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Factors related to the use of critical thinking instructional strategies and principles by Ohio Cooperative Extension Home Economists

Bull, Nancy Howe, Ph.D.
The Ohio State University, 1992

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FACTORS RELATED TO THE USE OF CRITICAL THINKING INSTRUCTIONAL STRATEGIES AND PRINCIPLES BY OHIO COOPERATIVE EXTENSION HOME ECONOMISTS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

By

Nancy Howe Bull, B.S., M.Ed.

* * * * *

The Ohio State University

1992

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E.V. Norland
Advisor
Department of Agricultural Education
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1992
DEDICATION

To my friend and neighbor, Signa Zimmerman, without whose love and support my graduate education would not have been possible, I dedicate this work.
ACKNOWLEDGEMENTS

To all of the people who have made my graduate experience a positive one, I say thank you. I take this opportunity to say thank you to some very special people who have supported my pursuit of a graduate degree.

To my good friend and, fortunately for me, my graduate co-advisor Dr. Jo M. Jones. Thank you for the many years as co-workers, as friends, and now as advisor. Your cheerful smile and ready ear were greatly appreciated during some of the dark hours of my degree program. Your graduate research inspired me to not only pursue a degree, but, also to follow-up on your research. Thank you for stretching my mind to be a more critical thinker.

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for your professionalism. To Dr. David Greenberger, who served on my generals
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and Marvin.

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of my graduate experience, you have made the whole process a joy. You have
been the world's best cheerleader and supporter. You have been there in the good
times and the bad times, always with words of encouragement and love. Thank
you for making this degree possible.
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CHAPTER I
INTRODUCTION

The Cooperative Extension Service, established in 1914 by the Smith-Lever Act, was designed "to teach people to determine their own needs and the solution of their own problems; to help them acquire knowledge and to inspire them to action. The basic philosophy of Extension education was to teach people 'how' to think, not 'what' to think. Extension educators taught 'people', not 'subject matter'" (Prawl, Medlin, & Gross, 1984, p. 31). Success of an Extension educator depended on technical training as well as a background of education and experience (Prawl, Medlin, & Gross, 1984).

The Cooperative Extension Service offered a nationwide system for lifelong learning demanded by today's technological society so people might have been better able to resolve problems challenging their future. The task of the Cooperative Extension Service was to disseminate practical and useful information from research centers and land grant universities to people on a wide variety of subjects (Prawl, Medlin, & Gross, 1984).

Dillman (1985) projected the Cooperative Extension Service as entering a new era, the third since its inception. The original community control era (1900-
1950) was a period when community was a geographic place where people lived their daily lives. The county agent served as a broker of information from the outside world. As a broker, the Extension educator was not expected to affect the substance or context of what was taught (Winters, 1982). Success depended on the county agent becoming part of the community (Dillman, 1985).

Mass society (1950-1988) subsequently replaced the community control era and focused on building larger hierarchies. Extension programs changed to focus more on organization and agency personnel, and less on individuals. The Extension educator role changed to that of teacher and "helpful-interpreter" (Dillman, 1985). However, the Extension Service provided rural people with no help in learning to understand or control the outcomes of applying what the Cooperative Extension Service taught (Winters, 1982).

The third era, the information age (1988-present), was presently occurring largely driven by the increasing speed of communication, amounts of information, ability to send and receive information, growth of artificial intelligence, and relative importance of information. The Extension educator would emerge, during the information era, as a "peer information consultant" (Dillman, 1985, p.21). This role would bring with it the responsibility to help adult learners understand what they learned and apply the information within contexts beyond the immediate application. Extension educators needed a vision to help learners understand as well as to know (Winters, 1982). Critical thinking was the vehicle to create this vision.
Raudabaugh (cited in Boone, 1989) stated the role of the Extension educator was to teach people "how to think, not what to think" (p.7). Learning was an active transaction between the learner and the environment. It was the role of the Extension educator not to change learner behavior, but rather to provide opportunities for learners to change if they so desire (Raths, Wasserman, Jonas, & Rothstein, 1986). Active transaction provided adult learners opportunities to develop critical thinking.

Dillman (cited in Jimmerson, 1989) believed the role of Extension educators was to interpret information for local use, make decisions about serving those with fewer resources, and establish trust with people. To do so, Extension representatives must have improved their ability to understand the sources of information, the interpretation provided with the information, and the goals for which the information would be used. The improvement of this ability required training in values, ethics, policy analysis, and critical thinking (Jimmerson, 1989).

Patterson (1991) stated the Extension educator of the future must have the knowledge, attitudes, and skills of an autonomous learner, an effective communicator, and a systemicist. Extension educators as autonomous learners would need to be critical thinkers, to make sense out of large amounts of information. Extension educators of the future would facilitate the co-learning process to help learners make decisions, confront issues, and help solve problems. The emphasis on subject matter training for the Extension educator would give way to competency as an autonomous learner, effective communicator, and systemicist (Patterson, 1991).
Statement of the Problem and Need for Study

Extension, traditionally viewed as the information provider (Steedman, 1987), is now questioning at all levels of the organization, its traditional programming and delivery methods (Smith & Denton, 1987). Thinking had been neglected by Extension education; emphasis was placed on simple solutions to complex problems, and the focus was on action and results. Now the shift seems to have swung to a new emphasis on thinking in adult education (Raths, Wasserman, Jonas, & Rothstein, 1986).

Instructional materials in Extension education that required higher order thinking skills were lacking. Instructional strategies were based on the dissemination of information while Socratic questioning was largely missing (Raths, Wasserman, Jonas, & Rothstein, 1986). The process of encouraging Extension educators to use critical thinking instructional strategies was a slowly evolving one where educators must learn how to incorporate critical thinking instructional strategies only by practice (Paul, Binker, Martin, & Adamson, 1989).

Why had there been limited success in developing and implementing education for critical thinking in adult learners? Educators may have lacked the knowledge base for teaching thinking as well as the means for developing their own thinking (Kuhn, 1986).

Critical thinking involved the ability to clarify issues, to judge the credibility of the information source, as well as to solve problems while drawing reasonable conclusions (Ennis, 1985). Critical thinking had been equated with the develop-
Critical thinking did not just happen. A framework for critical thinking to
develop took time, patience, and intentional design of instructional strategies which
force learners to practice critical thinking (Meyers, 1987; Adams & Hamm, 1990).
Teaching critical thinking in adult education required "creating an atmosphere of
disequilibrium" so learners may consider, rethink, and rework their thinking.
Learners' old modes of thinking must have been challenged and the structure and
support provided to develop new modes" (Meyers, 1987, p.14).

"Critical thinking is not a separate subject taught in a compartmentalized
way. Instead, developing critical thinking is a process underlying all educational
activities" (Brookfield, 1990, p.21). The goal of education was to help to free
learners from their dependence on the educator, to learn to ask insightful ques­
tions and to reflect on their thinking (Griffith, 1984; Adams & Hamm, 1990).

Countless studies had shown that while students were learning the basic
skills for living, they were not learning higher level thinking skills needed to survive
in the information era (Chance, 1986). In The Central Purpose of American
Education, the Educational Policies Commission of the National Education
Association stated the "common thread of education is the development of the
ability to think" (Kuhn, 1986). Eastburn (cited in Bartz, Schwandt, & Hillman,
1989) defined education as "challenging an individual intellectually and uncovering
latent thinking" (p.166). Learning in Extension education was an active transaction between learners and the environment. Extension had not been fully successful in viewing their clients as learners and the role of Extension educators as facilitators of learning (Boone, 1989).

The role of the educator should have been to create an environment conducive to critical thinking. Learners should have believed in the power of their own minds to identify and solve problems. The role of the educator was to help learners clarify their thoughts, to keep the discussion focused, and to teach learners how to use resources available to them (Paul, 1989). The role of the educator was to lead learners out of dependency on the thinking of others and into the freedom of thinking for themselves (Trachy, 1983). In the last twenty years, Raths, Wasserman, Jonas, & Rothstein (1986) found only the rhetoric about thinking had flourished; the application lagged far behind.

Brookfield (1990) identified three reasons why Extension educators should have developed critical thinking in adult learners. These reasons included: "First, critical thinking is one of the intellectual functions most characteristic of adult life" (Mezirow & Associates, cited in Brookfield, 1990 p.20).

Second, critical thinking is necessary for personal survival. It is a lived reality pressing in on us in the shifting contexts of the personal, occupational, and political changes we experience...Organizations which presume that the assumptions and organizational mores that have worked comfortably for the last several decades are always going to serve them are heading
for a brutal awakening. Third, critical thinking is a political necessity in a democratic society. Educators from Dewey to Freire have considered the fostering of political literacy...an important intellectual and philosophical element of higher education (Brookfield, 1990, pp 20-21). Thinking critically is one of the important ways in which adulthood is developed (Brookfield, 1989).

Home economics appeared to be one of the forerunners in trying to incorporate critical thinking concepts into the adult education curriculum. While there were differing views of how and what to teach to promote critical thinking, most educators agreed critical thinking development was a vital part of education (Purdin, 1989).

Extension educators must have improved their ability to deal with value laden information, the values underlying teaching methods and goals, and the values associated with knowledge (Jimmerson, 1989). Solutions to value questions which families faced everyday required reflective judgment and action. Home economics educators assisted families in discovering and using knowledge relevant to solving complex everyday problems (Strom & Plihal, 1989).

If Extension educators defined themselves only as subject matter experts within the narrow domain of home economics, agriculture, or youth development, they had cut themselves off from the broader identity as change agents helping learners shape the world in which they live (Brookfield, 1990). Given the fact that in Ohio there was a two-to-one ratio of technical degreed faculty to education
degree faculty, many OCES faculty were employed with no training in adult education strategies. Although not trained in adult education, OCES faculty were part of the adult education network and, therefore, expected to perform as adult educators (Norland, Seevers, & Smith, 1990).

Symonds (cited in Kuhn, 1986) stated "practice in thinking is necessary for the improvement of thinking." If Extension Home Economists were to improve critical thinking in adult learners, an assessment must first have been made of actual practices used by the educators. Recent research on fostering critical thinking in adult learners had been neglected (Brookfield, 1989; Jones, 1989). Only one study by Jones (1989) was found which focused on critical thinking in the Cooperative Extension Service. This study focused on principles of fostering critical thinking in adult learners, designing instructional strategies to promote critical thinking, and determining Ohio Extension Home Economists' perception of the importance of the principles and their perceived use of instructional strategies to foster critical thinking.

The first step to improving the critical thinking in adult learners participating in Extension Home Economics programs was for the researcher to focus on identifying critical thinking instructional strategies used in Extension Home Economics (Kuhn, 1986). What instructional strategies and principles to promote critical thinking in adult learners were currently used by Ohio Extension Home Economists? What was the perceived knowledge of Ohio Extension Home Economists concerning instructional strategies and principles which foster critical
thinking? What was the perceived use of the same instructional strategies by Extension Home Economists? The answers to these questions were needed to develop a statewide plan for improving the critical thinking of Extension educators and eventually, adult learners.

**Purpose of the Study**

The purpose of this study was to assess factors related to the actual use of instructional strategies and principles by Ohio Extension Home Economists as related to their perceived knowledge of, perceived use of, and attitude toward the instructional strategies and principles. In addition, the study assessed relationships of actual use to the independent variables of perceived knowledge, perceived use, and attitude toward critical thinking instructional strategies and principles. Also, the personological variables of area of specialization, administrative position as county chair, program position as multi-county agent, program position as cluster agent, length of service with Extension, teaching experience in public or private education, age, academic major, training in critical thinking skills, and annual performance appraisal scores were used as intervening variables. The situational variables including subject matter of the lesson, Ohio Cooperative Extension Service district, and number of people attending were assessed as intervening variables. The best predictors of actual use were determined.
Variables and Objectives of the Study

The following dependent variable and independent variables were used to guide this study:

I. Dependent Variable:

Actual use of selected instructional strategies and principles related to questioning, dialogue, and reflection which foster critical thinking in adult learners involved in the Cooperative Extension Service as indicated by scores on a direct observation instrument completed by a trained observer.

II. Independent Variables:

A. Perceived knowledge of selected instructional strategies and principles related to questioning, dialogue, and reflection which foster critical thinking in adult learners involved in the Cooperative Extension Service home economics program.

B. Perceived use by Extension Home Economists of selected instructional strategies and principles related to questioning, dialogue, and reflection which foster critical thinking in adult learners involved in the Cooperative Extension Service home economics program.

C. Attitude of Extension Home Economists toward the perceived use of selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection with adult learners.
III. Intervening Variables

A. Ten personological variables were identified which related to the Extension Home Economist's actual use of selected instructional strategies and principles related to questioning, dialogue, and reflection which foster critical thinking. These ten variables were area of specialization, administrative position as county chair, program position as multi-county agent, program position as cluster agent, length of service with Extension, teaching experience in public or private education, age, academic major, training in critical thinking skills, and annual performance appraisal scores.

B. Three situational variables were identified which related to the Extension Home Economist's actual use of selected instructional strategies and principles related to questioning, dialogue, and reflection which foster critical thinking. These three variables included the subject matter of the lesson, Ohio Cooperative Extension Service district, and number of people attending the lesson.

IV. Objectives of the Study

The following research objectives were established as a guide for the study:

Objective I: To describe sample of County Extension Agents, Home Economics of the Ohio Cooperative Extension Service, included in this study, in terms of the following selected characteristics:

A. Area of specialization.

B. Administrative position as county chair.
C. Program position as multi-county agent.
D. Program position as cluster agent.
E. Length of service with Extension.
F. Teaching experience in public or private education.
G. Age.
H. Academic major.
I. Training in critical thinking skills.
J. Annual performance appraisal scores.
K. Perceived knowledge of selected instructional strategies and principles related to questioning, dialogue, and reflection.
L. Perceived use by Extension Home Economists of selected instructional strategies and principles related to questioning, dialogue, and reflection.
M. Attitude of Extension Home Economists toward the perceived use of selected instructional strategies and principles related to questioning, dialogue, and reflection.
N. Actual use of selected instructional strategies and principles related to questioning, dialogue, and reflection.

Objective II: To describe the relationship between independent variables, specifically:

A. The perceived knowledge level of the Extension Home Economists on selected critical thinking instructional strategies and principles related to
questioning, dialogue, and reflection and their perceived use of the same instructional strategies and principles.

**Question 1:** What is the relationship between the perceived knowledge level of Extension Home Economists on selected instructional strategies and principles which foster critical thinking and their perceived use of the same instructional strategies and principles?

**B.** The perceived knowledge level of Extension Home Economists regarding selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection and the ten personological variables including area of specialization, administrative position as county chair, program position as multi-county agent, program position as cluster agent, length of service with Extension, teaching experience in public or private education, age, academic major, training in critical thinking skills, and annual performance appraisal scores.

**Question 2:** What is the relationship between the perceived knowledge level of Extension Home Economists on selected instructional strategies and principles which foster critical thinking and selected personological characteristics?

**C.** The perceived knowledge level of Extension Home Economists regarding selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection and three situational variables including
ing the subject matter of the lesson being observed, the Ohio Cooperative
Extension Service district, and number of people attending.

**Question 3:** What is the relationship between the perceived knowl-
edge level of Extension Home Economists on selected instructional
strategies and principles which promote critical thinking and selected
situational characteristics?

**D.** The *perceived knowledge* level of Extension Home Economists regard-
ing selected critical thinking instructional strategies and principles related to
questioning, dialogue, and reflection and the *attitude* of Extension Home
Economists toward using these strategies and principles.

**Question 4:** What is the relationship between the perceived knowl-
edge level of Extension Home Economists regarding selected instruc-
tional strategies and principles which foster critical thinking and the
attitude of Extension Home Economists toward using these strategies
and principles?

**Objective III:** To describe the relationship between all independent variables and
the dependent variable, controlling for the two sets of intervening variables.

**Question 5:** What is the relationship between the actual use of selected
critical thinking instructional strategies and principles related to questioning,
dialogue, and reflection and the independent variables of perceived knowl-
edge, attitude toward use, and perceived use of the instructional strategies
and principles?
Objective IV: To explain the relationship between the actual use of selected instructional strategies and principles related to questioning, dialogue, and reflection and selected personological variables when the independent variables are controlled.

Question 6: What is the relationship between the actual use of selected instructional strategies and principles and selected personological variables when the independent variables are controlled?

Objective V: To explain the relationship between the actual use of selected instructional strategies and principles related to questioning, dialogue, and reflection and selected situational variables for which the independent variables are controlled.

Question 7: What is the relationship between the actual use of selected critical thinking instructional strategies and principles and selected situational variables for which the independent variables are controlled?

Objective VI: To explain the variance of the dependent variable, actual use of selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection, as measured by the direct observation of a teaching situation.

Question 8: Which variable(s) explain the variance of the actual use of selected critical thinking instructional strategies and principles?
Objective VII: Postulate and explain a conceptual model describing the interaction of independent and intervening variables as they relate to the actual use of critical thinking and the related instructional strategies and principles (Figure 1).
Figure 1

Factors Related to the Use of Critical Thinking Instructional Strategies and Principles by Ohio Cooperative Extension Home Economists
Definition of Terms

Terms used in this study were operationally defined as follows:

**Adult learner** was any learner over the age of 18 years.

**Area of specialization** was an area of expertise where the Extension educator was willing to teach beyond their own county (Stitzlein, 1991).

**Cluster agent** was an Ohio Cooperative Extension educator involved in a grouping of Extension educators where all agreed to work together and to share across county lines. The cluster agent was identified as the first line of contact for clientele in a defined specialty area (Stitzlein, 1991).

**County chair** provided administrative leadership to Extension programming in the county (Stitzlein, 1991).

**Critical thinking** was the art of thinking about thinking, in order to make thinking more clear, accurate or defensible; identifying and removing bias and one sidedness of thought, self-directed, rational thinking with clarity, accuracy, insight, and fairness (Paul, 1989; Paul, Binker, Martin, & Adamson, 1989).

**Dialogical thinking** was thinking that involved a dialogue which provided opportunities for learners to express views and to try to fit their own views into the views of others (Paul, Binker, Martin, & Adamson, 1989).

**Dialoguing** was a way to open the mind, rather than close it. *Webster's II New Riverside Dictionary* defined dialogue as "a conversation between two or more
persons." The _American Heritage Dictionary_ went on to define dialogue as the "exchange of ideas or opinions."

**Extension Home Economist** was an educator employed by the Cooperative Extension Service to teach, on an informal basis, adults living in a particular geographic area.

**Home Economics Extension** was an "informal, educational program designed to reach families...for the purpose of enhancing individual knowledge and skills so they can better and more quickly adapt to the demands of today's rapidly changing society" (Prowl, Medlin, & Gross, 1984, p.174).

**Length of service** was the self-reported number of years the Extension educator had been employed by the Cooperative Extension Service both in and outside of Ohio.

**Multi-county agent** was an Ohio Cooperative Extension employee at the county level with an appointment split between two or more counties (Stitzlein, 1991).

**Probing questions** were asked to seek additional responses or for clarification.

**Reflection** was part of the learning process where experiences were explored to lead to new understanding and behavior. Reflection involved stepping out of the picture in order to explore the experience. It required time in the learning process (Jarvis, 1987).

**Socratic questioning** was the use of the "right" question. These questions facilitated the exchange of ideas and viewpoints, gave new meaning to content, explored application to problems, and gave implications for real life situations. They
avoided yes and no responses that stopped thinking (Jones, 1989). Socratic questioning was a mode of questioning that probed the meaning, justification or logic of reasoning. It might have been adopted to many levels of ability (Paul, Binker, Martin, & Adamson, 1989).

Teaching situation was at least a one hour block of time where the Extension Home Economist was teaching in a group situation to adult learners on a topic related to home economics.

The teaching of critical thinking included any process or activity planned and directed by any teacher, parent, peer, or other person which was aimed at encouraging, fostering, and/or developing the use of critical thinking by someone else. It also included any process or activity through which one learned to think critically on his or her own (Walker, 1985).

Limitations of the Study

Recognized restrictions of this study included the fact that only county Extension Home Economists were included. This focus was selected to reliably build on, yet expand the fundamental research work advanced by Jones (1989). Results of this study were limited to Ohio Extension Home Economists employed as of June 1, 1991 in four of the five Ohio Extension districts and should not necessarily be generalized beyond this group. Some responses represented perceptions of respondents which might have been influenced by factors not included in this study (Jones, 1989).
Self-report of the use of instructional strategies may not have accurately reflected the effectiveness of the strategy. The actual use of instructional strategies and principles was a measure of the direct observation by a trained observer on a one time basis. The Hawthorne effect may have influenced results obtained by direct observation. In addition, although observers were trained at the beginning of the study, observation skills may have deteriorated over the period of the study (Gay, 1987). This study was descriptive-correlational and, by nature, did not show cause and effect (Campbell & Stanley, 1963).

**Assumptions**

Assumptions included:

- Critical thinking was important to the effective Extension education of adult learners.

- Many Extension programs now lacked effective use of critical thinking instructional strategies.

- Once made aware of the need for more effective instructional strategies and principles, Extension Home Economists would want to learn ways to implement critical thinking instructional strategies and principles.

- Extension Home Economists who had received high evaluations on their annual performance appraisals had made better use of critical thinking instructional strategies than those who did not.
CHAPTER II

REVIEW OF LITERATURE

As compared to studies of the development of critical thinking in children, those related to adult learners were still fairly new. The concept of teaching thinking skills to adult learners had received growing interest among educators and researchers in the field of adult education. The Extension educator had the opportunity to empower adult learners by utilizing critical thinking instructional strategies (Jones, 1989).

This review of literature addressed critical thinking as an integral part of the adult education process; it explored the relationship of knowledge and attitudes to behavior, the importance of perception to changed behavior, and the characteristics of adult learners regarding strategies and techniques for learning. The information included in this chapter was presented under the following major headings: literature related to critical thinking including teaching for thinking, questioning, dialogue, and reflection; literature related to knowledge and attitude; literature related to perception; literature related to adult learners; literature related to performance appraisal; literature related to educational practice; and literature related to direct observation.
Literature Related to Critical Thinking

"Give me a fish and I'll eat today.
Teach me to fish and I'll eat for a lifetime."

This Chinese proverb exemplified the concept of critical thinking. Teaching people the ability to think would last a life time (McTighe, 1987).

Background of the Critical Thinking Concept

A review of curriculum in 18th century colleges and universities revealed courses in logic, rhetoric, and analysis. Dewey advised United States schools in 1899 to prepare students for problems of all people in all communities living together (Steedman, 1987). During the twentieth century, the study of thinking had explored the cognitive and affective domains. Educators stressed problem solving while ignoring thinking oriented toward the evaluation of alternate solutions to problems.

The current emphasis in education had shifted to a lifelong learning approach where adults sought educational opportunities to upgrade skills, change occupations, or broaden their previous education base (Boucouvalas, 1987; Knowles, 1990). Adults needed opportunities to develop their thinking abilities which may not have occurred in prior formal education programs. However, traditionally, facilitators of adult learners may not have been trained how to think or how to teach others to think.
Paul (1990) suggested

the ideal of rationality and fairminded critical thought is essential to global social and economic development and prosperity. The problem of knowledge, freedom, and productivity requires that we, for the first time in our history, take true intellectual discipline and the 'fitness' of our minds seriously. We must create conditions in our school and society under which intellectual virtues long ignored—intellectual courage, intellectual humility, intellectual perseverance, intellectual integrity, faith in reason, and fairmindedness—can develop (pp. xix-xx).

Could Extension educators teach critical thinking to meet the conditions set forth by Paul?

Brandt (1984) and McTighe (1987) suggested teaching be divided into teaching for thinking, teaching of thinking and teaching about thinking. Teaching for thinking implemented instructional strategies to strengthen thinking, the most natural of which was questioning. In addition, wait time and follow-up questions encouraged thinking. Teaching about thinking encouraged awareness by the learner of thinking by the learner. Poor thinkers were generally less likely to have engaged in inner dialogue and were unable to describe their learning and reasoning strategies. Teaching of thinking emphasized mental skills and processes designed to enhance thinking such as reflection and dialogue. Teaching of thinking did not automatically assume that thinking improved by engaging in other
activities. Teaching based on critical thinking strategies was a combination of teaching for thinking, of thinking, and about thinking.

Functionalism as a cognitive theory was first suggested by John Dewey in the early twentieth century. This was the first break with the behaviorist who believed learning was overtly observable and based on physical stimuli, muscle movement, and glandular secretions (Knowles, 1990). The basis of functionalism was that "educators are most helpful when they teach their students approaches to problem solving instead of simply giving answers to their questions" (Griffith, 1984, p.15). Dewey subsequently promoted the concept of reflective thought. "Active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends constitutes reflective thought" (Dewey, 1933, p.9). Dewey's work had evolved into what today's literature defined as reflective and reasonable thinking focused on what to believe and do, or "critical thinking" (Ennis, 1985).

Critical thinking was not cultivated by seeking an easy solution to everyday problems; attempts to do so demonstrated little understanding of the dialectical nature of critical thinking to move back and forth between opposing points of view (Romanish, 1986; Paul, 1984). While thinking was experimenting with possibilities, critical thinking developed in an environment which fostered a sense of self within the social context of consideration for others (Barell, Liebmann, & Sigel, 1988). Critical thinking was essential in a society in transition or in a state of change as people sought the best alternative to new dilemmas (Romanish, 1986). Through
education, it was possible to create a critical awareness which lead to the develop-
ment of the critically empowered mind (Romanish, 1986).

