Correct					

See pp. 16-17 in information packet for instructions to complete the analysis.

8

Summary of Student Remarks/Deductive Lesson

Concept _____ Student _____

Teacher _____ Date _____

1. How did the analogy contribute to your understanding?

2. How did the mnemonic device help you to remember?

3. How did the teacher motivate my learning?

4. In what ways did "teach" involve you in the lesson? In what ways was this helpful?

5. How would you rate <u>your own</u> behavior? (Did you answer questions, let "teach" know when you didn't understand, volunteer to answer, etc.?)

Very Reluctant	Only When Called On	Involved	Super Student

6. How would you rate your teacher's enthusiasm on a scale of one to five?

Robot	Needs Improvement	Some	Pretty Good	Chirpy & Burpy

7. What could "teach" have done to make learning more effective?

8. I enjoyed your micro-teaching because (or some other warm fuzzy--with a real reason!):

9

Summary of Observer Remarks/Deductive Lesson

Concept _____ Observer _____

Teacher _____ Date _____

1. Did "teach" directly relate a specific example and a non-example to the main attributes? Did "teach" have students test examples and non-examples?

2. What did the teacher do to motivate student learning?

3. What did "teach" do to make the lesson easy to learn and understand? What was done effectively?

4. How would you evaluate the teacher's preparation and organization?

5. What could "teach" have done to make learning more effective?

6. How would you rate the teacher's enthusiasm on a scale of one to five?

Robot	Needs Improvement	Some	Pretty Good	Chirpy & Burpy

7. I enjoyed your microteaching because (or some other warm fuzzy--with a reason--a real one!):

10

Task One: Deductive
Viewing/Listening Guide

This guide is designed to assist you in structuring your tape viewing/listening so that this feedback component of the teaching laboratory will be of maximum benefit to you. Choose someone from your group to analyze your tape with you. You may wish to review the tape more than once.

1. List each different reinforcer that you used and count the number of times you used each one. Do not use "OK" as a reinforcer (see item #7 below).
   Reinforcer/reasons:

   _____ |__| _____ |__| _____
   _____ |__| _____ |__| _____
   _____ |__| _____ |__| _____

   Total |____|

2. Tally each time you do not reinforce a student's contribution.
   Total |____|

3. Tally each time you verbally <u>cue</u> someone.
   Total |____|

4. Did I allow the students at least five seconds before giving a cue?

   _____ Yes _____ No

5. Tally each time a student is unable to answer a question because you didn't <u>cue</u>.
   Total |____|

6. List students' name and tally every time you called on each.

   _____ _____
   _____ _____

7. Tally each time you used some distracting mannerism (e.g., fiddling with hair, standing on one leg, 75 OK's, etc.) What were they?
   Total |____|

8. How would you evaluate your enthusiasm on a scale of 1-5?

Robot	Needs Improvement	Some	Pretty Good	Chirpy & Burpy

11

Task Two: Instructional Input Analysis

Review task one, student/observer comments, test analysis, and supervisor comments. What are your strengths? How did you help students process information? Supply the sources of evidence of each of your behaviors (see A). Then supply the reason for exhibiting these effective behaviors (see B).

A. List behaviors that helped students process information	B. How did each behavior help students to learn?

Task Three: Reflection

1. Did this lesson increase <u>your</u> conception of your competency? Explain.

2. If you were going to reteach the lesson, what specific changes would you make in order to improve it?

Grade: These will be filled in by your professor:

_____ Preparation

_____ Presentation

_____ Write-Up

_____ TOTAL

Comments:

Student Remarks/Deductive Lesson

Concept _____ Student _____

Teacher _____ Date _____

1. How did the analogy contribute to your understanding?

2. How did the mnemonic device help you to remember?

3. How did the teacher motivate my learning?

4. In what ways did "teach involve you in the lesson? In what ways was this helpful?

5. How would you rate <u>your own</u> behavior? (Did you answer questions, let "teach" know when you didn't understand, volunteer to answer, etc.?)

Very Reluctant	Only When Called On	Involved Student	Super

6. How would you rate your teacher's enthusiasm on a scale of one to five?

Robot	Needs Improvement	Some	Pretty Good	Chirpy & Burpy

7. What could "teach" have done to make learning more effective?

8. I enjoyed your micro-teaching because (or some other warm fuzzy--with a real reason!):

Observer Remarks/Deductive Lesson

Concept _____ Observer _____

Teacher _____ Date _____

1. Did "teach" directly relate a specific example and a non-example to the main attributes? Did "teach" have students test examples and non-examples?

2. What did the teacher <u>do</u> to motivate student learning?

3. What did "teach" do to make the lesson easy to learn and understand? What was done effectively?

4. How would you evaluate the teacher's preparation and organization?

5. What could "teach" have done to make learning more effective?

6. How would you rate the teacher's enthusiasm on a scale of one to five?

Robot	Needs Improvement	Some	Pretty Good	Chirpy & Burpy

7. I enjoyed your microteaching because (or some other warm fuzzy--with a reason--a real one!):

Appendix C

TIME SCHEDULE

TIME SCHEDULE

The proposed research, as outlined in these pages, was conducted during the Fall of 1989. The timetable for each group is represented below:

Group A (Monday - Wednesday - Friday sections)

Pretest: September 8

Microteaching: September 11-October 6

Posttest: October 9

Group B (Monday - Wednesday - Friday sections)

Pretest: October 9

Microteaching: October 11-November 3

Posttest: November 6

Group C (Tuesday - Thursday sections)

Pretest: November 2

Microteaching: November 7-December 5

Posttest: December 12

Appendix D

BIOGRAPHICAL DATA FOR WGCTA ANSWER SHEETS

RESULTS BASED UPON BIOGRAPHICAL DATA

BIOGRAPHICAL DATA FOR WGCTA ANSWER SHEETS

Please remove the answer sheet without opening the test booklet. In the section labeled "Name," print your name--last name first. Skip a space, print your first name and then your middle initial. PAUSE . . . code your name by filling in the appropriate letters under your name. PAUSE.

In the section labeled "Birth Date," please fill in and code your birth date.

In the section labeled "Identification Number," print your student number in the boxes A-F. Do NOT skip any spaces or use dashes. Then code your student number in the spaces below it. PAUSE.

In the box labeled "K," print an A for the code on your test booklet. Code A as 1 in the space below.

Under the section labeled "Special Codes," under the letter "L" print "M" for male or "F" for female. Code M as 1, code F as 2 by filling in the number below.

In the box labeled "M," print and code one of the following numbers that describes your current class rank:

Freshman = 1

Sophomore = 2

Junior = 3

Senior = 4

Graduate Student = 5

Other (unclassified) = 6

In the box labeled "N," fill in a _____ and code it for our section number.

In the box labeled "O," print a _____ and code it below for our class time.

In the box labeled "P," print and code the number that best describes your major (OR the area you hope to teach).

Early Childhood = 1

Elementary (includes both Upper and Lower) = 2

Both Early Childhood and Elementary = 3

Special Education = 4

Reading = 5

Junior High/Middle School = 6

Majors with a K-12 certification (such as music, P.E., art, industrial arts, and communicative disorders) = 7

Secondary (includes majors such as English, math, science, social science, business, foreign languages) = 8

Table 2

Results Based Upon Biographical Data

		Pretest: Form A		Posttest: Form B	
	N	Mean	SD	Mean	SD
Major					
1[a]	1	47.00	-	53.00	-
2[b]	37	53.16	8.10	56.19	6.76
3[c]	12	53.83	6.56	56.00	6.48
4[d]	5	46.00	10.30	45.80	2.68
5[e]	-	-	-	-	-
6[f]	4	60.00	6.98	59.75	5.97
7[g]	24	56.88	8.75	54.33	7.15
8[h]	42	57.93	9.47	58.07	8.29
Sex					
M[i]	38	59.08	9.73	58.15	7.97
F[j]	87	53.83	8.17	55.20	7.21
Classification					
1[k]	-	-	-	-	-
2[l]	17	54.12	9.75	56.12	9.49
3[m]	78	54.71	8.93	55.60	7.09
4[n]	28	58.82	7.56	57.50	7.20
5[o]	1	36.00	-	45.00	-
6[p]	1	58.00	-	69.00	-

[a]1 = Early Childhood. [b]2 = Elementary (includes both Upper and Lower). [c]3 = Both Early Childhood and Elementary. [d]4 = Special Education. [e]5 = Reading. [f]6 = Junior High/Middle School. [g]7 = Majors with K-12 certification. [h]8 = Secondary. [i]M = Male. [j]F = Female. [k]1 = Freshman. [l]2 = Sophomore. [m]3 = Junior. [n]4 = Senior. [o]5 = Graduate Student. [p]6 = Other (unclassified).

Appendix E

SUBTEST RESULTS

Table 3

Statistical Results of the WGCTA Subtest 1: Inference

H	Pre/Post	n	Mean	SD	t value	df	p value
H_1	O_1	28	8.96	2.55	-.68	54	.501
	O_2	28	8.54	2.17			
H_2	O_3	50	9.48	2.70	-1.32	98	.190
	O_4	50	8.86	1.94			
H_3	O_5	47	9.11	2.27	-.50	92	.620
	O_6	47	8.87	2.30			

Table 4

Statistical Results of the WGCTA Subtest 2: Recognition of Assumptions

H	Pre/Post	n	Mean	SD	t value	df	p value
H_1	O_1	28	10.50	3.47	+1.71	54	.093
	O_2	28	11.96	2.91			
H_2	O_3	50	11.82	3.35	-.25	98	.804
	O_4	50	11.64	3.87			
H_3	O_5	47	10.70	3.77	+1.62	92	.109
	O_6	47	11.81	2.80			

Table 5

Statistical Results of the WGCTA Subtest 3: Deduction

H	Pre/Post	n	Mean	SD	t value	df	p value
H_1	O_1	28	11.11	2.18	-2.39	54	.020
	O_2	28	9.86	1.70			
H_2	O_3	50	11.76	2.51	+.04	98	.969
	O_4	50	11.78	2.70			
H_3	O_5	47	10.81	2.76	-.39	92	.698
	O_6	47	10.60	2.53			

Table 6

Statistical Results of the WGCTA Subtest 4: Interpretation

H	Pre/Post	n	Mean	SD	t value	df	p value
H_1	O_1	28	12.39	1.57	+.34	54	.735
	O_2	28	12.56	1.58			
H_2	O_3	50	12.70	2.06	+1.44	98	.153
	O_4	50	13.32	2.24			
H_3	O_5	47	11.64	2.45	+1.79	92	.077
	O_6	47	12.43	1.77			

Table 7

Statistical Results of the WGCTA Subtest 5: Evaluation

H	Pre/Post	n	Mean	SD	t value	df	p value
H_1	O_1	28	11.61	3.17	-.05	54	.962
	O_2	28	11.57	2.43			
H_2	O_3	50	12.08	4.07	-.65	98	.520
	O_4	50	11.60	3.33			
H_3	O_5	47	11.11	3.91	+1.78	92	.078
	O_6	47	12.26	2.07			