Paul (cited in Way, 1987) underscored
the importance of affective processes in his differentiation between critical
thinking in the 'strong' and 'weak' sense. In the weak sense, critical think­
ing consisted of the development only of technical reasoning skills. In the
strong sense, it consisted of the development of emancipatory reasoning
skills; those that generated insight into one's own affective and cognitive
processes that produced openness to and comfortableness with dialectical
analysis (the weighing and reconciling of contradictory arguments and views
through dialogue, discussion, and debate).

Paul (1989) identified thirty-five dimensions of critical thought, divided into
affective principles, cognitive principles (macro-abilities) and cognitive principles
(micro-skills). Affective principles included thinking independently, exercising
fairmindedness, developing intellectual courage, and developing confidence in
reason. Cognitive principles (macro-abilities) included generating or assessing
solutions, questioning deeply, raising and pursuing root or significant questions,
practicing Socratic discussion (clarifying and questioning beliefs, theories, perspec­
tives), and reasoning dialectically (evaluating perspectives, interpretations, or
theories). Cognitive principles (micro-skills) included examining or evaluating
assumptions, recognizing contradictions, and exploring implications and conse­
quences.
Dialogue, questioning, and reflection were viewed as key elements in the critical thinking process. According to Romanish (1986), attention should have been given to the questioning skills of educators, to the need for educators to be facilitators of critical thinking. Educators should have focused on a climate of openness and trust, and eliminated those things which inhibit the opening and empowering of the mind (Romanish, 1986).

Freire (1970), a well known theorist who applied critical thinking to Extension, viewed Extension education as "banking education" where learners acted as depositories into which the educator deposited information. To be successful, Freire (1970) said Extension educators should have developed problem posing education to make learners critical thinkers. In addition, Freire stated Extension educators should have developed the ability to dialogue with learners to promote a spirit of learning from each other (Freire, 1973).

Cognitive development in adult learners was considered fundamental to the critical thinking process (Lastner, 1990). Miller's (1991) model of knowledge transfer and utilization in adult agricultural education studied teacher characteristics which influenced the intended and actual levels of cognition as they affected the level of learner participation. An intervening variable identified by Miller was wait time after a question was asked and before the learner participated. Miller also studied the level of participation as it influenced the learner's attitude toward the innovation and the learner's level of use of the innovation. Student characteristics had a much stronger influence on level of participation during instruction
than did teacher characteristics. Miller’s study implied that the emphasis in cognitive development should have been on the learner instead of the facilitator.

**Definition of Critical Thinking**

Thinking was a way of learning, of acquiring facts for some purpose (Raths, Wassermann, Jonas, Rothstein, 1986). Thinking was a social activity as thinking was always in the process of being constructed (Hultgren, 1987). According to Raths, Wassermann, Jonas, and Rothstein, (1986) thinking contained both the component of critical thinking and inadequate thinking. Paul (cited in Way, 1987) defined this difference as critical thinking in the strong sense and inadequate thinking as thinking in the weak sense.

Critical thinking was the active, purposeful, and organized effort to examine thinking of self and of others to clarify and improve an understanding of the world (Chaffee, 1988). It was a process applied to some content (Norris & Ennis, 1989). Thinking included comparing, summarizing, observing, classifying, interpreting, criticizing, looking for assumptions, imagining, collecting data, hypothesizing, applying facts and principles to new situations, and decision making (Raths, Wassermann, Jonas, & Rothstein, 1986).

Behaviors which reflected inadequate thinking included impulsiveness, overdependence on the educator, inability to concentrate, missing the meaning, dogmatic, assertive behavior, rigid, inflexible behavior, lack of confidence in own thinking and unwillingness to think (Raths, Wassermann, Jonas, & Rothstein,
When people lack critical thinking skills, they viewed critical thinkers as "prejudiced, closed minded, overly academic, negative, or nit-picky" (Paul, 1984). Paul viewed (1989) the ability to think critically as a matter of degree.

In contrast to inadequate thinking, critical thinking was thinking developed beyond the basic skills and included moral and ethical implications not associated with inadequate thinking. Siegel (cited in Paul, Binker, Martin, & Adamson, 1989) defined critical thinking as "thinking appropriately moved by reason" as compared to thinking motivated by desires, fear, rewards, or punishment. Paul, Binker, Martin, & Adamson (1989) argued for the need for more than one definition of critical thinking and said critical thinking was "disciplined, and self-directed thinking" (p.352).

Ennis (cited in Romanish, 1986) identified twelve aspects of critical thinking which were:

(1) grasping the meaning of a statement, (2) judging whether there is ambiguity in a line of reasoning, (3) judging whether certain statements contradict each other, (4) judging whether a conclusion follows necessarily, (5) judging whether a statement is specific enough, (6) judging whether a statement is actually the application of a certain principle, (7) judging whether an observation statement is reliable, (8) judging whether an inductive conclusion is warranted, (9) judging whether the problem has been identified, (10) judging whether something is an assumption, (11) judging
whether a definition is adequate, and (12) judging whether a statement made by an alleged authority is acceptable. (p.48)

Teaching for Critical Thinking

Lee (1990) suggested learners who had the capacity for higher order thinking would not do so unless "taught". The need for teaching thinking had been highlighted by the College Board (1983) and the Education Commission of the States (1982) (Marzano, 1988). Students of the future needed not only factual knowledge, but strategies to process and utilize the information. Teaching thinking skills may have provided to some students the means for unlocking the education process. However, barriers identified with the teaching of thinking included a narrow view of curriculum, a narrow view of assessment, and the involvement of non-educator groups in the decision making process (Marzano, 1988). These barriers must be removed or breached in order to fully exploit the potential available to critically thinking students.

Chance (1986) summarized points on which most developers of programs on thinking agreed as follows:

- Thinking is a skill and can be taught.

- Thinking is best taught by direct and systematic instruction.

- The emphasis of instruction in thinking should be upon the process of thinking, not its products.

- Students must use the thinking skills they are to learn.
- Teachers should re-enforce the appropriate use of thinking skills.

- Thinking should be taught in a relaxed, non-threatening atmosphere. Students should take time to think before answering. Teachers should correct thinking errors.

- Thinking must be taught over a period of years. (p. 133-135)

Evans (cited in Backus, 1984) found 40% of professors surveyed thought knowledge of content was a sufficient prerequisite for teaching on the university level, 35% thought methods were of some importance, and 10% thought the two were of equal importance. In reality, little was known about how adult learners learned subject matter or thinking and how to selected the best method to promote learning (Webb, 1983).

In addition, expanding content instruction from factual information to include critical thinking would have required a reconceptualization of teaching by educators. Many critical thinking instructional strategies had been attacked by non-educator groups. Dewey, in 1916 (cited in Marzano, 1988), argued that the direct path to improving learning, centers on promoting thinking.

There were at least three concepts addressing how to teach thinking. The first was to teach thinking by itself; the second was to teach thinking embedded in subject matter. A third theory was to model thinking for learners.

The first two theories related to the teaching of thinking: one proposed to teach thinking by itself, the second to teach thinking in the context of specific subject issues. Ennis (cited in Prawat, 1990), a proponent of the first theory,
believed that if educators did not focus on thinking, thinking skills would not transfer from one subject matter to the next. With a separate program on teaching thinking that ensured teaching thinking would be a focal point of education (Rosaem, 1988), a false dichotomy was created that subject matter and thinking may be separated (Joyce & Weil, 1986). In contrast to the first theory, Rosaem (1988) found rather than rely on the learner's ability to transfer thinking skills, attention must be paid by the educator to teach for the transfer of thinking skills.

In addition, Rosaem (1988) found that while most programs that taught thinking claimed the transfer of higher order thinking skills, there was no evidence to support the claim. The supporters of teaching thinking embedded in subject matter (the second theory) were in turn divided into two camps. Some preferred to teach the skill first and then showed learners how to use the skill in relation to subject matter. Others taught thinking skills on a need-to-know basis (Prawat, 1990). Joyce and Weil (1986) believed that teaching subject matter without teaching thinking neglected thinking and was inefficient. Teaching thinking in an integrated way ensured students' abilities to think and to reason were being promoted in the educational process (Resnick, cited in Rosaem, 1988).

The third concept for teaching thinking, whether by itself or in subject matter, was for the educator to model his or her thinking processes. This technique involved thinking out loud when problem solving so learners could experience how others solve problems. Steps to effective modeling included defining the problem which may not be obvious to others, verbalizing thoughts about possible
solutions, and soliciting suggestions from the group (Good & Brophy, 1987; Meyers, 1987; Adams & Hamm, 1990).

Critical thinking involved the ability to evaluate either one's own or someone else's interpretations of reality. By teaching thinking skills openly, students had more opportunity to reflect on and benefit from instruction on thinking skills (Prawat, 1990).

One of the distinctive attributes of effective teaching was the ability to combine ideas to form new ideas (McHenry, 1977). This synthesis of concepts was an integral part of applying critical thinking and using critical questions. The task of the adult educator according to Brookfield (1986) was to present learners with alternatives to their current way of thinking.

A second attribute of the critical thinking process involved teaching values. Teaching values meant addressing them concretely to explore their consequences for human well being, to reject or to accept values. Teaching values may have lead to a point of contact with the lives of adult learners, thus opening the door to effective teaching (Morrill, 1982). Teaching values and examining the moral implications of behavior and action were crucial components of critical thinking.

Educators created an atmosphere conducive to thinking by listening to learners, encouraging open discussion, promoting active learning, accepting and appreciating others' ideas, allowing time to think, nurturing confidence, and giving feedback. Learner thinking was inhibited when the educator brought closure or induced fear. Learner thinking was limited when the educator required only the
recall of information, manipulated the learner's thinking, or asked for the "right" answer. Educators taught for thinking when they ask learners to reflect, examine ideas more deeply, and challenge learners' ideas (Raths, Wassermann, Jonas, & Rothstein, 1986).

To teach critical thinking, educators must first have developed a new concept of teaching and learning. Learners traditionally were expected to accept the knowledge presented without question (Paul, Binker, Martin, Adamson, 1989). Educators who believed in cognitive theories may have changed their concept of teaching by using more directed instructional strategies without altering their teaching philosophy. The educator's attitude toward the learner remained constant, while the instructional techniques changed to accommodate the learner (Even, 1987), thus, developing a new concept of teaching and learning.

Brookfield (1986) defined an andragogical approach to teaching as one in which adults were encouraged to think critically instead of accepting the thinking of others. Educators needed to use instructional strategies to help learners apply their knowledge and skill (Rosaen, 1988).

Walker's study (1985) found that teachers seemed willing to accept responsibility to teach critical thinking to students. The researcher noted that instruction in critical thinking should have been integrated into subject matter courses. Half of the respondents in the study had not had feedback from an observer on their ability to teach critical thinking, and half said they had not received formal training in teaching critical thinking. In addition, Walker found teachers at all teaching
levels and across all subject area assignments reported critical thinking to be very important in their lives. The researcher implied widespread use of critical thinking among teachers.

Was it possible to teach thinking skills to adults? If so, how, and was it being done (Schlesinger, 1984)? Did the subject matter taught impact on the use of critical thinking instructional strategies (Purdin, 1989)? Scholl (1988) studied influences on the program planning process for Extension Home Economists. Of the thirty-three identified influences, not one mentioned the development of thinking in adult learners.

The literature suggested that just as learners vary in their abilities and willingness to use critical thinking skills, so did educators and other adults vary in their ability and willingness (Hunt & Germain, 1969; Martin, 1984; Norris, 1985). There was a wide separation between sharing information as an educator and teaching thinking in adult learners (Schlesinger, 1984). Martin (1983) stated that since teachers lacked cognitive development in their schooling, they were unprepared to foster such in their learners; they failed to apply systematic thinking to their instruction.

Barriers to staff development for critical thinking identified by Newman, Onosko, and Stevenson (1988) included "(a) teachers' practice, attitudes and knowledge; (b) the demands associated with the standard high school curriculum...; (c) the organizational features of high schools" (p.7). The researchers found that teachers had underdeveloped skills in instructional strategies which otherwise
promoted student learning. Attitudinal barriers included a resistance to change and doubts about promoting thinking. Also mentioned were a lack of teachers’ knowledge about thinking and a concern for strategies which were immediately and practically successful. Teachers claimed that demands to cover subject matter content prevented teaching of thinking.

Staff developers studied by Newman, Onosko, and Stevenson (1988) recognized that teacher training often did not include the process of dialogue and reflection. High schools were described as environments designed to teach skill and not committed to teaching thinking. As a result of this study, the authors recommended, in order to improve teacher thinking skills, staff development should have involved teachers in higher order thinking in their subject matter areas, had teachers developed specific lesson plans incorporating thinking, and supported teachers who tried these new ideas.

Critical thinking concepts had been shown to be related to methods of instruction. Perhaps if educators had been teaching critical thinking all along, there would not be such a concern today regarding inadequate thinking skills (Joyce & Weil, 1986). The role of education should have been to move toward a new process of thinking through the dialogical relationship of learner and facilitator (Freire, 1973). The educator must have helped learners to clarify thoughts, kept the discussion focused, and showed learners how to use resources (Paul, Binker, Martin, & Adamson, 1989).
"Each day that passes without instruction in thinking is one less day in which to improve thinking" (Chance, 1986). Research showed thinking skills could be developed by the effective use of instructional strategies (Adams & Hamm, 1990). Three of these instructional strategies were questioning, dialogue, and reflection.

**Questioning**

"Judge a man by his questions rather than by his answers;" Voltaire.

Socrates, more than 2,400 years ago, found that by asking probing questions, many authorities of the day could not justify, on rational grounds, their claims to knowledge (Paul, 1985). Since that time, questioning had been recognized as the most influential teaching strategy due to its ability to stimulate thinking and learning (Perkins, 1966; Wilen, 1984). Both the oral and agonistic roots of Western academics were identified in Plato’s Socratic dialogues and dialectical procedures (Kramer, 1986).

Questioning was an important component of critical thinking. Socratic questioning searched for hidden assumptions or hypotheses; things were not always what they appeared to be, and matters of facts needed to be transcended to discover the facts of the matter (Goldman, 1984). Socratic questioning lead to further questioning, and from this patience, rather than the answer, was discovered (Goldman, 1984).
Gall (1970) reviewed literature on types of question classification systems and found most were based on the type of cognitive process required to answer the question. Bloom's taxonomy represented the commonalities between each system reviewed. Questions not included in existing taxonomies, but which Gall viewed as important, included questions which asked the learner to improve on a weak response or probing questions and questions which generated a dialogue. Good and Brophy (1987) defined probing questions as those asked to seek an additional response or for clarification. Probing questions were used to focus the learner's attention and to stimulate thinking more fully about the topic. Gall (1970) cited the need for additional study of teacher follow-up questions since this type of question appeared to have a substantial impact on learning.

The majority of questions in Honig and Wittmer's (1982) study required a simple "yes" or "no" response. Ideally, questions should have asked "To what extent..." rather than to ask for a "yes" or "no" response (Smith, cited in Conklin, 1991). Ninety percent of teacher questions were asked at the recall level (Paul, Binker, Martin, & Adamson, 1989). Sirotnik (cited in Chance, 1986) noted less than 1 percent of class time spent on questions was devoted to questions requiring thought. Gall (1970) found only about 20 percent of teachers' questions required students to think while over 60% required the recall of facts. The priority was to cover large amounts of information at a quick pace. Watson (1983) found that no more than 50% of teachers' question and answer techniques stimulated critical thinking; most often asking for recall and not interpretation on the part of the
learner. Good and Brophy (1987) suggested a balance between self-evident questions, and fact and thought questions. Gall (1970) and Paul, Binker, Martin, and Adamson (1989) hypothesized the emphasis on fact questions was related to the lack of effective teacher training programs and the need to develop more programs to sharpen learner questioning skills.

French and MacLure (cited in Honig & Wittmer, 1982) found in-class teacher questions differed from questions outside the classroom since teachers knew the answer and were not seeking information to solve a problem. Teachers had often predetermined what was a "right" answer.

Adams (1988) identified three types of questions to be asked: literal, inferential, and judgmental. Literal referred to the answer being "in the lines"; inferential referred to the answer being "between the lines"; and judgmental referred to the answer being "beyond the lines".

Another type of question was the rhetorical question. Rhetorical questions were not meant for the learner to answer, but provided the stimulus for the learner to engage in mental dialogue when answering the question (Fahnestock & Secor, 1990).

Wilen (1984) believed emphasis in modern education should be to identify questioning skills which enhanced learner development, and to then apply alternative instructional strategies to enhanced teaching effectiveness. Rowe (cited in Wilen, 1984), Miller (1991), and Swift and Gooding (cited in Dillon, 1984) investigated the use of wait time by teachers following the asking of a question. With an
average wait time of 1 second, educators trained to wait 3 to 5 seconds found a dramatic increase in the quantity and quality of learner discussion. Adams (1988) postulated that thinking which goes into formulating questions may enhance comprehension more than thinking which goes into answering questions.

Taba (cited in Wilen & Clegg, 1986) believed questioning was "the most influential single teaching act because of the power of the question to impact student thinking and learning" (p.153). The skill of questioning was complex. However, this skill was secondary to the educator's attitude, disposition and commitment to using questions to generate dialogue.

Dialogue

"Thinking is the mind talking to itself, dialoguing, answering its own questions. Dialogue, the Socratic method, is really the externalization of thinking; more accurately, thinking is internalization of a social process, a dialogue" (Goldman, 1984). Paul (cited in Beyer, 1990) defined dialogue as "an interchange among two or more individuals or points of view on a given topic, claim, or subject in an effort to ascertain the truth" (p.58). Dialogue "awakens an awareness" (Freire, 1973, p.127); only dialogue which required critical thinking was capable of generating critical thinking (Freire, 1970).

Plato (Miller, 1988) professed educators should take a risk and share his or her knowledge with others. By so doing, the educator must have entered into the world and engaged in dialogue with others. Dialogue among a group of peers
seeking a common solution to common problems encouraged self-reflection required by thinking (Johnson, 1984). Freire (1973) defined a successful educator as one who possessed the ability to dialogue with learners in a "mode of reciprocity" (p.xiii).

Beltran (cited in Agunga, 1990) believed dialogue to be the basis for horizontal communication; there was no room for dialogue in a vertical relationship (Freire, 1973). Each person must have had opportunities to both give and receive communications without monopolization by one. Dialogue made possible an environment favorable to creativity. Feedback was an important feature of dialogue; however, feedback which was negative may be one-way and thus foster dependency. Dialogue was not always possible and at times monologue was unavoidable and may have been necessary (Beltran, cited in Agunga, 1990).

Dialogue was more than just a question and answer session, but rather a conversation passed from learner to learner with the educator participating as one of the group. Dialogue was a method of inquiry where all ideas and thoughts were examined in search of greater understanding (Johnson, 1984; Walton, 1989). Watson (1983) found that educators could have conducted more effective class discussions by arranging seating to promote discussion and encouraging learners to respond to each other directly, thus promoting dialogue between learners. Dialogue occurred best in an open area, where learners developed a sense of participation; it was a devotion to the constant transformation of reality. Dialogue required social and political responsibility (Freire, 1973).
Beyer (1990) stated Socratic questions should have been used as a device to engage in dialogue; for it was by asking and answering questions that dialogue was generated. Learner generated dialogue was a means for guiding the practice and application of knowledge presented by the educator.

Dialogue was essential to education. As Freire (1973) suggested, there was no such thing as isolated thinking; thinking required a subject to think, an object to think about, and communication. Freire (cited in Alschuler, 1986) cited six attitudes that must have been present for dialogue to occur; love, humility, faith, trust, hope, and critical thinking. Dialogue encouraged reflection.

**Reflection**

Reflection was an essential phase in the critical thinking process whereby people explored their experiences in a conscious manner in order to lead to a new understanding and perhaps new behavior (Jarvis, 1987). Freire (1973) stated reflection was the means by which men related to their world in a critical way. Boud, Keogh, and Walker (1985) identified three elements of reflection as replaying of the experience in the mind of the learner, attending to feelings, and re-evaluating the experience.

Brookfield (1987) stated one of the most important functions of an adult educator was to reflect back to the learner their motivations, actions, and justifications. It was difficult, if not impossible, for learners to see themselves as they really were; learners became trapped in their own taken-for-granted assumptions.
By reflecting other's behavior, educators helped learners see how their behavior was perceived, the first step to resolving the complexities of life. Meyer (1987) stated that by building on a learner's past experiences, the educator may lead them to a more reflective way of thinking.

Watson (1983) found class discussions would have been more effective if educators would allow students to reflect on material, first by themselves, and then in small groups, before conducting a class discussion. Praxis or critical reflection on an experience, helped the learner to try new strategies which often involved collaboration with others. The process made learners aware of how taken-for-granted norms were acted out without questioning (Marsick, 1987).

**Summary**

The study of critical thinking in education dated from the days of Socrates. However, in recent years the emphasis had shifted from reflective thinking promoted by Dewey in the early twentieth century, to an emphasis on subject matter. Little emphasis had been placed on critical thinking development in adult learners. With the exception of Jones (1989) and Brookfield (1986), critical thinking had been neglected in the adult educational literature.

Critical thinking, building on Dewey's definition of reflective thought, was defined by Ennis (1985) as reflective and reasonable thinking focused on what to believe and do. Critical thinking included the component of values and the moral and ethical implication of decisions.
If the development of critical thought was an important educational goal, then educators must have devised instructional strategies to foster critical thinking in their teaching. In adult learners, critical thinking may be fostered by the use of selected instructional strategies. This study selected the strategies of questioning, dialogue, and reflection. Greater attention needed to be focused on the questioning skills of educators and on the need for Extension educators to be facilitators of critical thinking through dialogue and reflection (Romanish, 1986).

Instead of asking recall level questions, educators should have incorporated questions conceived at the higher cognitive levels of analysis, synthesis, and evaluation. Questions asked should help the learner transfer what was learned in the educational setting to the real world. Questioning along with the effective use of wait time could have been, according to Taba (cited in Wilen & Clegg, 1986), the single most important teaching act.

The second instructional strategy, dialogue, was promoted by Freire (1970) and viewed by Beltran (cited in Agunga, 1990) as a means for encouraging horizontal communication. Dialogue was more than just questions and answers; effective dialogue involved the use of reflection.

Reflection allowed the learner to see how their behavior was perceived (Brookfield, 1987). In addition, reflection allowed the learner to try new strategies which may have involved collaboration with other learners (Marsick, 1987).
Therefore, the critical thinking instructional strategies selected for inclusion in this study were questioning, dialogue, and reflection. In this researcher's opinion, these strategies were critical components of effective Extension teaching.
Literature Related to Attitude and Knowledge

How did attitudes and knowledge impact on the instructional strategies used by Extension educators? What was the relationship of attitude and knowledge to the actual use of instructional strategies and principles which foster critical thinking in adult learners?

Attitudes

Attitudes were defined as an overall evaluation which included the properties of intensity, favorability, and confidence, all of which influenced the educator's approach to teaching. Their impact derived from and was shaped by the nature of the educator's prior experience with critical thinking (Engel, Blackwell, & Miniard, 1990). Attitudes were defined by Hawes (1990) as beliefs that were held today and were open for revision and improvement. Moore, McCann, & McCann (1985) defined attitudes as a "persisting state of readiness to react favorably or unfavorably...according to one's value system" (p.433).

Attitudes were like dispositions in that they were general principles which govern behavior and were usually observable as inner speech (Marzano, Brandt, Hughes, Jones, Presseisen, Rankin, & Suhor, 1988). Often people were unaware of their attitudes and their affect on thinking. Attitudes were often backed by emotion and may have been in conflict with basic goals and needs (Moore, McCann, & McCann, 1985).
Several researchers had developed methods of measuring attitude as a means to identify and measure a behavior of interest. Probably the best known were Ajzen and Fishbein (1980) who found, "barring unforeseen events, a person will usually act in accordance with his or her intention" (p.5). Their theory of reasoned action stated that a person's intention to act was based on the personal factor of "positive or negative evaluation of performing the behavior ... termed attitude toward the behavior" (p.6) and on the subjective norm or the perceived social pressures to act. "Individuals will intend to perform a behavior when they evaluate it positively and when they believe that important others think they should perform it" (p.6). Locke (1969) found the best indicator of behavior was the intention of the individual toward the behavior.

Behavioral beliefs according to Ajzen and Fishbein (1980) were beliefs which underlaid a person's attitude toward the behavior, while normative beliefs underlaid a person's subjective norm. Subjective norms may have exerted pressure to perform a given behavior independent of a person's own attitude toward the behavior (Ajzen & Fishbein, 1980). They concluded that to adequately conceptualize and measure behavior, understanding the connection between attitude and behavior was essential.

A second theorist regarding attitude measurement, Mueller (1986), believed actual behaviors were influenced by many things other than attitudes and were not an accurate measure of attitude. When asked about their attitude, Mueller (1986) found people responded with "beliefs, feelings, prescriptions (behavioral preferenc-
es or behavioral intentions), statements of fact, and statements about their own behavior" (p.1).

According to Ajzen and Fishbein (1980), one way to measure behavior was by observation of the relative frequency of behavioral performance. "Although self-reports of behavior are usually quite accurate, the accuracy cannot be taken-for-granted" (p.38). Self reports of behavior usually required less time, effort, and money than direct observation of the same behaviors. An example of how to broaden the behavioral criterion was to observe more than one action, in different contexts, at different points in time.

In a study conducted by Walker (1985) to measure attitudes, findings described teachers’ attitudes about their own ability to teach critical thinking. Approximately half of the respondents said they were good teachers of critical thinking. Although half the teachers sampled had not been adequately trained and half had not been told whether or not they were good at teaching critical thinking, many of them believed they were. Behavior seemed to be driven in part by attitudes.

Norris (cited in Rankin, 1987) stressed increased attention to those attitudes and dispositions fundamental to good thinking. Critical thinking resulted from the combination of both skills and attitudes. In Walker’s study (1985), the teachers’ attitudes toward their own abilities to teach critical thinking were very positive. If positive attitudes toward critical thinking resulted in instructional strategies which
promote thinking, then was it possible to alter teacher attitudes toward critical thinking?

Fishbein's multi-variate model suggested two ways to change attitudes: one way was to influence the salience of the evaluative criteria; a second was to alter beliefs. The salience of an evaluative criteria was difficult to improve. Beliefs may be altered by changing perceptions about behavior or action (Engel, Blackwell, & Miniard, 1990).

Talmage, Pascarella, and Ford (cited in Chatraphorn, 1989) found that changing teaching practices was a required basis for improving teaching quality. Educators participating in long term in-service programs on educational practices developed more positive attitudes toward an educational practice and tended to implement the practice more often. In addition, Bettencourt, Gillett, Gall, and Hull (cited in Chatraphorn, 1989) found trained educators to be more enthusiastic than untrained educators.

Howser (1989) stated that for educators to make a change in their attitudes or behaviors, the environment must allow them to become learners first and educators second. Behavioral change within educators was often due to changes in cues from the work environment. Professional development in educators was a combination of "interactions between adult learning, the change process, adult development theories, and staff development activities. All those issues must be taken into consideration when trying to understand why some teachers learn and grow and others do not" (p. 18), and why some educators used instructional strate-
gies to foster critical thinking and others did not. Therefore, training and practice using a behavior tended to develop a more positive attitude toward that behavior. Would the practice of critical thinking by Extension educators develop a more positive attitude toward critical thinking?

Knowledge

While attitude was based on beliefs, knowledge was what the Extension educator knew about critical thinking instructional strategies. Most researchers agreed trying to assess whether behavior was based on attitude or knowledge was difficult, if not impossible. This study examined perceived knowledge as related to the actual use of critical thinking instructional strategies and principles.

The desire to gain knowledge was sufficiently strong that many people would make substantial personal sacrifices just to obtain knowledge. Although the search for knowledge was often viewed as a phenomenon of higher education, in reality the process occurred daily in normal lives. By satisfying the need to know, resources were generated to satisfy other needs. When information was understood, the satisfaction of knowing was usually enough (Moore, McCann, & McCann, 1985).

Brown (cited in Norland, 1990) adopted Bloom's taxonomy and identified six behaviors in the cognitive domain. Knowledge was the ability to recall; comprehension was the ability to apprehend what was being communicated and required knowledge; application was the ability to use ideas, principles, theories
and required comprehension and knowledge; analysis was the ability to breakdown
a communication into parts and required application, comprehension, and knowl-
edge; synthesis was the ability to put things together and required analysis, applica-
tion, comprehension, and knowledge; evaluation was the ability to judge the value
of ideas and procedures. and required analysis, application, comprehension and
knowledge. Critical thinking occurred at the levels of analysis, synthesis, and
evaluation.

Paul, Binker, Martin, and Adamson (1989) compared two conflicting
theories of knowledge and learning: the scholastically dominant theory and the
critical theory.

The scholastically dominant theory suggested:

-Learners need to be taught what to think, not how to think.
-Knowledge was independent of thinking.
-The educated person was similar to a data bank.
-Learners did not need to be taught how to listen.
-Basic skills of reading and writing may be taught without emphasis on
higher order thinking.
-Learners who had no questions were learning.
-People would gain knowledge without seeking or valuing it.
-It was more important for the educator to cover a lot of information than
to cover the information in-depth.
-The teacher was responsible for what the student learned.
Students would automatically transfer what was learned in the classroom to real life.

The critical theory of knowledge and learning assumed:

-Learners needed to be taught how, not what to think.

-An educated person was a "repository of strategies, principles, concepts and insights embedded in processes of thought rather than atomic facts" (p.300).

-Learners needed to be taught how to listen critically.

-Reading and writing were inferential skills requiring critical thinking.

-Learners who had no questions were probably not learning.

-Learners gained only the knowledge they sought and valued.

-It was more important to uncover a small amount of knowledge or information in-depth, than to cover superficially a large volume of information.

-Learning occurred when we taught what we knew to others.

-Learners should have had responsibility for their own learning.

Thus, the critical theory of knowledge and learning was the basis for teaching critical thinking to adult learners.

Ornstein (1988) proposed ten areas of knowledge for educators to consider. One of these was that "knowledge should facilitate learning how to learn" (p.73). Since no individual could accumulate all knowledge necessary to live, educators must teach how to retrieve and use knowledge. Knowledge should be taught in a context of values since the interpretation of knowledge in part reflected a value
system. Failure to achieve knowledge skills may leave a person powerless to the forces of change.

"Learning is the transformation of experience into knowledge, skills, and attitudes...Skills are acquired through the interaction of experimentation and reflection, until they are internalized as both habituated knowledge and routinized performance" (Jarvis, 1987, p.164,166). Jarvis continued by stating reflection was essential to learning. Reflection provided an opportunity for learners to consciously explore their experiences to lead to new understandings such as the development of critical thinking. Knowledge was therefore, created through a synthesis of previous knowledge based on reflection and perception of the present experience.

While attitudes were like dispositions in that they were general principles by which people lived, knowledge was the fact or condition of knowing (Webster, 1983). Understanding how learning interacted with knowledge and attitudes began to develop an understanding of how to assess and train Extension educators to incorporate more instructional strategies to promote critical thinking.

To move into the information era, Extension educators would need to develop a positive attitude toward and a knowledge of the critical theory of knowledge and learning. If this happened, then Extension educators could focus on the development of critical thinking in adult learners.

The subjects in this study were Extension educators. Therefore, attitudes and knowledge were measured in relation to their attitude toward and perceived
knowledge of selected critical thinking instructional strategies and principles and their actual use of the same strategies and principles.
Literature Related to Perceptions

Frequently, what Extension educators emphasized in their teaching and how they taught were based on what they perceived to be important. These perceptions may have been based on personal experience or on what was perceived to be important to adult learners or to administration. What the educator perceived as having occurred in a teaching situation may not have been what actually happened. Did the perceived use of an instructional strategy by the Extension educator match the actual use of the same strategies and principles as measured by a trained observer?

Perception may be defined by at least four factors. These included (1) considerations that could not be identified, (e.g., size being influenced by color); (2) deferential acceptance of perceptual evidence from a respected source more than from other sources, (e.g., a supervisor commenting on the use of an instructional strategy as opposed to a peer making the same comment); (3) influence derived from emotional factors, (e.g., teaching preference based on what was perceived to be correct (normative) to teach; (4) use of irrelevant cues when confronted with difficult judgment options, (e.g., decisions regarding instructional method effectiveness based on facial expressions) (Gibson, Ivancevich, & Donnelly, 1976).

Perception was the selecting, organizing, and interpreting of what was experienced by the senses (Chaffee, 1988; Steers, 1988). Meyers (1987) viewed thought structures as the way perceptions were organized to make sense of the
world. Perception involved knowledge (Gibson, Ivancevich, & Donnelly, 1976) and lead to a portrait of the world based on needs, desires, values, and dispositions of the perceiver (Steers, 1988).

Perception included perceptual selectivity, perceptual organization and personal factors affecting perception. Perceptual selectivity, the process by which objects were selected for attention (Steers, 1988), may have caused educators to select information that tended to support their views and ignored information that made them feel uncomfortable.

Perception also influenced how people viewed others. If educators understood that their own traits and values influenced their perceptions, then they might more accurately evaluate the performance of others. Information, actions, and behaviors which appeared to satisfy a self-need, would be perceived more readily than those which did not (Gibson, Ivancevich, & Donnelly 1976). Objects may be removed from the perceptual field by going unnoticed or by being "tuned out" (Steers, 1988).

Perceptual organization, the second factor, was making sense out of the object, once noticed, by organizing it according to the individual's unique frame of reference and needs (Steers, 1988). Frame of reference was the body of knowledge, beliefs, and experiences through which new experiences were interpreted and understood. In addition, frame of reference limited perceptions or the process by which meaning was given to sensory stimuli. Perceptions were often shaped by what was being observed or thought about at the time. The verbalization of
perceptions (or the intended message for another) was also subject to error, as the language of the speaker may not accurately communicate the desired perception. Strong emotions tended to narrow perceptions and limited or inhibited critical thinking. It was human behavior to imagine what was never perceived (Moore, McCann, & McCann, 1985).

Thirdly, perception was influenced by three personal factors identified by Steers (1988) which may influence the attention paid by an individual to an object of attention. The first was response salience, or the tendency to focus on objects that related to immediate needs and wants. Response salience may have distorted the educator's view of his or her surroundings and caused an over or under estimation of time spent on a teaching technique.

The second was response disposition, or the tendency to recognize familiar objects sooner than unfamiliar ones. Response disposition recognized the importance of past learning as it pertained to what was perceived to be important. Past training in instructional methods may have influenced what methods an educator perceived were currently used.

Attitudes and feelings toward an object was the third factor influencing perception. Attitudes and values sensitized educators so objects related to the strongest feelings were more readily recognized. Therefore, the more important the educator perceived or valued the teaching of critical thinking, the more easily the educator would recognize the perceived use of strategies which promote critical thinking.
Jones (1989) presented research results indicating "Ohio Extension Home Economists perceive critical thinking to be an important part of adult learning, but believe that if their teaching is to reflect critical thinking principles, they need to increase their knowledge and skills pertaining to critical thinking" (p.94). They believed their knowledge of critical thinking methods and theory to be inadequate.

In summary, perception was selecting and organizing what was seen, involved knowledge, and was based on values and needs. Perception involved both perceptual selectivity and perceptual organization. Perceptual selectivity determined how people paid attention to the world. Objects may go unnoticed or be tuned out and therefore, not perceived.

Steers (1988) stated that "the importance of perception should not be overlooked by managers interested in the study of people at work" (p.99). Therefore, the perceived use of selected instructional strategies and principles had been included in this study.

Extension educators may have over or under reported their perceived use of instructional strategies to promote critical thinking. This study measured the perceived use of selected instructional strategies and principles which fostered critical thinking and compared the perceived use by Extension Home Economists with the actual use of the same strategies and principles.
Literature Related to Adult Learners

Knowles (1980), who Americanized the European concept of andragogy, characterized the adult learner as being self-directed, identified by highly-valued self-experience, and motivated to learn based on the developmental tasks of the adult’s social role. Adult learners tended to be problem-centered instead of subject-centered in their learning. Knowles (1970) believed the role of the educator moved from creator of a learning environment (which encouraged questioning and critical thought) to that of a professor of concepts and knowledge, then back again to the role of facilitator of instructional strategies for adult learners to apply concepts to their everyday lives.

Brookfield (cited in Caffarella, 1987) said true self-directed learning involved the element of critical reflectivity. Some adult learning was not problem centered, but rather the "free-flowing exploration of an area of knowledge" (Brookfield, 1986, p. 121). Jones and Woodcock (cited in Sweeney, no date) claimed adults were capable of being responsible for their own learning; thus, educators should incorporate self-directed learning activities into courses. In addition, adults learned through reflection; therefore, interactive instructional methods such as case studies and role playing should be used. Adults may have fixed points of view and be seemingly closed to new ways of thinking; educators must therefore use opportunities for experimentation and feedback to overcome the mental barriers to expanded self-directed learning.
Brookfield (1986) rationalized that for learners to be self-directed, educators must help learners understand how to use the experiences of others as a learning resource, to organize what was learned in relation to current problems and concerns, to facilitate problem posing and problem solving, to create a supportive climate with feedback to encourage efforts to change and take risks, and to emphasize experiential instructional methods.

Brookfield (1986) further identified six principles of effective adult education: (1) participation in learning was ultimately voluntary; (2) effective practice was characterized by respect among participants for each other’s self-worth; (3) facilitation was collaboration of facilitators and learners; (4) praxis, a combination of reflection and action, was the heart of effective facilitation; (5) the goal of facilitation was to foster a spirit of critical reflection; and (6) the aim of facilitation was the nurturing of self-directed, empowered adults. Collaborative modes of teaching and learning would enhance the self concept of those involved and result in more meaningful and effective learning.

Cross (1985) believed some adult learners preferred the educator to take responsibility for their learning; some learners experienced a feeling of safety by giving up all self-direction to the authority. Rather than wholesale acceptance of the concept of andragogy, Cross urged educators instead to diagnose learner problems and develop strategies to overcome them. Multiple strategies may be used to help adults become aware of their thinking ability and function to overcome blocks to learning.
Adult educators must remember "most learners who have the capacity to reach the highest levels of thinking...will not do so unless they are 'taught'" (Lee, 1990). Most adult learners approached learning situations with specific expectations of what they would gain from the experience. Some of these expectations provided a guide to the activity, while others served as resources to their learning (Chatraphorn, 1989).

Adult learners were willing to lend a hand in the actual teaching, thus facilitating the implementation of critical thinking instructional strategies (Kreitlow, 1982). Adults progressed more rapidly in situations involving realistic problems (Etheridge, 1982). Adults benefitted most from active participation in the learning process which was what critical thinking emphasized. Adult learners were interested in asking questions or listening to questions and the responses raised by other learners (Kreitlow, 1982).

Good adult education did not just happen. Adult educators became effective by learning and practicing principles and techniques of critical thinking. To be a creative adult educator and to adjust to a variety of learning patterns, the educator must be dedicated to their own continual learning (Klevins, 1982). To be a creative teacher of adults, adult educators must be interested in their own continual learning (Kreitlow, 1982).

In summary, adult education should be collaboration between facilitator and learners using a combination of reflection and action. Adults benefitted from self-directed learning which required active participation of learners to facilitate the
fostering of critical thinking skills. Becoming an effective adult educator did not just happen; effort and continual growth on the part of the educator were required to understand the needs of adult learners and to develop critical thinking in both self and others.

Therefore, for this study, Extension educators were viewed, not only as educators, but also as adult learners of critical thinking instructional strategies. The researcher postulated that there was a relationship between the perceived knowledge of critical thinking and the Extension Home Economist's actual use of critical thinking instructional strategies and principles as well as between the Extension Home Economist's training in critical thinking and the actual use of critical thinking instructional strategies and principles.
Literature Related to Performance Appraisal

Educator performance was possibly driven by feedback on formal performance appraisal. Attitudes toward change of teaching practice may have resulted from the educator's perception of what was being evaluated by the performance appraisal. Was there a relationship between the actual use of critical thinking instructional strategies and principles by the Ohio Extension Home Economists and their performance appraisal scores?

Performance appraisal may be defined as the "progress of observing, identifying, measuring and developing human behavior in the organization" (Schneier & Beatty, cited in Kruger, 1986). Cascio (1982) defined performance appraisal as "the systematic description of individual job-relevant strengths and weaknesses" (p.309). Performance appraisal was more than just a technique; it was a exchange between people and data (Cascio, 1982). Performance appraisals served two functions: to ensure acceptable levels of performance and to plan career development (Slater, 1991).

Who actually conducted performance appraisals? Cascio (1982) found actual performance appraisal consisted of appraisals by subordinates, by clients, and by peers as well as multi-rater approaches and self-assessments. However, the immediate supervisor had the best information to evaluate the employee against organizational objectives and, thus, was the most logical person to do so. Performance appraisals may be used for a variety of purposes including as a predictor of future performance and facilitator of organizational development.
A potential and frequent problem with performance appraisals was the problem of employees thinking their behavior was being judged against one standard and supervisors using a different standard. Other performance appraisal problems included central tendency and halo effect.

Central tendency was an error in rating where supervisors tended to avoid the high and low extremes. With halo effect, the individual was rated high or low on many factors because the rater knew the individual was high or low on a specific factor. In an effort to avoid a halo effect or consistently rating an individual too high or too low, Cascio (1982) suggested the use of a combination of rating techniques to be the most effective.

Performance appraisal systems consisted of a variety of techniques including behavior checklists, forced choice system, critical incident, and behaviorally anchored rating scales. Many performance appraisal systems emphasized results when what was needed was an integration of behavior with results. Behaviors (in this context) were defined as how results were accomplished as opposed to what results were accomplished. Focusing on behaviors, and not on results, could improve communications between managers and employees and assist employees in a positive manner to overcome performance deficiencies (Kruger, 1986).

What behaviors defined quality in an Extension educator? Quality in Ohio Extension education was defined by programs which (1) reflected needs assessment, (2) were planned in conjunction with district specialists, (3) were based on technically accurate content, (4) were developed from a broad base of community
networks, (5) used multiple delivery methods, (6) were innovative, (7) were cost effective, (8) reached a wide variety of clientele, (9) targeted multiple audiences, (10) had a strong support base, and (11) demonstrated documented accomplishments (Conone, 1991). These standards of quality were the basis for the Ohio Cooperative Extension Service performance appraisal system.

In the Ohio Cooperative Extension Service, performance appraisals were conducted yearly and scores were directly related to salary increases. Regression analysis was computed factoring in program area, gender and tenure including credit received when entering the organization (a significant variable). Promotion and tenure were also significant since the year in which promotion or tenure were received resulted in an automatic percentage pay increase (Stitzlein, 1991).

During 1991, performance appraisals for the Ohio Cooperative Extension Service were based on two inputs: Major Program Objective (MPO) which accounted for 25% of the score and Performance Against Standard (PAS) which accounted for 75% of the 1000 point score. If a county Extension agent had administrative responsibilities, then 25% of the PAS score was based on this factor. The scores were computed by the district director and communicated to the Extension educator. The PAS performance appraisal instrument was comprised of program criteria using a quantitative measure, while the MPO instrument consisting of major targeted program efforts, also used a quantitative scale (Stitzlein, 1991).
On a state wide basis, Stitzlein (1991) reported a greater range for Ohio Extension educators in MPO scores than in PAS scores. Scores for all Extension educators in a district were totaled based on 1000 points and then grouped by score into five groups for the final analysis by the district director. Past records indicated approximately 15-20% of Extension educators were in group 5 (the highest); 20-30% in group 4, 40-50% in group 3, and 2-5% in group 2. There appeared to be little variation between district directors on how agents were grouped for the final evaluation. Nor was there much variation when a district director left the position and a new director was hired.

The most significant variable in performance appraisal appeared to be if the Extension educator created a good impression early in his or her career. Stitzlein (1991) reported the criteria for hiring Ohio Extension educators, included academic course work in education or hands-on experience with teaching. No records were maintained on the percent of Extension educators with degrees in education.

Instructional practice was one of the five categories most often used on evaluation instruments to measure teacher behaviors (Weber & McBee, 1990). However, in the Ohio Cooperative Extension Service, while the use of instructional strategies was assessed, instructional strategies which promoted critical thinking were not a distinct identified variable in performance appraisal (Stitzlein, 1991).

Jones (1992) postulated that if Extension educators used critical thinking, this would lead to better decision making, which in turn, should produce better teachers. Being a more effective educator should translate to a higher perfor-
mance appraisal score. Performance appraisal was used as a variable in this study to test this thinking.

In summary, performance appraisal was the systematic review of an employee's strengths and weaknesses and should include the critical thinking technique of dialogue. Performance appraisals were best conducted by the immediate supervisor and may be impacted by the problems of central tendency, halo effect, (Cascio, 1982) and inappropriate application.

Behaviors rather than results should be the prime focus of performance evaluation. While the performance appraisal system of the Ohio Cooperative Extension Service included behavior oriented criteria, the terminology "critical thinking" was not used.

This study looked at the relationship between performance appraisal scores for Extension Home Economists, averaged over the last two years, and the actual use of selected critical thinking instructional strategies and principles by Ohio Extension Home Economists. The researcher postulated a direct relationship between performance appraisal scores and the actual use of critical thinking instructional strategies and principles.
Literature Related to Educational Practice

The word educate came from the Latin educere = e, out + ducere; to lead, draw, bring. The word meant "to draw or bring out, not to pump in" (Ferguson, 1986, p. 217). The educational practice philosophy of the Extension educator influenced whether or not instructional strategies were used to promote critical thinking. This review of literature examined four dimensions of general educational practice and three positions to education as they related to critical thinking.

Vaines and Wilson (1986) proposed a theoretical framework for consideration of four general educational practices. The dimensions proposed were customary practice, instrumental practice, interactive practice, and reflective practice. These dimensions facilitated teaching actions and directed professionals behaviors.

Customary practice was defined as atheoretical using historical precedent, personal experience, and conventional wisdom as modes of inquiry. A purpose of customary practice was to solve particular and immediate problems, while action was guided by personal expertise based on historical, cultural tradition. Values might have been shared through reading a story with a moral or a poem. The behavior of the professional was based on routine and social conduct.

Instrumental practice was defined based on empirical theories of causal explanation using the empirical examination of predefined problems as the mode of inquiry. One purpose of instrumental practice was to produce technically useful knowledge while knowledge and action were viewed separately. The educator tried
to prevent or control problems by using recommended techniques with a research base. Reliable information was used to teach subjects related to control of the environment. Questions asked related to what was the best method? How could the best results be obtained? The educator defined the problem, planed procedure, and assisted the learner in achieving objectives set by the educator. Values were explained as they affect a decision but otherwise were not shared.

Interactive practice was defined based on interpretive theory and historical analysis with the modes of inquiry being analysis of experience, practical deliberation, and discourse and dialectic. One purpose of interactive practice was to build consensus of understanding; knowledge was tied to action through interpretation and orientation. The educator and learner worked in partnership to obtain long term goals. This practice was used to solve practical, ongoing problems. Knowledge was tied to action by interpretation.

Reflective practice was defined based on critical and normative theory with the modes of inquiry including dialectical, critical reflection, and reflexive examination. One purpose was to build a just society for all through constant interplay between professional knowledge and the way knowledge was translated into action. Learners were provided opportunities to reflect on observations and experiences. Critical and creative thinking skills were used to evaluate situations and create action. Questions asked included What ought to be? Was this in the best interest of others? What would be best in the future? Values were identified and discussed in terms of long term consequences. The ideal was discussed in light of
what values conflict with reaching that goal. Educators used this practice for reflection, critique, and social action.

Miller (1988) viewed educational practice differently in his proposed three positions to education: transmission, transaction, and transformation. Transmission focused on traditional subjects taught using traditional teaching methods and emphasized the absorption and retention of material by the learner. Transaction viewed the individual as rational and capable of problem-solving. Education was viewed as dialogue between learner and subject matter. Transaction thus focused on educational problem-solving and instructional strategies to teach problem solving skills. The heart of transaction was John Dewey's application of the scientific method to a broad range of problems. The transformation position viewed the learner as a whole being; not just the cognitive processes but also the aesthetic, moral, physical, and spiritual needs. The transformation position was divided into concern for individual growth and social change.

Miller (1988) postulated one way to view these three positions was by an inclusive approach (Figure 2). The transaction position included the transmission focus on knowledge retention and applied it to problem solving. The transformation position incorporated the cognitive emphasis of the transaction position in a broader context. The transformation position was the basis of holistic education which broadened the vision and perspective of the learner, similar in context to critical thinking.
Figure 2

Three Positions to Education: Transmission, Transaction, and Transformation

In summary, Vaines and Wilson (1986) proposed four dimensions to educational practice: customary, instrumental, interactive, and reflective. Instrumental practice proposed that the educator using recommended techniques based on research try to prevent or solve problems. Reflective practice involved critical reflection where critical thinking skills were used to evaluate situations and actions.

Miller (1988) presented three positions to education: transmission, transaction, and transformation. While transmission was similar to the traditional view of Extension as the provider of information, transformation viewed the individual as a whole and was closely aligned to the use of critical thinking instructional strategies.

Earlier, the researcher noted literature suggesting educational practice to be a requirement for the development of critical thinking skills in the educator. Combining the reflective practice of Vaines and Wilson (1986) and the transformation position of Miller (1988) created an educational atmosphere supportive of and conducive to the development of critical thinking in adult learners.

For this study, educational practices which foster critical thinking in adult learners were defined as reflective practices as opposed to the instrumental practice more commonly used by Extension educators. In addition, the researcher considered that critical thinking was more readily fostered in adult learners if Extension educators maintained a transformation position to teaching.
Literature Related to Direct Observation

Direct observation in adult education permitted the verification of certain skills and behaviors not measurable by other methods. In this study, the most efficient way to assess the actual use of instructional strategies and principles was by direct observation.

The process of direct observation was divided into two categories. The first, systematic observation, dictated an advance determination of behavior types to be measured. Behaviors were then counted during a predetermined time period. Systematic observation required time, organization, and strict procedures for the observer to follow. In contrast, nonsystematic observation involved noting all behaviors, characteristics and personal habits which appeared significant. This type of information was very useful in the formative stages of research. However, two limitations of direct observation, which the researcher wanted to closely control, were observer bias and narrowness of behavior being sampled (Clarke County Board of Education, 1984).

Direct observation might serve as either an obtrusive or unobtrusive method of data collection subject to reactivity; the process of measuring might change what was being measured. By using multiple methods of data collection, the researcher could determine if the result was a product of the method or a more general characteristic of the world (Kagan, 1972). Verbal reports of behavior might not be representative; behavior in one situation might not reflect behavior in another. Unobtrusive measures relied on what the world was, and could not always measure
what was desired. Disadvantages included the introduction of observer error as reported by Campbell who documented 21 types of human observer error (Kagan, 1972). In addition, observation might also be viewed as "spying" (Nine Basic Assessment Methods, cited in Conklin, 1991).

Audio or video tapes might be used in place of an observer or as a means to confirm observations made by the observer. Audio tapes might be used as "expert observers" since they recorded without interpretation everything that occurred within their range. Audio taping could occur when an actual observer in the classroom might be too threatening, too involved, or inappropriate in some way or when videotaping of a single teaching incident might be too "staged" to be of use (Task Force on Faculty Evaluation, 1982).

Videotapes of group situations might also be used to train observers as evidenced by Carroll, Hain, Howell, Crosby, & Rombeau (1983). Observers independently rated videotaped simulations and then compared ratings to evaluate agreement on items. The researchers found the level of inter-rater reliability to be in the range of 0.45 to 0.70. Despite additional training, acceptable levels of inter-rater reliability were not achieved.

Insignificant inter-rater reliability might be due to the observational code, the training of the observers, or the method of calculating reliability. Several approaches were available for recording and coding single and multiple class responses, one of which was a specific observational code for each problem under study.
Observation codes should be devised with mutually exclusive categories so each event did not occur in another category (Bijou, Peterson, & Ault, 1968).

The training of observers might be used to improve the coding technique. During training, observers might work as a group to identify behaviors being scored and uncover ambiguities in the coding, thus, reducing interpretation by the observer and improving the code. An improved code also improved inter-rater reliability (Bijou, Peterson, & Ault, 1968).

How was inter-rater reliability calculated? Bijou, Peterson, and Ault (1968) recommended that "unless the sums obtained by each observer are equal, the smaller sum is divided by the larger to obtain a percentage of agreement. If the sums are identical the reliability index would be 100" (p. 183). The researchers continued by saying reliability might also be calculated by scoring each time segment of the observation as "agree or disagree (match or mismatch) and dividing the total number of agreements by the number of agreements plus the number of disagreements" (p. 184).

The length of the teaching situation might also be a variable the researcher using direct observation could not control. One method for controlling this variability was to calculate the frequency of each behavior and divide by the teaching time to produce a density factor to each behavior, which could then be compared across teachers (Showers, 1982).

Triangulation, or the use of multiple techniques for greater accuracy, reduced some of the problems with direct observation and viewed qualitative and
quantitative data collection methods as complementary. The effectiveness of triangulation was in the assumption that the weaknesses of one method would be compensated for by the strengths of another method. Research designs which integrated field work in the form of direct observation and survey results were rare. Triangulation allowed researchers to be more confident of results, might produce divergent results, and might serve as a test for competing theories. The disadvantage to using triangulation was the difficulty of replication of the study by other researchers (Jick, 1983).

In summary, direct observation might either be done in a systematic manner where predetermined behaviors were counted or in a nonsystematic way in which all behaviors were recorded. Verbal reports of behavior might not be accurate; audio or video tapes might be used in place of human observers. Inter-rater reliability was a concern with direct observation, and methods must be sought to improve the reliability.

This study used direct observation as part of the theory of the study as well as a data collection technique. The researcher hypothesized that the actual use of selected critical thinking instructional strategies and principles could only be accurately measured by using direct observation.
Summary

This review of literature provided a theoretical basis for the variable actual use of selected critical thinking instructional strategies and principles and the variables related to the actual use of these strategies and principles by Ohio Extension Home Economists. This review included summaries as well as major findings of prior studies on the variables of interest.

Based on the review of literature, the following variables were included for study of the actual use of selected critical thinking instructional strategies and principles by Extension Home Economists. Independent variables were perceived knowledge of critical thinking instructional strategies and principles, perceived use of critical thinking instructional strategies and principles, and attitude toward critical thinking. The dependent variable was actual use as measured by direct observation of a teaching situation.

An overview of the critical thinking literature had highlighted the wide variety of definitions of critical thinking found in the literature. Instructional strategies must be developed to foster critical thinking in adult learners. Three of these strategies were questioning, dialogue, and reflection. According to Taba (cited in Wilen & Clegg, 1986) questioning was the single most important teaching act. Effective dialogue involved the use of reflection; which allowed learners to see how their behavior was perceived. Since critical thinking in adult learners had not been well researched, very little on this aspect of critical thinking was found.
A framework for the study of the actual use of instructional strategies and principles was provided by a review of the literature on knowledge and attitude. The critical theory of knowledge was the basis of critical thinking. Perceived knowledge was used as an independent variable because the more important the educator perceived or valued the teaching of critical thinking, the more easily the educator would recognize the perceived use of strategies and principles which promote critical thinking. Nothing was found in the literature to correlate the actual use of a behavior with the perceived use of the same behavior.

A review of the adult learning literature provided the framework for developing critical thinking in educators and in adult learners. True self-directed learning was based on the principles of critical thinking. Being an effective adult educator meant the Extension agent must also be an adult learner.

Literature on performance appraisal was reviewed as the researcher hypothesized there was a positive relationship between Extension Home Economists with high performance appraisal scores and the actual use of critical thinking instructional strategies and principles. Educational practices of the adult educator provided the underlying ground work for the educator's philosophy for teaching based on critical thinking. Extension educators who used reflective practice and maintained a transformational position to teaching adults should use also critical thinking instructional strategies.

Finally, direct observation was included as a basis for the theory that the only way to accurately measure actual behaviors was by direct observation. The
The purpose of this study was to explore the relationships between the actual use of critical thinking instructional strategies and principles and the independent variables identified in this literature review.
CHAPTER III
PROCEDURES

The following topics were discussed in this chapter: Research Design, Population, Instrumentation, Data Collection Procedures, and Data Analysis.

Research Design

This study was descriptive-correlational in nature; it explored the relationships between perceived knowledge, perceived use, and attitude (independent variables) as related to the actual use (dependent variable) of selected critical thinking instructional strategies and principles by Ohio Cooperative Extension Home Economists. The relationships between selected personological and situational intervening variables and the dependent variable were also explained.

This study identified seven research objectives. The first research objective was descriptive in nature and required no research question. The remaining six objectives included corresponding research questions to determine the relationships between the independent variables and the dependent variable in this study.

Data collection involved a random sample of 25 Extension Home Economists, with names first stratified by district, and then drawn at random to partici-
pate. The method of data collection was direct observation of a teaching situation by a trained observer and a self-report instrument, completed by each Extension Home Economist; both were forms of survey research (Kerlinger, 1986). Both instruments (Appendix A) were developed by the researcher. Additional data were obtained from Cooperative Extension Service personnel records. Data analysis provided measures of perceived knowledge, perceived use, attitude, personological and situational variables, and the actual use of instructional strategies and principles.

**Internal Validity**

The main concern with internal validity and survey research was measurement error. The issues of reliability and validity were addressed in the instrumentation section of this chapter. Appropriate personnel files of the Ohio Cooperative Extension Service were used to collect selected data as a way to reduce measurement error. Both instruments were reviewed by a panel of experts (Appendix B) during July and August, 1991 to determine content validity. The knowledge sections of the self-report instrument were pilot-tested by Ohio Extension Home Economists, not participating in the study, during August, 1991 to determine reliability on the knowledge portions of the self-report instrument.

**External Validity**

External validity, referring to the degree to which results may be generalized beyond the sample, was a major concern of self-report or survey research. Four
types of external validity included frame error, sampling error, selection error, and non-response error.

Frame error occurred when there was a discrepancy between the list of names in the population and the actual population. A list of the population was developed by the researcher and then confirmed by each District Specialist, Home Economics for her respective district on June 12, 1991 to reduce the possibility of frame error.

Sampling error was a second threat to external validity and occurred when a nonprobabilistic sample was obtained. To reduce sampling error in this study, the population was stratified by districts, thus producing a sample more likely to reflect the total population than a simple random sample (Fowler, 1988). A sample size of only 25, or 42% of the population (N=59), was selected due to the high cost of doing direct observation data collection. Ary, Jacobs, and Razavich (1985) suggested a sample size of at least ten to twenty percent of the accessible population. With a smaller sample, the likelihood of sampling error increased.

Selection error, a threat to external validity, occurred when some members of the population had a greater chance of selection than others (Miller, 1990). Ohio used a multi-county agent staffing pattern. As a result, some Extension Home Economists worked in two counties, which might be located in different districts. If lists were not compared for duplication, then multiple listed persons had a greater chance of being included in the study (Norland, 1990). This could have increased the chance of multi-county agents being selected for the study. Howev-
er, each multi-county agent was assigned one "home" county. Thus, the population list was developed using multi-county agents "home" counties, so as to avoid the chance of appearing on the list twice, thereby, eliminating their chance of being selected twice.

In this study, non-response error might have occurred in two ways. The first way involved subjects selected for the study who did not participate or who left employment with the Extension Service prior to completing the study. Non-response error would have occurred if an Extension Home Economist indicated willingness to participate, but never scheduled an observation time. In an effort to increase response rate, the initial letter to the Extension Home Economists explained the personal cost involved with participation in terms of time, preparation, or power of the observer over the observed. These potentially negative concerns were neutralized as much as possible. Participants were informed that the study should not add to their work load. They were asked to contact their District Specialist, Home Economics, who served as their observer, and to schedule a time between August 15 and December 1, 1991 to be observed. Participants were encouraged to teach a lesson already planned or to be scheduled.

A concern with personal interview research (including direct observation) was the interviewer might "hang onto" a participant hoping to get an interview until the study was over, with no opportunity for the researcher to take corrective action (Fowler, 1988). A concern of the researcher's during the data collection period was that some observers appeared to be "hanging onto" a participant and
not scheduling an observation. To control for this situation, all members of the sample were telephoned by the researcher to obtain a commitment to participate. With some members of the sample, the contact required repeated telephone calls, due to unavailability, to confirm the time for the teaching situation. As a result, all observations were scheduled and completed.

A second form of non-response was the Extension Home Economist who was scheduled for an observation and canceled the teaching situation. Repeated attempts were made by the researcher to encourage the participant to schedule a time to be observed. In addition, the District Specialist, Home Economics contacted the delinquent participant to schedule an observation of the teaching situation. In this study, there was a 100% response rate, even though 20% of the data were lost in the mail. This was similar to a mailed survey where data were returned and lost by the researcher. The researcher would not go back and recollect the data. This was a similar situation. Both the observer and the educator had made the effort to collect the data. Participants were assured confidentiality.

Non-response error on the self-report instrument was not considered a problem since the observer waited for the Extension Home Economist to complete the self-report instrument and returned both instruments to the researcher. After the December 1, 1991 deadline for completion of the observations, the researcher planned to contact any non-participants by telephone and verbally collect data for Section VII, Personological Information. This was not necessary due to a 100% response rate.
Population

The target population for this study consisted of all Ohio Extension Home Economists holding the job title of County Extension Agent. The frame consisted of a stratified random sample of the names of twenty-five county Extension Home Economists, drawn from a population of 59 Extension Home Economists, first stratified by districts. Stratifying the sample produced a sample "more likely to reflect the total population than a simple random sample" (Fowler, 1988, p.24). The accessible population was a list of names of all Ohio Extension Home Economists employed as of June 1, 1991 obtained from the Ohio Cooperative Extension Service Leader, Personnel and confirmed by District Specialists, Home Economics on June 12, 1991.

The frame contained all Extension educators who carried the title of Home Economics, in a county position, as of June 1, 1991. Only Extension Home Economists in a county position were used to hold constant the variable of job responsibilities. Extension Home Economists on the district and state level had different job responsibilities. Due to the constraints of time and money in conducting direct observations, a stratified random sample was used instead of a census. The accessible population consisted of 59 Extension Home Economists; 9 in the East District, 13 in the Northwest District, 15 in the Southwest District, 9 in the South District, and 13 in the Northeast District of Ohio.

The resulting data sample of twenty-five Extension Home Economists was comprised of five county Extension Home Economist from the East District, five
from the South District, five from the Northeast District, five from the Northwest District, and five from the Southwest District of Ohio.

Table 1

Data Collected By District

<table>
<thead>
<tr>
<th>District</th>
<th>Number In District</th>
<th>Number Selected</th>
<th>Percent of Respondents Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>East</td>
<td>9</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>South</td>
<td>9</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Northeast</td>
<td>13</td>
<td>5</td>
<td>20*</td>
</tr>
<tr>
<td>Northwest</td>
<td>13</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Southwest</td>
<td>15</td>
<td>5</td>
<td>20</td>
</tr>
</tbody>
</table>

Grand Total 59 25 25 100%

*Data were collected but lost in the mail

The frame was considered to be representative of the target population due to verification of the frame by the District Home Economists on June 12, 1991; the assumption was then made that the accessible and target populations were the same. Therefore, the results were assumed to describe the target population.
Just as a large sample would be more reliable than a small sample, a high response rate would produce a better, less biased sample than one with more non-response (Fowler, 1988). This study had a response rate of 100%.

Instrumentation

Two instruments were developed by the researcher to use for data collection in this study; one was a direct observation instrument and one was a self-report instrument.

Direct Observation Instrument

The direct observation instrument of critical thinking instructional strategies and principles was used for the observation of a group teaching situation to assess the actual use of selected critical thinking instructional strategies and principles. These strategies and principles were questioning, dialogue, and reflection; the findings were related to selected critical thinking principles for adult learners developed by Jones (1989). Each observation was audio taped to allow the researcher to check the observer for reliability in measuring the actual use of the instructional strategies and principles. The researcher decided not to use videotaping due to the legal and ethical issues related to social science research and videotapes ("Videotaped data," 1991) as well as the fact that audio taping collected all the necessary data.

A direct observation instrument (Appendix A), completed by the observers on each subject, was used to collect data on the following variables:
1. The actual use of selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection.

2. Length of time of the teaching situation.

3. Description of the teaching setting.

4. Type of teaching situation such as leader training lesson, open meeting, issues forum, or part of a series.

5. Number of audience members.

6. Topic of the teaching situation.

7. Purpose of the teaching situation.

The instrument was developed by studying other research instruments used to measure actual use and behavior by direct observation. It was based on a closed system of observation where only those items listed were observed (Evertson & Green, 1986) with units of measurement decided on an a priori basis.

The direct observation instrument consisted of four sections. Section I of the instrument consisted of a description of the teaching situation including date, time, topic, type of educational setting, number in audience, description of the audience, and purpose of the program.

Section II was the actual observation form with four categories: educator-initiated questions, educator-initiated dialogue, learner-initiated dialogue, and reflection. These categories were generated from the review of literature, interviews with researchers in the area of critical thinking, and from the researcher's experience. The observation form was divided into ten minute segments for
recording behaviors. The minimum length of an observation was to be one hour with a maximum length of two hours. The observer placed a tally mark under the appropriate category as the behavior occurred. Each tally recorded translated to one point for a total critical thinking implementation score. Each category was summed to assess the evidence of these instructional strategies and principles in the teaching situation. A teaching situation was defined as a block of time the Extension Home Economist was teaching in a group situation to adult learners.

Section III asked the observer to consider the entire teaching situation as 100% time. The observer was then asked to divide the time by percentages into lecture time, group activity time, time for educator questions, time for educator dialogue, time for learner dialogue, and time for reflection. These data were collected but not used in this study.

Section IV asked if an evaluation instrument which required reflection was used. If so, the observer was to attach the instrument to the observation form. These data were collected but not used in this study.

A panel of experts consisting of educators in the Colleges of Human Ecology and Agriculture, at The Ohio State University, who were familiar with critical thinking and Extension, was asked by letter to review the direct observation instrument and assess the quality of the question format, wording, sequence, and the format of the pages to determine content validity. This review occurred during July and August, 1991. Responses were returned to the researcher by campus mail.
The five observers assigned to collect data were the District Specialists, Home Economics. Each District Specialist, Home Economics held at least one degree in home economics so the observer should have been familiar with the subject matter presented. In addition, their job responsibilities included the observation of agents teaching for the agent's annual performance appraisal review. The researcher met with the District Specialists, Home Economics and the Assistant Director, Home Economics on June 12, 1991 to discuss the research study. Following a general explanation of the research project, each of the five District Specialists, Home Economics was asked by the Assistant Director, Home Economics if they were willing to participate as observers and what questions or concerns they might have had. All five District Specialists, Home Economics agreed to participate and the date of August 1, 1991 was set for the researcher to train the five observers.

Training consisted of a three hour time block (see Appendix D for training agenda). During training, observers watched a series of videotaped teaching situations and evaluated each situation using the direct observation instrument. The subject of each taped teaching situation (videotaped by the researcher) was Ohio Extension Home Economists conducting a teaching situation. Educators who were videotaped were neither part of the research study sample nor of the pilot test. The examples of teaching situations were shown to the observers to highlight each critical thinking instructional strategy and principle being measured and to insure the observers became familiar with the direct observation form.
Following training all observers were asked to watch one teaching situation, a second time, ten days following the training. The observer was to complete the direct observation form a second time. Scores on the first and second observation instruments were then compared for intra-rater reliability. If training was adequate, observers should have repeatedly assessed the same teaching situation in the same manner (Gay, 1987). If the teaching situation was not repeatedly assessed the same, additional observer training should have been conducted. This was not the situation in this study as the observers did not promptly return the second observation and the researcher was unable to assess the intra-rater reliability until the completion of the study.

Interviewers (or observers) might introduce a significant source of error. However, training could significantly reduce observer error, improve reliability, and reduce bias. Further, training and development of instruments requesting quantitative measures could eliminate variability in observer's behavior and thus, reduced the observer's affects on data (Gay, 1987). Richards and Simons (cited in Kilpatrick & Duncan, 1985) found "rater personnel might account for more variance than differences in sampling of subjects" (p.237); thus, the reason for the use of audio tapes in this study to control for rater personnel differences.

Additional concerns involving the use of observers included lack of control of standard observational procedures and environments, and the alteration of results due to observer fatigue. A sample of completed observation forms was reviewed to assess the quality of the data being collected as suggested by Fowler
(1988). Since the observation instrument involved tallying all instructional strategies implemented, a summated score was used to assess a measure of reliability.

Inter-rater reliability as well as intra-rater reliability were both concerned with direct observation. Inter-rater reliability referred to the reliability of two or more independent observers; intra-rater reliability referred to the scoring by one individual observer of multiple subjects (Gay, 1987). Thus, observers were each assigned an identification number. Each observer watched the same videotaped teaching situation, once at training on August 1, 1991, and once at least one week later. Scores on the two instruments were compared and a coefficient of stability determined for intra-rater reliability (see Table 2). In addition, the scores for all five observers, obtained at the August 1, 1991 training, were compared using a coefficient of equivalency to determine inter-rater reliability. An agreement rate of 80% was set a priori as recommended by Gay (1987). The inter-rater reliability between the observer with the highest score and the observer with the lowest score was 70% on the first observation and dropped to 55% on the second observation which occurred at least one week later. Due to the tardiness of observers returning their intra-rater reliability forms, the researcher was unable to determine if there was a need for additional training or if revisions needed to be made until the study was almost completed.
Table 2

Summary of Intra-rater Reliability*

<table>
<thead>
<tr>
<th>Observer</th>
<th>Intra-rater</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>not completed</td>
</tr>
<tr>
<td>2</td>
<td>82.5%</td>
</tr>
<tr>
<td>3</td>
<td>67.6%</td>
</tr>
<tr>
<td>4</td>
<td>96.0%</td>
</tr>
<tr>
<td>5</td>
<td>85.7%</td>
</tr>
</tbody>
</table>

*Calculated using percentage of agreement

Self-report instrument

A self-report instrument (Appendix A), completed by each Extension Home Economist, was used to collect data on the following variables:

1. Perceived knowledge of the Extension Home Economist on selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection; (independent variable);

2. Perceived use by the Extension Home Economist of the selected instructional strategies and principles in the just-presented teaching situation; (independent variable);
3. **Attitude** of the Extension Home Economist toward the use of selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection; (independent variable);

4. **Personological variables** including area of specialization, administrative position of county chair, program position of multi-county agent, program position as cluster agent, length of service with Extension, teaching experience in public or private education, age, academic major, and training in critical thinking skills; (intervening variables).

The self-report instrument, which did not measure the actual use of a behavior (Nine Basic Assessment Methods, cited in Conklin, 1991), had the advantage of being able to ask questions with long or complex responses. Potential disadvantages included the need for a carefully designed instrument and, the fact that open ended questions were usually not useful. Participants should have had time for thoughtful answers (Fowler, 1988). In this study, participants were asked to respond immediately following the observation and without consulting the observer. Due to time constraints, some either rushed through the instrument or kept the instrument to complete later.

The self-report instrument consisted of eight sections (Appendix A). Section I -- Actual Knowledge -- consisted of twenty items designed to collect information on knowledge level and one item designed to collect information on attitude of Extension Home Economists on critical thinking instructional strategies.
The actual knowledge data were not used in this study but were collected for future studies.

Items in Section II -- Application of Critical Thinking Strategies -- asked respondents to apply their knowledge of types of questions to six actual questions. These data were not used as part of this study but were collected for future studies.

Section III -- Perceived Use of Strategies -- was identical to Section III of the direct observation instrument and was used to compare the observer perception of what happened with the educator's perception of the same event. These data were not used in this study.

Section IV -- Critical Thinking Instructional Techniques -Perceived Knowledge and Perceived Use -- was used to collect data on two dimensions. For each of twelve instructional techniques, respondents were asked the frequency with which the techniques were used in that day's lesson and their knowledge level of the technique.

All points on the Likert-scale were anchored by using key words to describe the rating scale to avoid any misinterpretations. For questions related to the use of an instructional strategy, the scale was 1 = Did not use today, 2 = Used occasionally, and 3 = Used frequently. For questions related to perceived knowledge level, the scale was 1 = I have no knowledge, 2 = I have introductory knowledge, 3 = I have working knowledge, 4 = I have advanced knowledge.

Examples of questions included:
Similarly, questions in Section V -- Critical Thinking Principles - Perceived Knowledge and Perceived Use -- asked usage and knowledge level on seven questions related to critical thinking principles. Examples of questions included:

<table>
<thead>
<tr>
<th>Used in Today's Presentation</th>
<th>Knowledge Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q47. Opportunities to consider</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>a wide range of alternatives during decision making.</td>
<td></td>
</tr>
<tr>
<td>Q52. Opportunities to discuss</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>creative ideas.</td>
<td></td>
</tr>
</tbody>
</table>

Section VI -- Perceived Use of Selected Instructional Techniques -- asked respondents to indicate the frequency with which an instructional technique was used in the observed teaching situation. These data were not used for this study.
Section VII -- Personological Information -- was used to obtain selected demographic information on each respondent. Examples of questions included:

Q78. I am a county chair: (CIRCLE ONE)
   1. Yes
   2. No

Q83. My year of birth:
   19__

Section VIII -- Learner-centered vs. Teacher-centered -- questioned the respondent on where they perceived themselves to be on a continuum between teacher-centered and learner-centered. These data were not used for this research project, but were collected as a basis for future study.

Data collected and not used for this study was done so for convenience and will be used by the researcher in future studies. This research was the start of a larger research project.

The self-report instrument was reviewed by a panel of experts from the Colleges of Agriculture and Human Ecology, at The Ohio State University, who had a background in critical thinking (Appendix B). The panel was asked to complete the instrument; review the format of the questions, the wording, and the sequence and format of the pages; and assess the instrument for content validity.

Once the random sample was drawn, twenty purposefully selected Ohio Extension Home Economists, not in the sample, were asked to field test only the perceived knowledge sections of the self-report instrument for content and face
validity. Following the initial pilot test, the first ten respondents were asked to retake the instrument to test the instrument for reliability. Cronbach’s alpha was used to determine reliability. An acceptable minimum Cronbach’s alpha level was set a priori at .70 based on Nunnally’s recommendation (1967). Reliability coefficients were calculated using the pilot test data and using the actual data.

Using the SPSS-PC+ computer program, Cronbach’s alpha coefficients were calculated for section IV of the pilot instrument containing twelve items which measured perceived knowledge of critical thinking instructional techniques. The Cronbach's alpha coefficient, using all twelve items, was 0.91. Section V measured perceived knowledge of critical thinking principles and contained seven items. Using all seven items, the Cronbach’s alpha coefficient was .90. Combining Section IV and Section V for a total perceived knowledge score resulted in a pilot study Cronbach’s alpha coefficient of .92. Using data from the actual study, the Cronbach’s alpha coefficient for perceived knowledge (combining Sections IV and V) was .95. The Cronbach’s alpha coefficient for a total perceived use score (combining Sections IV and V) based on the actual study was .86. Random error and thus, reliability, was a concern with both instruments as there was no way to control either the conditions under which the Extension Home Economist taught or their mental state as they completed the self-report instrument.

Summary

Three methods of data collection were used for this study. The first method involved direct observation of a teaching situation which was at least one hour in
length. The second method was a self-report instrument designed to gather information on perceived knowledge, perceived use, and attitude of Extension Home Economists concerning selected critical thinking instructional strategies and principles. In addition, the self-report instrument gathered personological information. The third method of data collection involved a review of Ohio Cooperative Extension Service personnel records for performance appraisal scores. The self-report instrument was developed, piloted, and judged to be reliable and valid.

Data Collection Procedures

Written permission to conduct this study was obtained from the Associate Director of the Ohio Cooperative Extension Service on March 20, 1991. Approval to conduct the study was received from the Human Subjects Review Committee of The Ohio State University on August 30, 1991 with a waiver for participants' written consent. The protocol number assigned to the study by the Human Subjects Review Board was 91B0146 (Appendix F).

Letters requesting Extension Home Economists to participate were mailed under the Associate Director's signature on July 8, 1991 (Appendix C). These letters indicated that the study was designed to examine instructional strategies currently used by Extension Home Economists. The phrase "critical thinking" was not used in the letter so as not to bias subjects in selecting their teaching situation to be observed. The letter provided participants the opportunity to consider participating before being contacted by the researcher to obtain a verbal commit-
ment to participate. The researcher then contacted each participant by telephone on July 25, 1991 to ask if they had received the initial letter and if they would be willing to participate. Participants understood they were free to decline involvement in the study without prejudice.

Data collection involved one trained observer spending a portion of one day with each member of the total sample. Times were scheduled by each Extension Home Economist based on their teaching schedule. Prior to the observation day, a telephone contact was made by the researcher with each Extension Home Economist to verify the scheduled time. Subsequently, the District Specialist, Home Economics eventually observed a group teaching situation where the Extension Home Economist taught for at least one hour. The group setting was audio taped for verification of the observation data by the researcher. All observations occurred between September 12 and December 18, 1991. The shorter the span between training and the actual observation, the less loss of trained observation skills occurred (Gay, 1987).

The observer completed the direct observation instrument as each group teaching situation with Extension clients occurred. In addition, the observer recorded any additional comments or observations on a separate sheet. These comments were analyzed as qualitative data. No attempt was made to observe teaching situations with other Extension personnel. Following the teaching situation, the observer asked the Extension Home Economist to complete the self-report instrument. This was done without consultation with the observer as to the
quality or methods used in the teaching situation. The observer then returned both the self-report instrument and the direct observation instrument, along with the audio tape, to the researcher for analysis. Copies of any handouts related to reflection were also included.

Data collected were for this study and were not to be used for performance appraisal scores. Data from Sections I, II, III, VI, and VIII were to be utilized for future study. The raw data were not shared with District Specialists, county Extension agents, or Extension administrators. If the data collected had been used as part of performance appraisal scores, instrumentation, an internal validity threat, would be a concern.

Identification numbers were entered in the upper right hand corner of the self-report instrument, on the front page of the direct observation form, and on the audio tape. This number was used during data analysis to correlate actual and perceived use of critical thinking instructional strategies and principles.

Feedback received from the observers indicated surprise at the low number of local county programs planned by Extension Home Economists for the time period of the study. The observers also commented they found themselves emotionally involved in the lesson and had a difficult time separating themselves enough to do the observation.

Three observers commented on the length of time between observations and the concern of a change in intra-rater reliability due to the time lag. There were also several comments about the nervousness of the Extension educator and their
concern of doing a good job for this study. In at least two cases, the observer was not able to wait for the educator to complete the self-report form; so the educator mailed the form to the researcher at a later date.

One situation, with a lot of activities, proved difficult for the observer to score. Even though Extension educators were asked to plan programs from one to two hours in length, seven of the teaching situations were less than one hour, with one as brief as forty minutes.

**Data Analysis**

The SPSS-PC+ computer program was used to analyze data. Descriptive statistics were first used to summarize and organize the data. The first objective of the study was to describe Extension Home Economists in Ohio on selected characteristics. Frequency, percentages, measures of central tendency and variability were used to describe the data.

The Pearson product moment correlation was used to determine the nature of the relationship between the variables of perceived knowledge and perceived use of selected critical thinking instructional strategies and principles. An alpha level of .05 was set a priori to test for significance of relationships. Table 3 illustrated the statistics used to test the relationships between perceived knowledge and selected personological characteristics. These same statistics were used to deter-
mine the relationships between the personological variables and the actual use of critical thinking instructional strategies and principles.

Table 3

Statistics Utilized for Selected Personological Characteristics, Type of Data and Their Relationship with Perceived Knowledge

<table>
<thead>
<tr>
<th>Selected Characteristics</th>
<th>Data</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area of specialization</td>
<td>Nominal</td>
<td>Point biserial</td>
</tr>
<tr>
<td>County chair</td>
<td>Nominal</td>
<td>Point biserial</td>
</tr>
<tr>
<td>Multi-county agent</td>
<td>Nominal</td>
<td>Point biserial</td>
</tr>
<tr>
<td>Cluster agent</td>
<td>Nominal</td>
<td>Point biserial</td>
</tr>
<tr>
<td>Length of service with OCES</td>
<td>Interval</td>
<td>Pearson product moment</td>
</tr>
<tr>
<td>Teaching experience</td>
<td>Interval</td>
<td>Pearson product moment</td>
</tr>
<tr>
<td>Age</td>
<td>Interval</td>
<td>Pearson product moment</td>
</tr>
<tr>
<td>Academic major</td>
<td>Nominal</td>
<td>Point biserial</td>
</tr>
<tr>
<td>Training in critical thinking</td>
<td>Nominal</td>
<td>Point biserial</td>
</tr>
<tr>
<td>Performance appraisal score</td>
<td>Interval</td>
<td>Pearson product moment</td>
</tr>
</tbody>
</table>

Table 4 showed the statistics used to determine relationships between perceived knowledge level and selected situational characteristics. These same statistics were also used to determine the relationships between actual use to the same selected situational variables.
Kendall’s Tau was used to determine the relationship between perceived knowledge and attitude as well as between actual use and attitude. The relationship between actual use and perceived knowledge as well as the relationship between actual use and perceived use were determined by Pearson product moment correlation coefficient. An alpha level of .05 was set a priori to test for significance of relationships.

Significant measures of association were described using Davis’ (1971) conventions. These conventions are described in Figure 3.
Coefficient Description

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>.70 or higher</td>
<td>Very strong association</td>
</tr>
<tr>
<td>.50 to .69</td>
<td>Substantial association</td>
</tr>
<tr>
<td>.30 to .49</td>
<td>Moderate association</td>
</tr>
<tr>
<td>.10 to .29</td>
<td>Low association</td>
</tr>
<tr>
<td>.01 to .09</td>
<td>Negligible association</td>
</tr>
</tbody>
</table>

Figure 3 Conventions for the Description of Associations.
Source: Davis (1971)

A hierarchial multiple regression analysis was used to determine the amount of variance in the dependent variable, actual use of selected instructional strategies and principles, which could be explained by the independent variables in the study. Even though this research was primarily predictive, hierarchial regression was used to explain the variance accounted for by the intervening variables with a significant correlation with the dependent variable and the independent variables. Variables were entered in their presumed causal priority (Cohen & Cohen, 1983).

The variable actual use was determined by calculating the frequency of each behavior and then summing the total of all behaviors. That number was then divided by the teaching time in minutes to produce a density factor as suggested by
Showers (1982). This procedure helped to control for variability in length of teaching situation.
CHAPTER IV

FINDINGS

The following topics were discussed in this chapter: Purpose of the Study; Variables, Objectives, and Research Questions; Population; Instrumentation; and Major Findings.

Purpose of the Study

The primary focus of this study was to assess factors related to the actual use of critical thinking instructional strategies and principles by Ohio Extension Home Economists. Included in these factors were perceived knowledge, perceived use, and attitude toward critical thinking instructional strategies and principles. In addition, personological and situational variables were controlled. The best predictors of actual use of instructional strategies and principles were assessed.

Variables and Objectives of the Study

The following dependent variable and independent variables were used to guide this study:

I. Dependent Variable:

Actual use of selected instructional strategies and principles related to questioning, dialogue, and reflection which foster critical thinking in adult
learners involved in the Cooperative Extension Service as indicated by scores on a direct observation instrument completed by a trained observer.

II. Independent Variables:

A. Perceived knowledge of selected instructional strategies and principles related to questioning, dialogue, and reflection which foster critical thinking in adult learners involved in the Cooperative Extension Service home economics program.

B. Perceived use by Extension Home Economists of selected instructional strategies and principles related to questioning, dialogue, and reflection which foster critical thinking in adult learners involved in the Cooperative Extension Service home economics program.

C. Attitude of Extension Home Economists toward the perceived use of selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection with adult learners.

III. Intervening Variables

A. Ten personological variables were identified which related to the Extension Home Economist's actual use of selected instructional strategies and principles related to questioning, dialogue, and reflection which foster critical thinking. These ten variables were area of specialization, administrative position as county chair, program position as multi-county agent, program position as cluster agent, length of service with Extension, teaching
experience in public or private education, age, academic major, training in critical thinking skills, and annual performance appraisal scores.

B. Three situational variables were identified which related to the Extension Home Economist's actual use of selected instructional strategies and principles related to questioning, dialogue, and reflection which foster critical thinking. These three variables included the subject matter of the lesson, Ohio Cooperative Extension Service district, and number of people attending.

IV. Objectives of the Study

The following research objectives were established as a guide for the study:

Objective I: To describe the sample of the County Extension Agents, Home Economics of the Ohio Cooperative Extension Service, included in this study, in terms of the following selected characteristics:

A. Area of specialization.

B. Administrative position as county chair.

C. Program position as multi-county agent.

D. Program position as cluster agent.

E. Length of service with Extension.

F. Teaching experience in public or private education.

G. Age.

H. Academic major.

I. Training in critical thinking skills.
J. Annual performance appraisal scores.

K. Perceived knowledge of selected instructional strategies and principles related to questioning, dialogue, and reflection.

L. Perceived use by Extension Home Economists of selected instructional strategies and principles related to questioning, dialogue, and reflection.

M. Attitude of Extension Home Economists toward the perceived use of selected instructional strategies and principles related to questioning, dialogue, and reflection.

N. Actual use of selected instructional strategies and principles related to questioning, dialogue, and reflection.

**Objective II:** To describe the relationship between independent variables, specifically:

A. The *perceived knowledge* level of the Extension Home Economists on selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection and their *perceived use* of the same instructional strategies and principles.

**Question 1:** What is the relationship between the perceived knowledge level of Extension Home Economists on selected instructional strategies and principles which foster critical thinking and their perceived use of the same instructional strategies and principles?
B. The perceived knowledge level of Extension Home Economists regarding selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection and the ten personological variables including area of specialization, administrative position as county chair, program position as multi-county agent, program position as cluster agent, length of service with Extension, teaching experience in public or private education, age, academic major, training in critical thinking skills, and annual performance appraisal scores.

**Question 2:** What is the relationship between the perceived knowledge level of Extension Home Economists on selected instructional strategies and principles which foster critical thinking and selected personological characteristics?

C. The perceived knowledge level of Extension Home Economists regarding selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection and three situational variables including the subject matter of the lesson being observed, the Ohio Cooperative Extension Service district, and number of people attending.

**Question 3:** What is the relationship between the perceived knowledge level of Extension Home Economists on selected instructional strategies and principles which promote critical thinking and selected situational characteristics?
D. The perceived knowledge level of Extension Home Economists regarding selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection and the attitude of Extension Home Economists toward using these strategies and principles.

**Question 4:** What is the relationship between the perceived knowledge level of Extension Home Economists regarding selected instructional strategies and principles which foster critical thinking and the attitude of Extension Home Economists toward using these strategies and principles?

**Objective III:** To describe the relationship between all independent variables and the dependent variable, controlling for the two sets of intervening variables.

**Question 5:** What is the relationship between the actual use of selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection and the independent variables of perceived knowledge, attitude toward use, and perceived use of the instructional strategies and principles?

**Objective IV:** To explain the relationship between the actual use of selected instructional strategies and principles related to questioning, dialogue, and reflection and selected personological variables for which the independent variables are controlled.
**Question 6:** What is the relationship between the actual use of selected instructional strategies and principles and selected personological variables when the independent variables are controlled?

**Objective V:** To explain the relationship between the actual use of selected instructional strategies and principles related to questioning, dialogue, and reflection and selected situational variables for which the independent variables are controlled.

**Question 7:** What is the relationship between the actual use of selected critical thinking instructional strategies and principles and selected situational variables when the independent variables are controlled?

**Objective VI:** To explain the variance of the dependent variable, actual use of selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection as measured by the direct observation of a teaching situation.

**Question 8:** Which variable(s) explain the variance of the actual use of selected critical thinking instructional strategies and principles?

**Objective VII:** Postulate and explain a conceptual model describing the interaction of independent and intervening variables as they relate to the actual use of critical thinking and the related instructional strategies and principles (Figure 1).
Population and Sample

To obtain the most accurate results possible, a random sample of twenty-five county Extension Home Economists was drawn from a population of 59 Extension Home Economists, with the names first stratified by district. The target population to which the results were to be generalized was all Extension Home Economists in Ohio, who carried the job title County Extension Agent. The accessible population was a list of names of all Ohio Extension Home Economists, employed as of June 1, 1991, obtained from the Ohio Cooperative Extension Service Leader, Personnel and confirmed by District Specialists, Home Economics on June 12, 1991.

Table 5 presented a summary table of the sample as compared to the population of all Extension Home Economists with the job title of County Extension Agent. The random sampling produced a higher than expected proportion of people carrying the job title of County Extension Agent, Home Economics (68%) as compared to the population (49%). In contrast, a low percentage (4%) of home economists carrying the job title of County Extension Agent, Home Economics and Chair were drawn in comparison to the population (19%). In addition, a low percentage (4%) of the sample carried the job title County Extension Agent, Home Economics and 4-H and Chair as compared to the population (8%).

One qualification for the job of County Extension Agent, Home Economics was to have at least a master’s degree. Since all members of the population had a
### Table 5

**Composition of Subjects by Job Title**

<table>
<thead>
<tr>
<th>Position</th>
<th>Number</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ohio</td>
<td>Sample</td>
</tr>
<tr>
<td>County Extension Agent, Home Economics</td>
<td>29</td>
<td>17</td>
</tr>
<tr>
<td>County Extension Agent, Home Economics and 4-H</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>County Extension Agent, Home Economics and Chair</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>County Extension Agent, Home Economics and 4-H and Chair</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>County Extension Agent, Home Economics and CNRD</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>County Extension Agent, Home Economics and CNRD and Chair</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Grand Total</td>
<td>59</td>
<td>25</td>
</tr>
</tbody>
</table>
master's degree, education level was not a variable. In addition, all members of the population were female, so gender was not a variable.

**Instrumentation**

Two instruments were developed by the researcher for use in this study. The first, a direct observation instrument, consisted of four parts and was designed to be used in the observation of at least a one hour teaching situation. The second, a self-report instrument, consisted of eight sections and measured all variables except the actual use of the selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection. A complete description of both instruments was discussed in Chapter III. Personnel records were used to obtain performance appraisal scores. The total number of subjects in this study was twenty-five. However, results from the Northeast district were lost in the mail and never received by the researcher, reducing the sample to twenty.

**Major Findings**

**Objective 1:** To describe the sample of County Extension Agents, Home Economics of the Ohio Cooperative Extension Service, included in this study, on all selected characteristics.

Information presented in Tables 6 through 23 included data which described the sample of OCES County Extension Agents, Home Economics, included in this
study, on all characteristics measured in this study. Statistics used to describe the characteristics included frequencies, percentages, and measures of central tendency and variability.

**Intervening Variables -- Personological**

(1) Area of Specialization

The data displayed in Table 6 reported the variable "area of specialization." Food and Nutrition was identified by 6 respondents (30%) as their area of specialization. Management of Family Resources was identified by 3 respondents (15%) as their area of specialization. Seven respondents identified Family Life/Human Development as their area of specialization (35%) while 2 respondents (10%) identified Leadership as their area of specialization. In addition, 2 respondents (10%) indicated more than one area of specialization.
Table 6

Frequency Distribution of Area of Specialization

<table>
<thead>
<tr>
<th>Area of Specialization</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food and Human Nutrition</td>
<td>6</td>
<td>30%</td>
</tr>
<tr>
<td>Management of Family Resources</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>Family Life/Human Development</td>
<td>7</td>
<td>35%</td>
</tr>
<tr>
<td>Leadership</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>Combination of 2 or more</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

(2) Administrative Position as County Chair

The frequency distribution of the administrative position of county chair within members of the data set is found in Table 7. Of the participants in the study, twenty percent (20%) served as a county chair in at least one county.
Table 7

**Frequency Distribution of the Administrative Position of County Chair**

<table>
<thead>
<tr>
<th>Agents Holding County Chair Position</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>County Chair</td>
<td>4</td>
<td>20%</td>
</tr>
<tr>
<td>Non-County Chair</td>
<td>16</td>
<td>80%</td>
</tr>
<tr>
<td>Grand Total</td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>

(3-4) Program Position as a Multi-County Agent and Program Position as a Cluster Agent

Of the 20 respondents included in the study, fifty percent (50%) served at least two counties in a multi-county position (Table 8). In addition, fifty percent (50%) served in a cluster of two or more counties sharing program responsibilities (Table 9).
Table 8

**Frequency Distribution of Program Position as a Multi-county Agent**

<table>
<thead>
<tr>
<th>Program Position</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-county agent</td>
<td>10</td>
<td>50%</td>
</tr>
<tr>
<td>Non Multi-county agent</td>
<td>10</td>
<td>50%</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Table 9

**Frequency Distribution of Program Position as a Cluster Agent**

<table>
<thead>
<tr>
<th>Program Position</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster agent</td>
<td>10</td>
<td>50%</td>
</tr>
<tr>
<td>Non Cluster agent</td>
<td>10</td>
<td>50%</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
(5) Length of Service with Extension

Of the 20 respondents, no agent was currently in her first year of employment (Table 10). Fifteen percent (15%) of the respondents had been employed 1-4 years, fifteen percent (15%) had been employed 5-7 years, twenty percent (20%) had been employed 8-12 years, and fifty percent (50%) had been employed over 12 years.

Table 10

Frequency Distribution for Years of Service with Extension

<table>
<thead>
<tr>
<th>Years Employed</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 year</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>1-4 years</td>
<td>3</td>
<td>15%</td>
<td>15%</td>
</tr>
<tr>
<td>5-7 years</td>
<td>3</td>
<td>15%</td>
<td>30%</td>
</tr>
<tr>
<td>8-12 years</td>
<td>4</td>
<td>20%</td>
<td>50%</td>
</tr>
<tr>
<td>Over 12 years</td>
<td>10</td>
<td>50%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Grand Total 20 100%

Mean = 11.90
Median = 11.50
Mode = 4.00
Standard deviation = 7.36
(6) Teaching Experience in Public or Private Education

Respondents who had taught in public or private education for less than one year comprised sixty percent (60%) of the sample (Table 11). Respondents having 1 to 4 years of teaching experience comprised twenty percent (20%) of the sample, while respondents with 5-7 years comprised five percent (5%) of the sample. Respondents with 8-12 years of teaching experience in public or private education comprised ten percent (10%) of the sample, while respondents with over 12 years comprised five percent (5%) of the sample.
Table 11

Frequency Distribution for Years of Teaching Experience in Public or Private Education

<table>
<thead>
<tr>
<th>Years Taught</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 year</td>
<td>12</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td>1-4 years</td>
<td>4</td>
<td>20%</td>
<td>80%</td>
</tr>
<tr>
<td>5-7 years</td>
<td>1</td>
<td>5%</td>
<td>85%</td>
</tr>
<tr>
<td>8-12 years</td>
<td>2</td>
<td>10%</td>
<td>95%</td>
</tr>
<tr>
<td>over 12 years</td>
<td>1</td>
<td>5%</td>
<td>100%</td>
</tr>
<tr>
<td>Grand Total</td>
<td>20</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Mean = 2.40
Median = .00
Mode = .00
Standard deviation = 4.22

(7) Age

The sample was comprised of ten percent (10%) of the agents being between the ages of 21 and 30 years (Table 12); thirty-five percent (35%) between the ages of 31 and 40 years; fifty-five (55%) percent of the sample between the ages of 41 and 50 years; and zero percent (0%) of the sample 51 and over in age.
Table 12

Frequency Distribution for Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-30 Years</td>
<td>2</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>31-40 Years</td>
<td>7</td>
<td>35%</td>
<td>45%</td>
</tr>
<tr>
<td>41-50 Years</td>
<td>11</td>
<td>55%</td>
<td>100%</td>
</tr>
<tr>
<td>51 and Over</td>
<td>0</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Grand Total</td>
<td>20</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Mean = 48.30  
Median = 50.00  
Mode = 50.00  
Standard deviation = 13.31

(8) Academic Major

The academic major (Table 13) most frequently mentioned by respondents was home economics education (44%). The second most frequently mentioned academic major was a specific subject matter (28%) such as clothing, food and nutrition or family life. The category "other" which included majors identified in political science, curriculum and instruction, general home economics, career and technical education, and psychology, was the third most frequently mentioned academic major (16%). Since all members of the sample had at least a master's degree, twelve respondents indicated more than one academic major.
Table 13

Frequency Distribution for Academic Major
(n = 20)

<table>
<thead>
<tr>
<th>Academic Major</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Economics Education</td>
<td>14</td>
<td>44%</td>
</tr>
<tr>
<td>Agricultural Education</td>
<td>2</td>
<td>6%</td>
</tr>
<tr>
<td>Adult Education</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Journalism</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Specific Subject Matter</td>
<td>9</td>
<td>28%</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>16%</td>
</tr>
</tbody>
</table>

(9) Training in Critical Thinking

Over half of the sample (65%) had participated in an in-service or mini workshop on critical thinking (Table 14). In addition, thirty percent (30%) had had a college course incorporating critical thinking; twenty-five percent (25%) had participated in an in-depth workshop or conference on critical thinking; and twenty-five percent (25%) had participated in an independent study on critical thinking. Only five percent (5%) had received feedback from their supervisor on
critical thinking and zero percent (0%) had participated in a college course on critical thinking.

Table 14

Frequency Distribution for Training in Critical Thinking

(n = 20)

<table>
<thead>
<tr>
<th>Training in Critical Thinking</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>College course incorporating critical thinking</td>
<td>6</td>
<td>30%</td>
</tr>
<tr>
<td>College course on critical thinking</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>In-depth workshop or conference</td>
<td>5</td>
<td>25%</td>
</tr>
<tr>
<td>In-service or mini workshop</td>
<td>13</td>
<td>65%</td>
</tr>
<tr>
<td>Independent study</td>
<td>5</td>
<td>25%</td>
</tr>
<tr>
<td>Feedback from supervisor</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Combination of 2 or more</td>
<td>7</td>
<td>35%</td>
</tr>
</tbody>
</table>

(10) Annual Performance Appraisal Score

Annual performance appraisal scores were collected from the Leader, Personnel on each member of the sample (Table 15). The scores were first
converted to z scores by each of the five districts and then standardized using z
scores, across peers throughout the state. Once averaged, the standardized perfor­
mance appraisal scores, of sample members, from 1989 and 1990, ranged from a
low of 43.03 to a high of 61.21. The highest percentage (35%) of sample members
received a score in the range of 50.10 - 54.00, with the lowest percentage (6%)
receiving scores in the range of 54.10 - 58.00. Performance appraisal scores had a
mean of 51.099 and a standard deviation of 5.446 for sample members.
Table 15

Frequency Distribution for Annual Performance Appraisal Score

<table>
<thead>
<tr>
<th>Performance Appraisal Standardized Scores</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>42.00 - 46.00</td>
<td>4</td>
<td>24%</td>
</tr>
<tr>
<td>46.10 - 50.00</td>
<td>3</td>
<td>18%</td>
</tr>
<tr>
<td>50.10 - 54.00</td>
<td>6</td>
<td>35%</td>
</tr>
<tr>
<td>54.10 - 58.00</td>
<td>1</td>
<td>6%</td>
</tr>
<tr>
<td>58.10 - 62.00</td>
<td>3</td>
<td>18%</td>
</tr>
</tbody>
</table>

Grand Total 17* 100%

*There were no scores for two members of the sample and one member had only one score.

Mean = 51.099
Median = 50.90
Mode = 43.03
Standard deviation = 5.446
Independent Variables

Perceived Knowledge of and Perceived Use by Extension Home Economists of Selected Instructional Techniques

A Likert-scale was used to assess the respondents perceived knowledge of selected instructional techniques. Table 16 indicated the frequency distribution of the respondents perceived knowledge of each of the 12 statements. Table 17 indicated the frequency distribution of the respondents perceived usage of each of the 12 techniques in the teaching situation observed for this study.

The majority of respondents perceived their level of knowledge of each of the twelve techniques to be at a working knowledge level or an advanced knowledge level (Table 16 Perceived Knowledge). When the two categories of "working knowledge" and "advanced knowledge" were combined, the percentage of respondents was as follows: one hundred percent (100%) for questions-yes/no and questions-right/wrong; ninety percent (90%) for questions-ID procedure; eighty-five percent (85%) for questions-cause and effect; eighty percent (80%) for descriptive questions, questions-generate dialogue, and questions-encourage learners.
Table 16

Frequency Distribution of Perceived Knowledge of Instructional Techniques (n=20)

<table>
<thead>
<tr>
<th>Perceived Knowledge of Instructional Technique</th>
<th>1*</th>
<th>2*</th>
<th>3*</th>
<th>4*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questions-cause/effect</td>
<td>0</td>
<td>15</td>
<td>65</td>
<td>20</td>
</tr>
<tr>
<td>Descriptive questions</td>
<td>5</td>
<td>15</td>
<td>60</td>
<td>20</td>
</tr>
<tr>
<td>Questions-yes/no</td>
<td>0</td>
<td>0</td>
<td>65</td>
<td>35</td>
</tr>
<tr>
<td>Questions-ID procedure</td>
<td>0</td>
<td>10</td>
<td>75</td>
<td>15</td>
</tr>
<tr>
<td>Questions-right/wrong</td>
<td>0</td>
<td>0</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>Questions-generate dialogue</td>
<td>0</td>
<td>20</td>
<td>70</td>
<td>10</td>
</tr>
<tr>
<td>Questions-ID conflicts</td>
<td>0</td>
<td>40</td>
<td>45</td>
<td>15</td>
</tr>
<tr>
<td>Questions-reflect knowledge</td>
<td>5</td>
<td>20</td>
<td>60</td>
<td>25</td>
</tr>
<tr>
<td>Questions-reflect beliefs</td>
<td>0</td>
<td>40</td>
<td>50</td>
<td>10</td>
</tr>
<tr>
<td>Questions-not resolved</td>
<td>0</td>
<td>35</td>
<td>50</td>
<td>15</td>
</tr>
<tr>
<td>Questions-examine impact</td>
<td>5</td>
<td>40</td>
<td>40</td>
<td>15</td>
</tr>
<tr>
<td>Questions-encourage learners</td>
<td>0</td>
<td>20</td>
<td>70</td>
<td>10</td>
</tr>
</tbody>
</table>

Scale range = 12-48
*Perceived Knowledge Level

1 = No knowledge  Mean = 35.10
2 = Introductory knowledge Median = 35.00
3 = Working knowledge Mode = 35.00
4 = Advanced knowledge Standard deviation = 5.946
In addition, the majority of respondents said they used (Table 17 Perceived Use) the twelve techniques occasionally or frequently in the observed teaching situation. When the two categories of "used occasionally" and "used frequently" were combined, the percentage of respondents was as follows: ninety percent said they used questions-cause and effect, and questions-generate dialogue in the observed teaching situation. Seventy percent (70%) said they used descriptive questions and questions-yes/no occasionally or frequently in the observed teaching situation. The majority of participants (55%) said they did not use questions-right/wrong, questions-ID conflict, nor questions-not resolved in the observed teaching situation.
Table 17

Frequency Distribution of Perceived Use of Instructional Techniques \( (n = 20) \)

<table>
<thead>
<tr>
<th>Perceived Use of Instructional Techniques</th>
<th>1*</th>
<th>2*</th>
<th>3*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questions-cause/effect</td>
<td>10</td>
<td>55</td>
<td>35</td>
</tr>
<tr>
<td>Descriptive questions</td>
<td>25</td>
<td>70</td>
<td>0</td>
</tr>
<tr>
<td>Questions-yes/no</td>
<td>30</td>
<td>60</td>
<td>10</td>
</tr>
<tr>
<td>Questions-ID procedure</td>
<td>35</td>
<td>40</td>
<td>25</td>
</tr>
<tr>
<td>Questions-right/wrong</td>
<td>55</td>
<td>35</td>
<td>10</td>
</tr>
<tr>
<td>Questions-generate dialogue</td>
<td>10</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>Questions-ID conflicts</td>
<td>55</td>
<td>45</td>
<td>0</td>
</tr>
<tr>
<td>Questions-reflect knowledge</td>
<td>40</td>
<td>50</td>
<td>10</td>
</tr>
<tr>
<td>Questions-reflect beliefs</td>
<td>40</td>
<td>55</td>
<td>5</td>
</tr>
<tr>
<td>Questions-not resolved</td>
<td>55</td>
<td>40</td>
<td>5</td>
</tr>
<tr>
<td>Questions-examine impact</td>
<td>50</td>
<td>45</td>
<td>5</td>
</tr>
<tr>
<td>Questions-encourage learners</td>
<td>35</td>
<td>55</td>
<td>10</td>
</tr>
</tbody>
</table>

Scale range = 12-36

*Perceived Level of Use

1 = Did not use  \hspace{1cm} \text{Mean} = 21.10
2 = Used occasionally \hspace{1cm} \text{Median} = 20.50
3 = Used frequently \hspace{1cm} \text{Mode} = 17.00

\text{Standard deviation} = 4.34
Perceived Knowledge of and Perceived Use of Critical Thinking Principles by Extension Home Economists

When asked what their perceived knowledge level was on seven selected critical thinking principles, respondents ranked their knowledge level as no knowledge, introductory knowledge, working knowledge, or advanced knowledge. The majority of respondents (at least 55%) perceived their knowledge level to be at the working knowledge level or the advanced knowledge level for six of the seven principles. When these two categories were grouped, the percentage perceiving their knowledge to be working or advanced were as follows: eighty-five percent (85%) knew how to provide opportunities to discover new information; eighty percent (80%) knew how to provide opportunities to apply a skill; seventy-five percent (75%) knew how to provide opportunities to consider alternatives; sixty-five percent (65%) knew how to provide opportunities to discuss creative ideas.

To calculate total perceived knowledge, the variables perceived knowledge on instructional techniques and perceived knowledge on critical thinking principles were combined. The mean for the variable total perceived knowledge was 54.20 (s.d. = 9.99).
Table 18

**Frequency Distribution of Perceived Knowledge of Critical Thinking Principles By Ohio Extension Home Economists**
(n = 20)

<table>
<thead>
<tr>
<th>Critical Thinking Principles</th>
<th>1*</th>
<th>2*</th>
<th>3*</th>
<th>4*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunities to consider strengths and weaknesses.</td>
<td>5</td>
<td>35</td>
<td>25</td>
<td>15**</td>
</tr>
<tr>
<td>Opportunities to consider alternatives.</td>
<td>0</td>
<td>25</td>
<td>70</td>
<td>5</td>
</tr>
<tr>
<td>Opportunities to raise ethical questions.</td>
<td>10</td>
<td>35</td>
<td>45</td>
<td>10</td>
</tr>
<tr>
<td>Opportunities to identify assumptions.</td>
<td>10</td>
<td>35</td>
<td>35</td>
<td>20</td>
</tr>
<tr>
<td>Opportunities to discover information.</td>
<td>0</td>
<td>15</td>
<td>60</td>
<td>25</td>
</tr>
<tr>
<td>Opportunities to apply a skill.</td>
<td>0</td>
<td>20</td>
<td>55</td>
<td>25</td>
</tr>
<tr>
<td>Opportunities to discuss creative ideas.</td>
<td>0</td>
<td>35</td>
<td>45</td>
<td>20</td>
</tr>
</tbody>
</table>

Scale range = 7-28
*Perceived level of use
**There were some non-respondents

1 = No knowledge  
2 = Introductory knowledge  
3 = Working knowledge  
4 = Advanced knowledge

Mean = 19.10  
Median = 19.00  
Mode = 17.00  
Standard deviation = 4.72
Respondents were asked the frequency with which they used seven selected critical thinking principles in the teaching situation observed for this study. The majority of respondents stated they had used these principles in the observed teaching situation (Table 19). When the categories of "used occasionally" and "used frequently" were combined, the percentage of respondents was as follows: ninety-five percent (95%) provided opportunities to discover new information; eighty-five percent (85%) provided opportunities to consider alternatives and opportunities to discuss creative ideas; seventy-five percent (75%) provided opportunities to identify assumptions and opportunities to apply a skill.

Total perceived use was calculated by combining the scores for perceived use of instructional techniques and perceived use of critical thinking principles. The mean for the new variable total perceived use was 34.60 (s.d. = 6.63).
Table 19

Frequency Distribution of Perceived Use of Critical Thinking Principles By Ohio Extension Home Economists
\( (n = 20) \)

<table>
<thead>
<tr>
<th>Critical Thinking Principle</th>
<th>1*</th>
<th>2*</th>
<th>3*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunities to consider strengths and weaknesses.</td>
<td>30</td>
<td>45</td>
<td>10**</td>
</tr>
<tr>
<td>Opportunities to consider alternatives.</td>
<td>15</td>
<td>70</td>
<td>15</td>
</tr>
<tr>
<td>Opportunities to raise ethical questions.</td>
<td>35</td>
<td>55</td>
<td>10</td>
</tr>
<tr>
<td>Opportunities to identify assumptions.</td>
<td>25</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>Opportunities to discover information.</td>
<td>5</td>
<td>60</td>
<td>35</td>
</tr>
<tr>
<td>Opportunities to apply a skill.</td>
<td>25</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>Opportunities to discuss creative ideas.</td>
<td>15</td>
<td>75</td>
<td>10</td>
</tr>
</tbody>
</table>

Scale range = 7-21
*Perceived level of use
**There were some non-respondents

1 = Did not use
2 = Used occasionally
3 = Used frequently

Mean = 13.50
Median = 13.00
Mode = 11.00
Standard deviation = 2.72
Attitude of Extension Home Economists Toward the Use of Instructional Strategies and Principles Which Foster Critical Thinking

Attitude was measured by a multiple choice question asking respondents if critical thinking should be used in Extension programming (Table 20). Zero percent (0%) of respondents said critical thinking should rarely or never be used or used when it is convenient to use; thirty-five percent (35%) said critical thinking should be used if the subject matter seemed appropriate; and sixty-five percent (65%) said critical thinking was used in most of their programming efforts.

Table 20

Frequency Distribution of Attitude Toward the Use of Critical Thinking Instructional Strategies and Principles

<table>
<thead>
<tr>
<th>Attitude Toward Critical Thinking</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used rarely or never</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Used when convenient</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Used when subject matter is</td>
<td>7</td>
<td>35%</td>
</tr>
<tr>
<td>appropriate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used most of the time</td>
<td>13</td>
<td>65%</td>
</tr>
<tr>
<td>Grand Total</td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>

Mean = 3.65 Mode = 4.00
Median = 4.00 Standard deviation = .489
Actual Use by Extension Home Economists of Instructional Strategies and Principles Which Foster Critical Thinking

Actual use of instructional strategies and principles which foster critical thinking was collected by direct observation of a teaching situation. The length of the teaching situation (Table 21) ranged from a low of 40 minutes to a high of 130 minutes. There was a total of 1,523 minutes of teaching time observed.

All ten predetermined instructional strategies and principles (Table 22) were used in at least one of the twenty observations. A total of 245 technical questions were asked as opposed to 201 interpretative/critical questions. One hundred and fifty probe questions were asked while only 15, 5-second waits were used. Dialogue was initiated by the educator 122 times and by the learner to the educator 248 times. Learners initiated dialogue with other learners 121 times. Educators provided corrective feedback 25 times and missed an opportunity to provide corrective feedback 22 times. Reflection time was provided 10 times.

Table 23 summarized the actual use of instructional strategies and principles by Ohio Extension Home Economists. Scores on each instructional strategy and principle were totaled per educator and then divided by the actual number of minutes of teaching time by the educator to arrive at a density factor. Density of instructional strategies and principles ranged from a low of .36 to a high of 1.63 with a mean of .872 and a standard deviation of .397.
Table 21

Frequency Distribution of the Number of Minutes of Teaching Time

<table>
<thead>
<tr>
<th>Number of Minutes</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-59</td>
<td>5</td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td>60-79</td>
<td>5</td>
<td>25%</td>
<td>50%</td>
</tr>
<tr>
<td>80-99</td>
<td>7</td>
<td>35%</td>
<td>85%</td>
</tr>
<tr>
<td>100-119</td>
<td>2</td>
<td>10%</td>
<td>95%</td>
</tr>
<tr>
<td>Over 120</td>
<td>1</td>
<td>5%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Grand Total 20 100%

Mean = 74.80
Median = 75.00
Mode = 50.00
Standard Deviation = 23.77
Table 22

**Frequency Distribution of Raw Data of Actual Use of Selected Instructional Strategies and Principles to Foster Critical Thinking**

<table>
<thead>
<tr>
<th>Instructional Strategy</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Educator-Initiated Questions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical</td>
<td>245</td>
<td>21%</td>
</tr>
<tr>
<td>Interpretative/Critical</td>
<td>201</td>
<td>17%</td>
</tr>
<tr>
<td>Probe</td>
<td>150</td>
<td>13%</td>
</tr>
<tr>
<td>5 Second Wait</td>
<td>15</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Educator-Initiated Dialogue</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dialogue initiated by educator</td>
<td>122</td>
<td>11%</td>
</tr>
<tr>
<td>Corrective feedback</td>
<td>25</td>
<td>2%</td>
</tr>
<tr>
<td>Missed opportunities</td>
<td>22</td>
<td>2%</td>
</tr>
<tr>
<td><strong>Learner-Initiated dialogue</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learner to educator dialogue</td>
<td>248</td>
<td>21%</td>
</tr>
<tr>
<td>Learner to learner dialogue</td>
<td>121</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Reflection</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time for reflection</td>
<td>10</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>1159</td>
<td>100%</td>
</tr>
</tbody>
</table>
Table 23

**Frequency Distribution of Density Factors* of Actual Use of Critical Thinking Instructional Strategies and Principles**

<table>
<thead>
<tr>
<th>Density Factor</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>.30 - .39</td>
<td>2</td>
<td>11%</td>
</tr>
<tr>
<td>.40 - .49</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>.50 - .59</td>
<td>4</td>
<td>21%</td>
</tr>
<tr>
<td>.60 - .69</td>
<td>3</td>
<td>16%</td>
</tr>
<tr>
<td>.70 - .79</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>.80 - .89</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>.90 - .99</td>
<td>2</td>
<td>11%</td>
</tr>
<tr>
<td>1.00 - 1.09</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>1.10 - 1.19</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>1.20 - 1.29</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>1.30 - 1.39</td>
<td>2</td>
<td>11%</td>
</tr>
<tr>
<td>1.40 and Over</td>
<td>3</td>
<td>16%</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>19</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

*Density Factor was derived by adding all instructional strategies and principles used in a teaching situation and dividing by the number of minutes of teaching time for that teaching situation.

Mean = .872
Median = .743
Mode = .357
Standard deviation = .397
Research Question 1
What is the relationship between the perceived knowledge level of Extension Home Economists on selected instructional strategies and principles which foster critical thinking and their perceived use of the same instructional strategies and principles (Objective II-A)?

The purpose of this correlation analysis, using the Pearson product moment correlation coefficient, was to assess the relationship between the perceived knowledge level of Extension Home Economists and their perceived use of the same instructional strategies and principles. This correlation was .4010 which was significant at a .05 level.

Research Question 2
What is the relationship between the perceived knowledge level of Extension Home Economists on selected instructional strategies and principles which foster critical thinking and selected personological characteristics (Objective II-B)?

Table 24 summarized the statistics used and the relationships found between personological variables and the Extension Home Economists' perceived knowledge level of selected critical thinking instructional strategies and principles. The relationship between area of specialization, food and nutrition and perceived knowledge was negative, moderate, and significant at the .05 level (point biserial =
Table 24

Statistics Utilized and Correlation Coefficients for the Relationship of Perceived Knowledge and Selected Personological Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Statistics</th>
<th>Correlation Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area of specialization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food and Nutrition**</td>
<td>Point biserial</td>
<td>-.3675*</td>
</tr>
<tr>
<td>Management of Family Resources**</td>
<td>Point biserial</td>
<td>.1927</td>
</tr>
<tr>
<td>Family Life/Human Development**</td>
<td>Point biserial</td>
<td>.2002</td>
</tr>
<tr>
<td>Leadership**</td>
<td>Point biserial</td>
<td>.0787</td>
</tr>
<tr>
<td>Administrative position of county chair**</td>
<td>Point biserial</td>
<td>-.0231</td>
</tr>
<tr>
<td>Program position as multi-county agent**</td>
<td>Point biserial</td>
<td>-.3491</td>
</tr>
<tr>
<td>Program position as cluster agent**</td>
<td>Point biserial</td>
<td>-.4518 *</td>
</tr>
<tr>
<td>Length of service in OCES</td>
<td>Pearson product</td>
<td>.0375</td>
</tr>
<tr>
<td>Teaching experience in public or private education</td>
<td>Pearson product</td>
<td>.6715 *</td>
</tr>
<tr>
<td>Age</td>
<td>Pearson product</td>
<td>-.6427 *</td>
</tr>
<tr>
<td>Academic major</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home Ec Education**</td>
<td>Point biserial</td>
<td>.4727 *</td>
</tr>
<tr>
<td>Agricultural Education**</td>
<td>Point biserial</td>
<td>.0958</td>
</tr>
<tr>
<td>Adult Education**</td>
<td>Point biserial</td>
<td>.1837</td>
</tr>
<tr>
<td>Journalism**</td>
<td>Point biserial</td>
<td>-.0754</td>
</tr>
<tr>
<td>Specific subject matter**</td>
<td>Point biserial</td>
<td>-.0908</td>
</tr>
<tr>
<td>Other**</td>
<td>Point biserial</td>
<td>.0000</td>
</tr>
</tbody>
</table>
The relationship was also negative, moderate, and significant at the .05 level (point biserial = -.4518). This indicted that cluster agents tended to have lower perceived knowledge scores. The data in Table 24 also indicated a positive, substantial relationship (significant at the .05 level) between years taught in public or private education and perceived knowledge (r = .6715). The relationship between age and perceived knowledge was a negative, substantial relationship significant at the .05 level (r = -.6427).

There were no significant relationships indicated between the administrative position as county chair, program position as multi-county agent, or length of service with OCES, and perceived knowledge.
The relationship between academic major of home economics education and perceived knowledge was positive, moderate, and significant at the .05 level (point biserial = .4727) indicating a tendency for majors in home economics education to have a higher perceived knowledge; with all other academic majors, there was no significant relationship.

There were three significant relationships between instruction in critical thinking and perceived knowledge. The relationship between in-depth workshop and perceived knowledge was positive, substantial, and significant at the .05 level (point biserial = .6046); with independent study on critical thinking, the relationship was positive, substantial, and significant at the .05 level (point biserial = .5928); and with feedback from the supervisor on critical thinking, the relationship was positive, substantial, and significant at the .05 level (point biserial = .5135). There was no significant relationship found between a college course incorporating critical thinking or in-service in critical thinking and perceived knowledge. There was no significant relationship found between performance appraisal scores and perceived knowledge of selected critical thinking instructional strategies and principles.

While statistically significant, some of the relationships may not be practically significant due to the low n. Caution should be used in interpreting practical significance with an n of 20.
Research Question 3

What is the relationship between the perceived knowledge level of Extension Home Economists on selected instructional strategies and principles which foster critical thinking and selected situational characteristics (Objective II-C)?

There were no significant relationships found between the perceived knowledge of Extension Home Economists (Table 25) and selected situational variables.

Table 25

Statistics Utilized and Correlation Coefficients for the Relationship of Selected Situational Variables and Perceived Knowledge

<table>
<thead>
<tr>
<th>Selected Variable</th>
<th>Statistics</th>
<th>Correlation Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject matter of lesson</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food and Nutrition**</td>
<td>Point biserial</td>
<td>-.1012</td>
</tr>
<tr>
<td>Family Relations**</td>
<td>Point biserial</td>
<td>.0846</td>
</tr>
<tr>
<td>Leadership**</td>
<td>Point biserial</td>
<td>.1837</td>
</tr>
<tr>
<td>Clothing**</td>
<td>Point biserial</td>
<td></td>
</tr>
<tr>
<td>Family Resource Management**</td>
<td>Point biserial</td>
<td>-.0949</td>
</tr>
<tr>
<td>OCES district</td>
<td></td>
<td></td>
</tr>
<tr>
<td>East**</td>
<td>Point biserial</td>
<td>.2253</td>
</tr>
<tr>
<td>South**</td>
<td>Point biserial</td>
<td>-.0356</td>
</tr>
<tr>
<td>Southwest**</td>
<td>Point biserial</td>
<td>-.0830</td>
</tr>
<tr>
<td>Northwest**</td>
<td>Point biserial</td>
<td>-.1067</td>
</tr>
<tr>
<td>Number of people attending</td>
<td>Pearson product</td>
<td>.0271</td>
</tr>
</tbody>
</table>

*Indicates significance at the .05 level
**Indicates dummy coding
Research Question 4

What is the relationship between the perceived knowledge level of Extension Home Economists regarding selected instructional strategies and principles which foster critical thinking and the attitude of Extension Home Economists toward using these strategies and principles (Objective II-D)?

Kendall’s Tau was used to assess the relationship between the attitude of Extension Home Economists toward the use of critical thinking as measured by a multiple choice question and the perceived knowledge of the same Extension Home Economists of critical thinking instructional strategies and principles as measured by a Likert-scale. There was no significant relationship between perceived knowledge and attitude.

Research Question 5

What is the relationship between the actual use of selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection and the three independent variables of perceived knowledge, attitude toward use, and perceived use of selected instructional strategies and principles (Objective III)?

The statistics indicated no significant relationships between actual use and the three independent variables.
Research Question 6

What is the relationship between the actual use of selected instructional strategies and principles and selected personological variables when the independent variables are controlled (Objective IV)?

Table 26 summarized the statistics used and the relationships between the personological variables and the Extension Home Economists' actual use of selected critical thinking instructional strategies and principles. The data in Table 26 indicated a negative, moderate relationship, significant at the .05 level, between length of service with OCES and actual use of selected critical thinking instructional strategies and principles ($r = -.3868$). No significant relationship was found between actual use and the following variables: area of specialization, administrative position as county chair, program position as multi-county agent, program position of cluster agent, teaching experience, or age.
Table 26

**Statistics Utilized and Correlation Coefficients for the Relationship of Actual Use and Selected Personological Variables**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Statistics</th>
<th>Correlation Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area of specialization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food and Human Nutrition**</td>
<td>Point biserial</td>
<td>.3364</td>
</tr>
<tr>
<td>Management of Family Resources**</td>
<td>Point biserial</td>
<td>-.0097</td>
</tr>
<tr>
<td>Family Life/Human Development**</td>
<td>Point biserial</td>
<td>-.1133</td>
</tr>
<tr>
<td>Leadership**</td>
<td>Point biserial</td>
<td>-.2569</td>
</tr>
<tr>
<td>Administrative position of county chair**</td>
<td>Point biserial</td>
<td>-.0988</td>
</tr>
<tr>
<td>Program position of multi-county agent**</td>
<td>Point biserial</td>
<td>.1383</td>
</tr>
<tr>
<td>Program position of cluster agent**</td>
<td>Point biserial</td>
<td>-.1034</td>
</tr>
<tr>
<td>Length of service in OCES</td>
<td>Pearson product moment</td>
<td>-.3868 *</td>
</tr>
<tr>
<td>Teaching experience in public or private education</td>
<td>Pearson product moment</td>
<td>-.0382</td>
</tr>
<tr>
<td>Age</td>
<td>Pearson product moment</td>
<td>.1878</td>
</tr>
<tr>
<td>Academic major</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home Ec Education**</td>
<td>Point biserial</td>
<td>.0823</td>
</tr>
<tr>
<td>Agricultural Education**</td>
<td>Point biserial</td>
<td>-.4532 *</td>
</tr>
<tr>
<td>Adult Education**</td>
<td>Point biserial</td>
<td>-.3095</td>
</tr>
<tr>
<td>Journalism**</td>
<td>Point biserial</td>
<td>-.0436</td>
</tr>
<tr>
<td>Specific subject matter**</td>
<td>Point biserial</td>
<td>-.0801</td>
</tr>
<tr>
<td>Other**</td>
<td>Point biserial</td>
<td>.0158</td>
</tr>
</tbody>
</table>
Table 26 (continued)

<table>
<thead>
<tr>
<th>Activity Description</th>
<th>Correlation Measure</th>
<th>Correlation Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>College course incorporating critical thinking**</td>
<td>Point biserial</td>
<td>-.0205</td>
</tr>
<tr>
<td>College course on critical thinking**</td>
<td>Point biserial</td>
<td>No responses</td>
</tr>
<tr>
<td>In-depth workshop on critical thinking**</td>
<td>Point biserial</td>
<td>-.0318</td>
</tr>
<tr>
<td>In-service on critical thinking**</td>
<td>Point biserial</td>
<td>.0118</td>
</tr>
<tr>
<td>Independent study on critical thinking**</td>
<td>Point biserial</td>
<td>-.0802</td>
</tr>
<tr>
<td>Feedback from supervisor on critical thinking**</td>
<td>Point biserial</td>
<td>-.1676</td>
</tr>
<tr>
<td>Performance appraisal scores</td>
<td>Pearson product moment</td>
<td>.0207</td>
</tr>
</tbody>
</table>

* Indicates significance at the .05 level
** Indicates variable was dummy coded

The only relationship between academic major and actual use which was significant was with a major of agricultural education where the relationship was negative, moderate and significant at the .05 level (point biserial = -.4532). Caution should be used in interpreting this statistic due to the low n.

No significant relationship between instruction in critical thinking and actual use was found to be significant. In addition, no significant relationship was found between performance appraisal score and actual use.
Research Question 7

What is the relationship between the actual use of selected critical thinking instructional strategies and principles and selected situational variables when the independent variables are controlled (Objective V)?

A positive, moderate, and significant relationship at the .05 level was found between the subject matter of the lesson -- food and nutrition -- and the actual use of instructional strategies and principles. A negative, moderate and significant relationship at the .05 level was found between the actual use of selected instructional strategies and principles and the situational variable of number in attendance ($r = -0.4005$). No other relationships were found to be significant.
Table 27

Statistics Utilized and Correlation Coefficient for the Relationship of Actual Use and Selected Situational Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Statistics</th>
<th>Correlation Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject matter of lesson</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food and Nutrition**</td>
<td>Point biserial</td>
<td>.3948*</td>
</tr>
<tr>
<td>Family Relations**</td>
<td>Point biserial</td>
<td>-.1813</td>
</tr>
<tr>
<td>Leadership**</td>
<td>Point biserial</td>
<td>-.0395</td>
</tr>
<tr>
<td>Clothing**</td>
<td>Point biserial</td>
<td>No responses</td>
</tr>
<tr>
<td>Family Resource Management**</td>
<td>Point biserial</td>
<td>-.0873</td>
</tr>
<tr>
<td>OCES district</td>
<td></td>
<td></td>
</tr>
<tr>
<td>East**</td>
<td>Point biserial</td>
<td>-.2394</td>
</tr>
<tr>
<td>South**</td>
<td>Point biserial</td>
<td>-.1456</td>
</tr>
<tr>
<td>Southwest**</td>
<td>Point biserial</td>
<td>.034</td>
</tr>
<tr>
<td>Northwest**</td>
<td>Point biserial</td>
<td>.3402</td>
</tr>
<tr>
<td>Number in attendance</td>
<td>Pearson product</td>
<td>-.4005 *</td>
</tr>
<tr>
<td></td>
<td>moment</td>
<td></td>
</tr>
</tbody>
</table>

* Indicates significance at the .05 level
** Indicates variable was dummy coded

Research Question 8

Which variable(s) explain the variance of the actual use of selected critical thinking instructional strategies and principles (Objective VI)?

This research question was related to the amount of variance explained by the independent variables of perceived knowledge, perceived use, and attitude toward the use of selected critical thinking instructional strategies and principles.
Hierarchical multiple regression was used to assess this question (Table 26-27). The two intervening personological variables, total years employed in Extension and an academic major of agricultural education, with a significant correlation to actual use, and the two intervening situational variables, subject matter of lesson — food and nutrition — and number in attendance, with a significant correlation to actual use, were entered in the equation. The personological variable of an academic major in agricultural education and subject matter of lesson — food and nutrition — were dummy coded as suggested by Cohen and Cohen (1983).

Variables were entered into the equation based on causal priority (Cohen & Cohen, 1983). The variables were entered into the equation based on perceived causal priority with actual use, the dependent variable. The data in Table 27 summarized the results of the regression of actual use on years employed in Extension, an academic major in agricultural education, subject matter of lesson — food and nutrition, number in attendance, perceived knowledge, perceived use, and attitude.

The variable agricultural education major explained 20.5% of the variance; number attending explained 1.8%, food and nutrition subject matter explained 9%; and years in Extension explained 19%. The addition of perceived knowledge explained an additional 0.079% of the variance. Perceived use was then entered and explained 2.30% of the variance. The final variable entered was attitude which accounted for 1.38% of the variance. Caution should be used in interpreting these statistics due to the low n.
The total $R^2$ of .541 or 54.1% indicated the total variance explained by the optimal linear relationship of the dependent variable, actual use, with the independent variables in the full model.
Table 28

Summary Data: Regression of Actual Use on Selected Variables (n=20)

<table>
<thead>
<tr>
<th>Variables</th>
<th>$x_1$</th>
<th>$x_2$</th>
<th>$x_3$</th>
<th>$x_4$</th>
<th>$x_5$</th>
<th>$x_6$</th>
<th>$x_7$</th>
<th>$Y_1$</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years in Extension($x_1$)</td>
<td>1.00</td>
<td>.036</td>
<td>.251</td>
<td>.295</td>
<td>.061</td>
<td>-.047</td>
<td>.256</td>
<td>-.387</td>
<td>11.900</td>
<td>7.355</td>
</tr>
<tr>
<td>Ag Education Major($x_2^a$)</td>
<td>1.00</td>
<td>-.262</td>
<td>.663</td>
<td>.081</td>
<td>-.082</td>
<td>.262</td>
<td>-.453</td>
<td>.100</td>
<td>.308</td>
<td></td>
</tr>
<tr>
<td>Food/Nutrition Subject($x_3^b$)</td>
<td>1.00</td>
<td>-.104</td>
<td>-.143</td>
<td>-.281</td>
<td>.357</td>
<td>.395</td>
<td>.350</td>
<td>.489</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number attending($x_4$)</td>
<td>1.00</td>
<td>-.008</td>
<td>-.459</td>
<td>.228</td>
<td>-.401</td>
<td></td>
<td></td>
<td></td>
<td>16.700</td>
<td>18.675</td>
</tr>
<tr>
<td>Perceived Knowledge($x_5$)</td>
<td>1.00</td>
<td>.414</td>
<td>.400</td>
<td>-.145</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>54.200</td>
<td>9.993</td>
</tr>
<tr>
<td>Perceived Use($x_6$)</td>
<td>1.00</td>
<td>-.065</td>
<td>.022</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>34.600</td>
<td>6.628</td>
</tr>
<tr>
<td>Attitude($x_7^c$)</td>
<td>1.00</td>
<td>-.164</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.650</td>
<td>.489</td>
</tr>
</tbody>
</table>

*aCoded: Agricultural Education = 1, Other major = 0

*bCoded: Food and Nutrition = 1, Other = 0

*cCoded: Rarely = 1, When convenient = 2, When appropriate = 3, Most of time = 4
Table 29

Regression of Actual Use on Selected Intervening Variables, Perceived Knowledge, Perceived Use, and Attitude

(n=20) (Hierarchial Entry)

<table>
<thead>
<tr>
<th>Variables</th>
<th>$R^2$</th>
<th>$R^2$ change</th>
<th>$b$</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag Education Major</td>
<td>.205</td>
<td>.205</td>
<td>-.571</td>
<td>-2.10</td>
<td>.05</td>
</tr>
<tr>
<td>Number attending</td>
<td>.223</td>
<td>.018</td>
<td>-.004</td>
<td>-.606</td>
<td>.55</td>
</tr>
<tr>
<td>Food/Nutrition Subject</td>
<td>.314</td>
<td>.090</td>
<td>.251</td>
<td>1.40</td>
<td>.18</td>
</tr>
<tr>
<td>Years in Extension</td>
<td>.504</td>
<td>.190</td>
<td>-.026</td>
<td>-2.32</td>
<td>.04</td>
</tr>
<tr>
<td>Perceived Knowledge</td>
<td>.505</td>
<td>.001</td>
<td>.001</td>
<td>-.089</td>
<td>.93</td>
</tr>
<tr>
<td>Perceived Use</td>
<td>.528</td>
<td>.023</td>
<td>.012</td>
<td>.671</td>
<td>.52</td>
</tr>
<tr>
<td>Attitude</td>
<td>.541</td>
<td>.014</td>
<td>-.130</td>
<td>-.574</td>
<td>.58</td>
</tr>
<tr>
<td>(Constant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Standard error = .344
Adjusted $R^2 = .250$
For model: $F = 1.855$; $p > .05$

Objective VII:

Postulate and explain a conceptual model describing the interaction of independent and intervening variables as they relate to the actual use of critical thinking and the related instructional strategies and principles.
The proposed model (Figure 1) suggested that the independent variables of perceived knowledge, perceived use, and attitude toward the selected critical thinking instructional techniques and principles should enhance the actual use of the same critical thinking instructional strategies and principles. This study, however, determined there were no significant relationships between the three independent variables and actual use. The revised model presented here reflects these findings (Figure 4). Two personological variables, length of service and academic major of agricultural education, explained variance in actual use. In addition, the two situational variables of subject matter of lesson -- food and nutrition and number in attendance explained variance in actual use.
**Intervening Variables**

**Personological**

1. Length of service with Extension
2. Academic major in agricultural education

**Situational**

1. Subject matter of lesson - food and nutrition
2. Number of people attending

Figure 4

Factors Related to the Use of Critical Thinking Instructional Strategies and Principles by Ohio Cooperative Extension Home Economists
CHAPTER V
SUMMARY, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

This chapter was organized in the following manner: Introduction; Summary of Procedures; Summary of Findings; Conclusions, Discussions, and Implications; Recommendations; and Recommendations for Further Study.

Introduction

This study was descriptive-correlational in nature, with the primary purpose being to assess factors related to the actual use of instructional strategies and principles by Ohio Cooperative Extension Home Economists. The dependent variable utilized in this study was the actual use of selected instructional strategies and principles as measured by direct observation of a teaching situation. The independent variables included in this study were the perceived knowledge of Extension Home Economists on selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection, the perceived use of these same strategies and principles, and the Extension Home Economists' attitude toward using these strategies and principles.
The intervening variables were the personological variables including area of specialization, administrative position as county chair, program position as multi-county agent, program position as cluster agent, length of service with Extension, teaching experience in public or private education, age, academic major, training in critical thinking skills, and annual performance appraisal scores. In addition, the situational variables including the subject matter of the lesson, Ohio Cooperative Extension Service district, and number of people attending were also considered as intervening variables.

The specific research objectives and questions which guided this study were:

Objective I: To describe the sample of County Extension Agents, Home Economics of the Ohio Cooperative Extension Service, included in this study, in terms of the following selected characteristics:

A. Area of specialization.

B. Administrative position as county chair.

C. Program position as multi-county agent.

D. Program position as cluster agent.

E. Length of service with Extension.

F. Teaching experience in public or private education.

G. Age.

H. Academic major.

I. Training in critical thinking skills.

J. Annual performance appraisal scores.
K. Perceived knowledge of selected instructional strategies and principles related to questioning, dialogue, and reflection.

L. Perceived use by Extension Home Economists of selected instructional strategies and principles related to questioning, dialogue, and reflection.

M. Attitude of Extension Home Economists toward the perceived use of selected instructional strategies and principles related to questioning, dialogue, and reflection.

N. Actual use of selected instructional strategies and principles related to questioning, dialogue, and reflection.

Objective II: To describe the relationship between independent variables, specifically:

A. The perceived knowledge level of the Extension Home Economists on selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection and their perceived use of the same instructional strategies and principles.

Question 1: What is the relationship between the perceived knowledge level of Extension Home Economists on selected instructional strategies and principles which foster critical thinking and their perceived use of the same instructional strategies and principles?

B. The perceived knowledge level of Extension Home Economists regarding selected critical thinking instructional strategies and principles related to
questioning, dialogue, and reflection and the ten personological variables including area of specialization, administrative position as county chair, program position as multi-county agent, program position as cluster agent, length of service with Extension, teaching experience in public or private education, age, academic major, training in critical thinking skills, and annual performance appraisal scores.

**Question 2:** What is the relationship between the perceived knowledge level of Extension Home Economists on selected instructional strategies and principles which foster critical thinking and selected personological characteristics?

C. The perceived knowledge level of Extension Home Economists regarding selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection and three situational variables including the subject matter of the lesson being observed, the Ohio Cooperative Extension Service district, and number of people attending.

**Question 3:** What is the relationship between the perceived knowledge level of Extension Home Economists on selected instructional strategies and principles which promote critical thinking and selected situational characteristics?

D. The perceived knowledge level of Extension Home Economists regarding selected critical thinking instructional strategies and principles related to
questioning, dialogue, and reflection and the attitude of Extension Home Economists toward using these strategies and principles.

**Question 4:** What is the relationship between the perceived knowledge level of Extension Home Economists regarding selected instructional strategies and principles which foster critical thinking and the attitude of Extension Home Economists toward using these strategies and principles?

**Objective III:** To describe the relationship between all independent variables and the dependent variable, controlling for the two sets of intervening variables.

**Question 5:** What is the relationship between the actual use of selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection and the independent variables of perceived knowledge, attitude toward use, and perceived use of the instructional strategies and principles?

**Objective IV:** To explain the relationship between the actual use of selected instructional strategies and principles related to questioning, dialogue, and reflection and selected personological variables when the independent variables are controlled.

**Question 6:** What is the relationship between the actual use of selected instructional strategies and principles and selected personological variables when the independent variables are controlled?
Objective V: To explain the relationship between the actual use of selected instructional strategies and principles related to questioning, dialogue, and reflection and selected situational variables when the independent variables are controlled.

Question 7: What is the relationship between the actual use of selected critical thinking instructional strategies and principles and selected situational variables when the independent variables are controlled?

Objective VI: To explain the variance of the dependent variable, actual use of selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection as measured by the direct observation of a teaching situation.

Question 8: Which variable(s) explain the variance of the actual use of selected critical thinking instructional strategies and principles?

Objective VII: Postulate and explain a conceptual model describing the interaction of independent and intervening variables as they relate to the actual use of critical thinking and the related instructional strategies and principles (Figure 1).
Summary of Procedures

The section on Procedures included a summary of the following: Research Design, Population, Instrumentation, Data Collection, and Data Analysis.

Research Design

This study was a descriptive-correlational study. The research described the population and examined the relationships between selected variables.

Population

The target population to which results were generalized were all Extension Home Economists employed by the Ohio Cooperative Extension Service, with the exception of Home Economists employed in the Northeast district, as of June 1, 1991 (N = 46). A random sample, with the names first stratified by districts, was used to gather data. Included were all Extension agents with the title of County Extension Agent, Home Economics, employed as of June 1, 1991. A complete list of names was obtained from the Leader, Personnel, Ohio Cooperative Extension Service. The total number of subjects in the study was twenty-five.

Instrumentation

Data were collected by direct observation by trained observers and by a self-report instrument. Both instruments were developed by the researcher (Appendix A). The direct observation instrument consisted of four sections. Section I of the
instrument consisted of a description of the teaching situation including date, time, topic, type of educational setting, number in audience, description of the audience, purpose of the program.

Section II was the actual observation form with four categories: educator-initiated questions, educator-initiated dialogue, learner-initiated dialogue, and reflection. The form was divided into ten minute segments for recording critical thinking instructional strategies and principles. Each category was summed to assess the evidence of these instructional strategies and principles in the teaching situation. The observer placed a tally mark under the appropriate category as the behavior occurred. Each tally recorded translated to one point for a total critical thinking implementation score.

The categories were generated from a review of literature, interviews with researchers in the area of critical thinking, and from the researcher's experience. The instrument was developed by studying other research instruments that measured similar variables. Data from Section III and IV were not used for this study.

The self-report instrument was also developed by the researcher and consisted of eight sections (Appendix A). Data from Sections I, II, III, VI, and VIII were not used for this study.

Section IV was used to collect data on two dimensions. For each of twelve instructional techniques, respondents were asked the frequency with which the technique was used in the lesson observed and their perceived knowledge level of
the technique. Similarly, questions in Section V asked usage and perceived knowledge level on seven statements related to critical thinking principles. Section VII was used to obtain selected demographic information on each respondent.

A panel of experts in Home Economics Education and Agricultural Education at The Ohio State University (Appendix B) were asked to review both instruments for content validity as a means of controlling measurement error. Thirteen of the sixteen questionnaires were returned and were useable. Following revisions, the knowledge related sections of the self-report instrument were distributed to twenty Ohio Extension Home Economists, not in the sample, who were asked to pilot test the instrument (Appendix B). Nineteen of the twenty self-report instruments were returned and were useable. Ten of the original twenty respondents were asked to retake the instrument to test the instrument for reliability.

Sections IV and V were combined for a total perceived knowledge score. A Cronbach's alpha coefficient of .92 was calculated from the data collected in the pilot test. For data collected in the study, a Cronbach's alpha coefficient of .95 was calculated on perceived knowledge, and a Cronbach's alpha coefficient of .86 on perceived use.
Data Collection

Initial contact was made with all members of the sample by the researcher in a letter dated July 8, 1991, inviting them to participate in the study (Appendix C). The initial letter was followed by an initial telephone contact on July 24, 1991 confirming their participation. Times for the observation to occur were to be scheduled between August 15 and December 1. The first observation occurred on September 12, 1991 and the final one on December 18. The percent of observations by month were as follows: September 16%, October 36%, November 40%, and December 8%. The resulting data sample was comprised of 25% of the Extension Home Economists from the East District, 25% from the South District, 25% from the Northwest District, and 25% from the Southwest District. Data from the Northeast district were collected but never received by the researcher.

Non-response error was eliminated by continual contacts with participants and observers to insure dates for observations had been scheduled and completed.

Data Analysis

Descriptive statistics were used to summarize and describe the data. Statistics used included frequencies, percentages, measures of central tendency, and variability. The nature and strength of relationships between variables were described using point biserial, Kendall's tau, and Pearson product moment correlation coefficients to represent the strength and direction of any relationship found.
A hierarchial regression analysis was used to determine which variable(s)
was(were) the best predictor(s) of the actual use of critical thinking instructional
strategies and principles.

Summary of Findings

Findings associated with the seven research objectives of the study were
summarized below.

Objective I: To describe the sample of County Extension Agents, Home Econom­
ics of the Ohio Cooperative Extension Service, included in this study on all
characteristics.

Personological Variables

Agents with a specialization in Family Life/Human Development (35%)
made up the largest percentage of the sample; followed by Food and Nutrition
(30%), and Management of Family Resources (15%). Twenty percent (20%) of
the study held the administrative position of county chair while fifty percent (50%)
of the sample served as a multi-county agent, and fifty percent (50%) served as a
cluster agent.

The majority of the sample (50%) had been in Extension education for
more than 12 years, followed by 20% with 8-12 years, 15% with 1-4 years and 15%
with 5-7 years. The sample had a mean of 11.90 and a standard deviation of 7.36.
Extension educators with one or more years of teaching experience in public or private education comprised a total of 40%. When divided into years of experience, 20% had 1-4 years, 5% had 5-7 years, 10% had 7-12 years and 5% had over 12 years experience in public or private education. With a mean of 2.40, the sample had a standard deviation of 4.22.

The highest percentage of respondents (55%) were in the age range of 41-50 years, with 35% in the range of 31-40 years, and 10% in the 21-30 year range. The mean was 48.30 with a standard deviation of 13.31.

Responses in the category of academic majors were as follows: 44% had a major in home economics education, 6% in agricultural education, 3% in adult education, 3% in journalism, 28% in subject matter, 16% in other including political science, curriculum and instruction, and psychology. On the questions of training in critical thinking, sixty-five percent (65%) of respondents had had in-service training on critical thinking, followed by thirty percent (30%) with a course incorporating critical thinking, and twenty-five percent (25%) attended an in-depth workshop and 25% had done an independent study. Standardized annual performance appraisal scores ranged from a high of 61.21 to a low of 43.03 with the largest percentage in the 50.10 to 54.00 range. The mean was 51.10 and the standard deviation was 5.45.

Perceived Knowledge

On the perceived knowledge of instructional techniques, eighty percent (80%) of respondents perceived their knowledge to be at the working or advanced
knowledge level on the following categories: questions-cause/effect, descriptive questions, questions-yes/no, questions-ID procedures, questions-right/wrong, questions-generate dialogue, and questions-encourage learners.

When asked their knowledge level of critical thinking principles, eighty percent (80%) of respondents perceived their knowledge level to be at the working or advanced level on the following principles: opportunities to discover new information and opportunities to apply a skill.

Total perceived knowledge was calculated by adding the scores for perceived knowledge of instructional strategies with perceived knowledge on critical thinking principles for a mean of 54.20 (s.d. = 9.99).

Perceived Use

Ninety percent (90%) of respondents perceived they had used the following instructional techniques occasionally or frequently in the observed teaching situation: questions-cause/effect, and questions-generate dialogue.

In addition, when asked their level of use of the critical thinking principles in the observed teaching situation, eighty-five percent (85%) of respondents said they had used the following principles occasionally or frequently in the just observed teaching situation: opportunities to consider alternatives, opportunities to discover information, and opportunities to discuss creative ideas.

Total perceived use was calculated by combining the scores for perceived use of instructional strategies and perceived use of critical thinking principles for a mean of 34.60 (s.d. = 6.63).
Attitude

When asked their attitude toward using critical thinking in Extension education, sixty-five percent (65%) of respondents said they used critical thinking most of the time while 35% said they used critical thinking when the subject matter was appropriate. The mean of attitude scores was 3.65 (s.d. = .489).

Actual Use

The observed teaching situations ranged in length from a low of 40 minutes to a high of 130 minutes with the largest percentage (35%) in the 80 to 99 minute range. The mean was 74.80 and the standard deviation was 23.77.

The results of direct observations indicated technical questions were used 245 times, interpretative/critical questions 201 times, probe questions 150 times, and 5 second wait 15 times. Dialogue initiated by educator happened 122 times, corrective feedback 25 times, and missed opportunity 22 times.

Learner-initiated dialogue was divided into dialogue initiated by the learner to the educator, which occurred 248 times, and dialogue initiated by a learner to another learner, which occurred 121 times. Reflection occurred 10 times.

When the actual number of instructional strategies was divided by the total number of teaching minutes per Extension educator, a density factor was derived. The mean of the density factor was .872 (s.d. = .397).
Objective II: To describe the relationship between perceived knowledge and the variables of perceived use, personological variables, situational variables, and attitude.

The relationship between perceived knowledge and perceived use was positive, moderate (r = .4010) and significant at a .05 level.

The relationship between perceived knowledge and selected personological variables varied depending on the variable. A positive, substantial, and significant at the .05 level association was found for the variables teaching experience in public or private education, in-depth workshop on critical thinking, independent study on critical thinking, and feedback from supervisor on critical thinking. A negative, substantial and significant at the .05 level relationship was found for age.

A negative, moderate and significant at the .05 level relationship was found for the variable program position as cluster agent, and for area of specialization -- food and nutrition-- while a positive, moderate and significant at the .05 level relationship was found for an academic major of home economics education.

No significant relationships were found between perceived knowledge and selected situational variables. No significant relationship was found between attitude and perceived knowledge level.
Objective III: To describe the relationship between all three independent variables and the dependent variable, controlling for the intervening variables.

No significant relationship was found between actual use and the three independent variables.

Objective IV: To explain the relationship between the actual use of selected instructional strategies and principles related to questioning, dialogue, and reflection and selected personological variables when the independent variables are controlled.

The relationship between length of service in Ohio Cooperative Extension Service and actual use was negative, moderate, and significant at the .05 level.

On the personological variables of academic major, the relationship with an academic major of agricultural education and the actual use of critical thinking instructional strategies and principles was negative, moderate, and significant at the .05 level. Caution should be used in interpreting this statistic due to the small n. No other relationships with academic major were found.

Objective V: To explain the relationship between the actual use of selected instructional strategies and principles related to questioning, dialogue, and reflection and selected situational variables when the independent variables are controlled.
A positive, moderate, and significant at the .05 level relationship was found between actual use and the situational variable subject matter of the lesson -- food and nutrition. A negative, moderate and significant at the .05 level relationship was found between number in attendance and actual use.

**Objective VI:** To determine the best predictor(s) of the dependent variable, actual use of selected critical thinking instructional strategies and principles related to questioning, dialogue, and reflection, as measured by the direct observation of a teaching situation.

Hierarchial multiple regression analysis was used to explain the variance of actual use of critical thinking instructional strategies and principles. The regression model explained 54.1% of the variance in actual use. A major in agricultural education explained 20.5% of the variance; number attending explained 1.8%; food and nutrition subject matter explained 9%; and years in Extension explained 19.0%. Perceived knowledge explained an additional .079% of the variance, perceived use an additional 2.30%, and attitude an additional 1.38%. The total variance explained by the optimal linear relationship of actual use with the independent variables was 54.1%. Caution should be used in interpreting these statistics due to the small n.
Objective VII: Postulate and explain a conceptual model describing the interaction of independent and intervening variables as they relate to the actual use of critical thinking and the related instructional strategies and principles.

The proposed model (Figure 1) suggested that the independent variables of perceived knowledge, perceived use, and attitude toward the selected critical thinking instructional techniques and principles should enhance the actual use of the same critical thinking instructional strategies and principles. This study, however, determined there were no significant relationships between the three independent variables and actual use. The revised model reflects these findings (Figure 4). Two personological variables, length of service and academic major of agricultural education, explained variance in actual use. In addition, the two situational variables of subject matter of lesson -- food and nutrition and number in attendance explained variance in actual use.
Conclusions, Discussions, and Implications of the Study

The following conclusions were presented, based on a review of the literature and the research questions, together with a discussion of the findings and implications based on the noted conclusions. These conclusions were applicable to Extension Home Economists employed by the Ohio Cooperative Extension Service with the exception of the Northeast district.

1. **Perceived knowledge was related to increased perceived use.**

   When Extension Home Economists perceived their knowledge level of critical thinking instructional techniques and principles to be high, the perceived use of those instructional strategies and principles also increased. As Ornstein (1988) proposed, learning should facilitate how to learn. As Extension Home Economists in this study perceived their knowledge to be high, they were more comfortable and used those strategies and principles more frequently to help others learn. Jarvis (1987) stated that learning is the transformation of experience into knowledge and skills. As Extension Home Economists' perceived knowledge of critical thinking instructional strategies and principles increased, their perceived use of these same strategies and principles also increased.

   The implication of this finding for the Cooperative Extension Service was the need to continually build perceived knowledge level through additional educational opportunities for Extension Home Economists to improve their critical thinking skills.
2. **Perceived knowledge decreased with increased age.**

Some of the differences in the perceived knowledge level of Extension Home Economists regarding selected critical thinking instructional strategies and principles may be explained by the personological variable of age. Literature and logic suggested that as the number of years in the teaching profession increased, the Extension Home Economists should have had more experience in teaching critical thinking and in the use of instructional strategies and principles which promote thinking.

The older the Extension Home Economist was, the lower the perceived knowledge level of critical thinking also was. The researcher expected to find a negative correlation between age and perceived knowledge of critical thinking instructional strategies and principles as older educators may not have received training in critical thinking in college. Since the reemergence of teaching critical thinking in college curriculum had been a relatively new concept (in the last ten years), this finding was as expected. Early curriculum in education was focused more on skill development of the learner, than on the development of thinking skills. With 90% of the sample over the age of 30, this finding re-enforced the need to provide in-service training opportunities to experienced Extension educators to foster critical thinking in adult learners.

The implication for the Cooperative Extension Service was a need to focus educational efforts in the area of critical thinking on older Extension educators. Older agents may have been away from the formal education system for a longer
time and may lack experience with critical thinking instructional strategies and principles.

3. **Perceived knowledge increased with academic major in home economics education.**

Since the home economics profession had been in the forefront of expanding critical thinking educational skills (Purdin, 1989), it was logical to conclude that younger Extension Home Economists with an academic major in home economics education would have increased perceived knowledge of critical thinking instructional strategies. This finding was as expected. The implication of this finding was that as new Extension home Economists are hired, emphasis should be placed on at least one degree in home economics education.

4. **Perceived knowledge decreased with the program position as a cluster agent.**

Agents working in a cluster situation should be able to develop programs to be shared across county lines and should be able to do more in-depth work in their area of specialization. Therefore, the researcher expected to find a strong correlation between being a cluster agent and the use of critical thinking instructional strategies. As more time was devoted to program development, more instructional strategies and principles which foster critical thinking in adult learners should have been used. However, this study found a negative correlation between being in the program position as a cluster agent, and the perceived knowledge level of the Extension Home Economists on critical thinking instructional strategies and principles. With the position of a cluster agent, the perceived knowledge level of
the Extension educator decreased. This finding reversed researcher expectations. The difference may have been due to the recent introduction of the cluster agent organizational concept; thus, subsequently concept development of expanded critical thinking educational skills may not yet be fully exploited. Or there may be a relationship with experience or age and the tendency to be in a cluster agent position.

The implication for the Cooperative Extension Service was the need to re-enforce with Extension educators the importance of providing opportunities for adult learners to develop thinking skills.

5. **Supervisory feedback as a measure of training in critical thinking was related to critical thinking skills.**

This study determined that the utilization of critical thinking instructional strategies and principles by Extension Home Economists was influenced by the feedback received from the immediate supervisor. Educators who had received feedback from their supervisors on their use of critical thinking instructional strategies had a higher perceived knowledge level of critical thinking instructional strategies and principles. Like Walker's study (1985), less than half of the respondents in this study had received feedback from their supervisor on critical thinking.

This study found a significant relationship between feedback from supervisors on the use of critical thinking instructional strategies and the perceived knowledge level of the Extension educator on the same strategies. Paul (1985) stated "The single most useful thing a teacher can do is to take at least one
...course in critical thinking, in which the teacher's own thinking skills are analyzed and nurtured" (p.37). This analysis and nurturing of critical thinking skills may have also occurred from supervisors. It appeared that when Extension educators had someone who cared about their use of strategies and principles to foster critical thinking, they had developed a higher perceived knowledge of those strategies and principles.

The implication for the Cooperative Extension Service was the need to encourage and support employees in a supervising role to provide feedback on critical thinking. This may necessitate training of supervisors in critical thinking instructional strategies and principles.

6. Participating in an in-depth workshop or an independent study was related to perceived knowledge.

Respondents who had participated in an in-depth workshop on critical thinking or who had done an independent study on critical thinking had a higher perceived knowledge level of critical thinking instructional strategies and principles.

Jones (1989) determined a need for in-service training on critical thinking for Extension professionals. In Jones' findings, over fifty percent of respondents had not participated in an in-service training nor engaged in an independent study on critical thinking. Building on Jones' work, this study found when Extension educators participated in in-service training on critical thinking, their perceived knowledge of critical thinking instructional strategies and principles to foster critical thinking in adult learners did not improve. Perhaps the in-service provided
was not effective or not sufficiently in-depth to impact on perceived knowledge level. In addition, there were no significant relationships between training of any kind in critical thinking and the actual use of critical thinking instructional strategies and principles.

The implication for the Cooperative Extension Service was to provide more in-depth opportunities or opportunities for in-depth study both of which did have a positive relationship with the perceived knowledge of critical thinking instructional strategies and principles. Perhaps in-service training opportunities needed to be more in-depth to impact on perceived knowledge.

7. **Perceived knowledge level of critical thinking instructional strategies and principles was related to teaching experience in public or private education.**

This study found a positive and substantial relationship between the variables perceived knowledge and teaching experience. This finding was as the researcher expected. With increased experience in teaching, the educator should be more knowledgeable of the subject matter content and more able to develop varying teaching strategies. An experienced educator should be comfortable in the teaching role and feel more comfortable initiating dialogue (Conone, 1990).

The researcher had found from personal experience the educator needs self-confidence to let go of the control of the teaching situation and allow dialogue to develop between learners. The implication of this finding for the organization was a need to continually develop educators by providing a safe environment to practice using critical thinking instructional strategies and principles and to reward
educators who take the risk and let go of the situation to allow thinking to develop.

8. **Performance appraisal scores did not reflect critical thinking based achievements.**

There was no significant relationship found between performance appraisal scores and the actual use of instructional strategies and principles which foster critical thinking in adult learners. The researcher expected to find a strong relationship based on Jones' postulate (1992) which stated using critical thinking should translate to being a more effective educator which should mean higher performance appraisal scores. This lack of distinction between educators who used critical thinking and those who did not may be related to a lack of reliability in the performance appraisal system or to the measurement of performance achievements not related to educational skills such as political popularity. This lack of relationship could have been due to the lack of importance placed on critical thinking by the organization.

The implication for the organization was that if the development of critical thinking in adult learners was an objective of the Cooperative Extension Service, then the performance appraisal and counseling systems of educators needed to be structured to provide feedback and critique to Extension educators on their use of critical thinking instructional strategies.
9. **Actual use decreased as length of service in OCES increased.**

This study found a negative, moderate relationship between length of service and actual use. The longer the Extension Home Economist had been employed by OCES, the less likely the educator was to use instructional strategies and principles to foster critical thinking in adult learners. This finding was as the researcher expected. As the age of the Extension Home Economist increased, the perceived knowledge level decreased. Since age is related to length of service, logic said there might also be a negative relationship between length of service and actual use.

The implication of this finding for the organization was a need to develop in experienced agents the skills needed to implement critical thinking instructional strategies and principles. This skill development might start with awareness of the variety of strategies and how to use each. The training might progress to practice teaching sessions and/or evaluation by a trained observer. The district specialist assigned to do performance appraisal on the educator could provide feedback and information on how to use instructional strategies and principles to foster critical thinking.

10. **Actual use declined with a major in agricultural education.**

Extension Home Economists who had at least one degree in agricultural education used fewer instructional strategies and principles to foster critical thinking in adult learners than did Extension Home Economists with other academic majors. This finding was not what the researcher expected as many
Extension educators in Ohio received their agricultural education degree from The Ohio State University where the agricultural education department focused on cognitive development.

The implication of this finding was, as the researcher expected, the fact that there is a distinct difference between cognitive development and critical thinking development. Or the agricultural education department at The Ohio State University may have only recently focused on cognitive development and with the majority of the sample being between the ages of 41 and 50 years, respondents may not have been in the formal education setting in recent years. Another implication was the need for the Cooperative Extension Service to evaluate each academic major separately and to not assume that an employee with an education degree would actually use instructional strategies and principles to foster critical thinking in adult learners. Caution should be used in interpreting this finding due to the small n.

11. **Actual use was related to subject matter of the lesson.**

This study found there was a positive, moderate, and significant at the .05 level relationship between the subject matter of the lesson -- food and nutrition -- and the actual use of instructional strategies and principles to foster critical thinking in adult learners. Extension Home Economists teaching food and nutrition lessons were more likely to use critical thinking instructional strategies and principles than Extension Home Economists teaching other subject matter areas.
This finding was different from what the researcher expected. The researcher made the assumption that Extension educators teaching family relations subject matter would be likely to use instructional strategies and principles to foster critical thinking. Logic dictated the educator would have an easier time asking interpretative/critical questions and engaging in dialogue with family relations subject matter than with other topics.

12. **Actual use declined with larger groups.**

The number of learners in attendance influenced the actual use of instructional strategies and principles in a negative manner. As the number in attendance increased, the actual use of instructional strategies and principles decreased.

The actual number in attendance may have influenced the utilization of strategies and principles to foster critical thinking since Extension educators may have perceived that the larger the group of learners, the more difficult time the educator would have in developing dialogue and asking questions of a critical nature. This study found a negative correlation between the actual use of instructional strategies and principles to foster critical thinking and the number in attendance. With a group of learners of less than 10, seated in a circle, the educator could fairly easily develop a situation to explore alternatives together.

The implication for the Cooperative Extension Service was to provide in-service information on how to incorporate critical thinking instructional strategies into large group situations. The instructional techniques were adoptable for a
large group; the educator just may have to give some critical thought to determine
the best way to proceed.

13. **Proposed model was redefined.**

The proposed model (Figure 1) for this study postulated an explanation for
the interaction between the Extension educator's perceived knowledge of critical
thinking instructional strategies and principles and the educator's actual use of
those same strategies and principles. Extension educators need to realize there
were intervening variables which influenced their actual use of instructional strate­
gies and principles. At times, these intervening characteristics may have influenced
their actual use in a positive manner, such as the subject matter of the lesson.
Other intervening characteristics such as length of service in OCES, an academic
major of agricultural education and the number in attendance, may have had a
negative influence. Caution should be used in interpreting this finding due to the
small \( n \).

Figure 1 suggested that by increasing the Extension educator's perceived
knowledge of critical thinking instructional strategies and principles, the actual use
of the selected critical thinking strategies and principles related to questioning,
dialogue, and reflection would also have increased. In addition, by increasing the
Extension educator's positive attitude toward or perceived use of the same instruc­tional strategies and principles, the actual use would have also increased. By
further recognizing both the positive and negative effects of the intervening
variables, the Extension educator may have structured the learning experience to
allow for increased use of instructional strategies which foster critical thinking in adult learners.

All respondents had a positive attitude toward using critical thinking. This finding was different from the attitudinal barriers including resistance to change and doubts about promoting thinking which were identified by Newman, Onosko and Stevenson (1988). This study found no significant relationships between the independent variables of perceived knowledge, perceived use and attitude with actual use. The researcher expected that as perceived knowledge increased so would actual use of critical thinking instructional strategies and principles. In addition, the researcher expected as perceived use increased, so would actual use and as attitude increased so would actual use. As a result, the original model was not supported. In its place (Figure 4), a revised model was postulated based on this study’s findings.

The implication of this finding for the Cooperative Extension Service was the need to recognize the role of the intervening variables and to train Extension educators to overcome the negative relationship associated with number in attendance, length of service, and a major in agricultural education. Caution should be used in interpreting this finding due to the small n.

**Recommendations**

1. If Extension education of the future, as Patterson (1991) proposed, will be a co-learning process, with the educator facilitating the process, then Extension educa-
tors must be trained to be better critical thinkers. Teaching to improve thinking skills involves new ways to conceptualize Extension teaching, including a shift in the way programs are developed, the way in-service is conducted, and the way Extension educators’ performance is appraised (Raths, Wassermann, Jonas, & Rothstein. 1986).

The researcher recommends the Ohio Cooperative Extension Service carefully review the future role of the Extension educator. If the role is to be one of autonomous learner, effective communicator, and systemist, as Patterson (1991) suggested, a careful review of both the goals and objectives of in-service training and of the performance appraisal system are in order.

2. The leader, staff development for the Cooperative Extension Service will need to work closely with state staff in planning in-service training programs which are more than just subject matter content. In-service training should ideally model critical thinking and instructional strategies to foster critical thinking in adult learners. In-service education should be planned, conducted, and evaluated to include the systematic training of Extension Home Economists on how to implement teaching to expand thinking skills in educational programs (Raths, Wassermann, Jonas, & Rothstein. 1986). Additional training is also needed for Extension personnel in critical thinking to increase their knowledge of selected critical thinking instructional strategies and principles which foster critical thinking.

3. Perhaps it is time, as Raths, Wassermann, Jonas, and Rothstein (1986) suggested, to shift the emphasis of Extension performance appraisal for educational
programs from action and results to thinking behavior in adult education. As Jones (1992) postulated, effective educators use good critical thinking and so should then receive high performance appraisal scores. However, performance appraisal may be based on a composition of factors, one of which is being an effective educator.

In future research, to more accurately assess performance appraisal, perhaps the total sample should be limited to Extension educators with no administrative responsibilities, thus eliminating educators with the title of county chair.

4. Extension educators with the program position as cluster agent need help in developing teaching materials which utilize critical thinking instructional strategies and principles. In the researcher's thinking, a cluster agent is in the ideal position for developing quality educational materials to use in a variety of educational settings. With some support from district specialists on how to use critical thinking instructional strategies and principles, cluster agents could do a more effective job of developing critical thinking in adult learners.

5. Since supervisory feedback enhanced critical thinking skills, Extension employees in a supervisory position need to be trained in how to recognize good critical thinking, what instructional strategies and principles promote good critical thinking, and how to provide feedback to Extension educators on the use of instructional strategies and principles which promote critical thinking in adult learners. If Extension educators know they have supervisory support, this researcher postulates they will be more willing to risk the change in behavior needed to incorporate teaching for thinking in the curriculum.
6. The leader, staff development for the Cooperative Extension Service, needs to make all Extension educators aware of opportunities to enroll in in-depth workshops or to take a college course on critical thinking. Extension educators should be encouraged to develop an independent study on critical thinking and to learn new instructional strategies and how to effectively use each strategy. A mentoring program could be initiated for Extension education to work together on the development of instructional strategies and principles.

7. If the Ohio Cooperative Extension Service decides to place emphasis on the development of thinking in adult learners, then serious consideration must be given to the performance appraisal system. The system must reward Extension educators who take the risk of using critical thinking instructional strategies and principles and must support the development of good critical thinking in each Extension educator.

8. The Ohio Cooperative Extension Service should examine variables which were related to the actual use of critical thinking instructional strategies and principles such as length of service with OCES, a major in agricultural education and the size of the audience.

**Recommendations for Further Study**

The following recommendations are made for further study:

1. Replicate this study with the population proportionally sampled by the number of agents per district instead of by a constant percentage per district. Proportional
sampling would avoid the problem of not obtaining an equivalent proportion of each job title in the study as there was in the population. With proportional sampling, some districts might conceivably have a higher proportion of agents carrying the title of County Extension Agent, Home Economics and Chair than would other districts.

2. Replicate this study by setting a minimum number of people to have in attendance before the observation is conducted. The researcher found the perception to be that initiation of critical thinking instructional strategies and principles was difficult with a very small or very large group of learners. In future studies, the researcher suggests the size of the group be a constant, if possible.

3. Replicate this study having the observer discuss, prior to the start of the teaching situation, with the Extension educator who is teaching, where in the room the observer should be seated, how the observer should be introduced to the audience, and how the observer will respond when learners approach the observer (Good & Brophy, 1987). These questions, discussed first, would reduce some of the uncertainties expressed by the observers in this study.

4. Replicate this study developing a better design for obtaining the intra-rater reliability results more quickly. In this study, several observers waited as long as four to six weeks to do the second observation. In addition, a plan should be implemented to work with observers who obtain less than a 70% agreement score on the intra-rater reliability. The inter-rater reliability could be improved with a longer training session or with repeated training sessions. Also, with more experi-
ence in doing direct observation research, the observers may have had a higher inter-rater reliability.

5. Develop an instrument that measures the critical thinking skills of Extension clientele. Although not addressed by this study, the problem with measuring the thinking of learners is the development of thinking takes hours of practice. Direct attribution of thinking development to Extension education programs may prove difficult. The measurement of learner thinking skills may not be possible. An alternate suggestion is to train Extension educators to listen to themselves as they interact with learners. This would initiate self awareness of truly teaching for thinking. In addition, critiques from a trained observer, may increase the educator's awareness of teaching techniques for thinking skill development (Raths, Wassermann, Jonas, & Rothstein. 1986).

6. Develop a method to identify learners who initiate dialogue. Good and Brophy (1987) suggested research focus on how often and who among the learners asks questions. This would be one way to assess the thinking of learners in a long-term education effort. In Extension programming, this might be implemented in an expanded program consisting of multiple lessons such as a series of subtopics.

7. Study the change in client questions as a result of the use of critical thinking instructional strategies and principles which have been modeled by an Extension educator. This would involve observation over an extended time period which may be difficult to accomplish with only one time Extension educational programs.
8. Focus on a study of the use of critical thinking instructional strategies and principles by Extension state and district specialists; many of whom are trained only in subject matter and not in teaching skills. Focus on the written materials prepared by the specialists such as newsletters, factsheets, or lesson outlines or focus on oral presentations by the specialists.

9. Replicate this study with written materials developed by the Extension educator being reviewed, instead of an observed teaching situation. The review would examine instructional strategies and principles which foster critical thinking in adult learners. Extension educators could be encouraged or rewarded for doing a self-review of their own written educational materials as compared to an expert review of the same materials.

10. Compare Extension educators work with 4-H members and 4-H advisors. Are more critical thinking instructional strategies and principles used with adults or with youth? Are the same results accomplished if critical thinking instructional strategies and principles are used when working with youth as compared to working with adults?

11. Replicate this study using individual teaching situations such as phone calls, office visits, and home visits instead of group teaching situations. Do Extension Home Economists use the same, more, or fewer instructional strategies and principles which promote critical thinking when they teach on an individual basis as compared to a group setting?
12. Study if the use of critical thinking instructional strategies improves the effectiveness of the Ohio Cooperative Extension Service. Examine measures of effectiveness of Extension education as perceived by clientele. These measures of effectiveness would include critical thinking instructional strategies and principles. The difficulty with this research would be in the wide range of needs of adult learners.

13. Examine the following: Does the knowledge of critical thinking improve the implementation of critical thinking strategies and principles? Which critical thinking instructional strategies and principles are the most effective?

14. Compare the strength of the critical thinking of the educator to that of their immediate supervisor. If the Extension educator is a strong critical thinker and is supervised by a strong critical thinker, will the Extension educator receive higher performance appraisal scores than if the strong critical thinker Extension educator is supervised by a person who has not developed critical thinking skills?

15. Replicate this study with Agricultural agents, 4-H agents, and/or Community and Natural Resource Development agents.

16. Develop a training program for supervisors on critical thinking instructional strategies and principles. This will provide training for supervisors in how to recognize critical thinking and how to foster the develop of critical thinking in Extension educators.
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APPENDIX A
DIRECT OBSERVATION FORM AND SELF-REPORT INSTRUMENT
Observer Instructions: This direct observation form has four sections. Section one asks for general information about the presentation. Section two is to be used during the observation time. Use tally marks (for example 6 = Util 1) to indicate the number of times a strategy was used during each 10 minute segment. Section three asks you to divide the time spent during the presentation into a number of specific strategies. Section four asks about the use of a reflection instrument at the close of the presentation. Following the observation, please record any personal observation about the presentation, the environment, or the nonverbal reactions of the learners at the end of the audio tape or write your thoughts on the back of this form.

SECTION ONE:
Observer __________________________ Location__________________________
Date____________________________ Starting Time_____________________
Code Number____________________ Ending Time______________________
Position Title____________________ of Presenter
Description of the setting (include whether the room was a comfortable temperature, how the room was arranged such as U shaped, complete circle, or chairs in rows): __________________________
_________________________________________________________________
_________________________________________________________________
Type of teaching situation________________________ (leader training lesson, open meeting, issues forum, part of a series, etc.)
Number of audience members_____________________
Description of the audience (include how familiar the audience appears to be with each other based on your observation before and after the meeting. Was there an activity to introduce each person?): __________________________
_________________________________________________________________
Topic of presentation_________________________
Purpose of the program________________________
_________________________________________________________________
### SECTION TWO: OBSERVATION OF TEACHING SITUATION

Record time in ten minute intervals such as 1:00, 1:10, 1:20. Write the actual time in each block.

<table>
<thead>
<tr>
<th>Time periods in 10 minute segments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

#### EDUCATOR INITIATED QUESTIONS

<table>
<thead>
<tr>
<th>Technical</th>
<th>Interpretative/Critical</th>
<th>Probe</th>
<th>5 second wait</th>
<th>EDUCATOR INITIATED DIALOGUE</th>
<th>Learner To Educator Dialogue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrective Feedback</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missed Opportunity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### LEARNER INITIATED DIALOGUE

<table>
<thead>
<tr>
<th>Learner To Learner Dialogue</th>
<th>REFLECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time For Reflection</td>
<td>210</td>
</tr>
</tbody>
</table>
## SECTION TWO: OBSERVATION OF TEACHING SITUATION

Record time in ten minute intervals such as 1:00, 1:10, 1:20. Write the actual time in each block.

<table>
<thead>
<tr>
<th>Time periods in 10 minute segments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

| EDUCATOR INITIATED QUESTIONS      |
| Technical                        |
| Interpretative/Critical          |
| Probe                            |
| 5 second wait                    |

| EDUCATOR INITIATED DIALOGUE       |
| Dialogue Initiated               |
| By Educator                      |
| Corrective Feedback              |

| Learner Initiated Dialogue       |
| Learner To                      |
| Educator Dialogue                |

| Learner To                      |
| Learner Dialogue                |

| Reflection                      |
| Time For Reflection             |
SECTION THREE:

Picture the circle below as if it were the program you just observed. How would you divide the time? What percentage of the circle was used for lecture time, for group activity time, for educator questions, for educator dialogue, for learner dialogue, for reflection? Choose to either divide the circle into pie shaped pieces indicating the time allocated for each topic OR write out the time spent (in percent of the total time of the presentation) on each.

1. Lecture time
2. Group activity time
3. Time for educator questions
4. Time for educator dialogue
5. Time for learner dialogue
6. Time for reflection

Total 100%

If you choose to use the circle, label (by exact words or by number) which category each section represents.

SECTION FOUR:

Was an evaluation instrument which requires reflection used at the conclusion of the program?

Yes, an instrument was used

No, an instrument was not used

If yes, please attach a copy of the instrument or record the questions asked.
INSTRUCTIONAL STRATEGIES
FOR
EXTENSION HOME ECONOMISTS

The human mind once stretched to a new idea, never goes back to its original dimensions.
Oliver Wendell Holmes
INSTRUCTIONAL STRATEGIES
FOR
EXTENSION HOME ECONOMISTS

Directions: Please take thirty minutes to respond to the questions below.

This instrument is designed to assess your perceived knowledge of critical thinking. Critical thinking is defined by Robert Ennis as reflective and reasonable thinking focused on deciding what to believe and do. The instrument is also designed to measure how frequently you use instructional methods which promote critical thinking. The identification number on the front of the instrument will be used to compare your responses with those of your observer. In no way will your name be connected with either form!

Thank you for taking time to participate in this project. Your efforts will help strengthen the quality of in-service education for Extension home economists.
SECTION ONE:

INSTRUCTIONS: Read each statement carefully, then select the response which best reflects your knowledge of the statement. Circle the one answer you believe is the best response. If you have no idea which response is correct, circle number 5, I have no idea. Please try not to guess. Please answer each question.

EXAMPLE:

QA. Instructional strategies are defined as:

1. Teaching methods.
2. Types of programs.
3. Types of audiences.
4. Times for programs to occur.
5. I have no idea.

By circling number 1, I am saying that I think instructional strategies are defined the same as teaching methods.

Q1. Asking technical questions means asking questions which:

1. Have absolute and concrete answers.
2. Have vague and relative answers.
3. Require learners to consider their beliefs and values.
4. Are seldom used by adult educators.
5. I have no idea.
Q2. Asking interpretative questions means asking questions which:

1. Have absolute and concrete answers.
2. Reflect on the meaning of life.
3. Probe the basis of a learner's beliefs.
4. Promote yes or no answers.
5. I have no idea.

Q3. Interpretative questions are:

1. Used as a means to enter into dialogue.
2. Questions with readily observable answers.
3. Not effective in identifying conflicts and uncertainties.
4. Questions which explore underlying assumptions.
5. I have no idea.

Q4. Critical questions are questions which:

1. Help to organize technical and interpretative questions.
2. Reflect on the thinking of others.
3. Will be resolved once and for all.
4. Have right and wrong answers.
5. I have no idea.

Q5. Critical thinking is the same as:

1. Creative thinking.
2. Cognitive development.
4. Practical reasoning.
5. I have no idea.
Q6. Dialoguing is defined as:

1. An exchange of verbal communication.
2. Answering questions asked by the educator.
3. The educator asking probing questions.
4. Two people having a conversation.
5. I have no idea.

Q7. When a question is asked, critical thinking is encouraged when the educator:

1. Responding immediately.
2. Waiting 3-4 seconds before responding.
3. Waiting five seconds before responding.
4. Waiting five seconds and then asking others to respond.
5. I have no idea.

Q8. Probing questions should:

1. Be asked with technical questions.
2. Ask learners to reword a response.
3. Only be used with rhetorical questions.
4. Be asked with critical questions.
5. I have no idea.

Q9. When a question is asked by a learner, critical thinking may be developed by the educator's:

1. Giving the right answer immediately.
2. Ignoring the question, especially if the educator does not know the answer.
3. Rephrasing the question before responding.
4. Offering to search out an answer if the educator does not know the answer.
5. I have no idea.
Q10. Critical thinking is defined as:

1. The cognitive skills as identified by Bloom's taxonomy of application, analysis, synthesis, and evaluation.
2. Persistent effort to examine any belief or statement in light of surrounding evidence to assess its authenticity, accuracy, and/or worth.
3. A refusal to settle for the one right answer; an attempt to consider alternatives that do not present themselves in formal, logical thinking.
4. My definition is different from these. It is as follows:

Q11. Dialogue is promoted by:

1. Questions which create a non-threatening discussion atmosphere.
2. Questions of a technical nature.
3. Questions which ask for an absolute or concrete answer.
4. Questions which provide information.
5. I have no idea.

Q12. Building time into programming for reflection is:

1. A detractor from teaching effectiveness.
2. An opportunity to apply new information to a familiar problem.
3. Structured so everyone shares an idea with the group.
4. More often an activity than a series of questions.
5. I have no idea.
Q13. Corrective feedback is:

1. The same as reflective feedback.
2. Avoided in an adult education setting.
3. A way to correct factual errors made in the discussion.
4. Only done on an individual basis, never in front of a group.
5. I have no idea.

Q14. Effective critical questions tend to:

1. Control the learning situation.
2. Focus the learner's thinking.
3. Be easy for an Extension educator to write.
4. Be used frequently by an experienced Extension educator.
5. I have no idea.

Q15. Using effective critical thinking strategies requires:

1. Little self confidence on the part of the educator.
2. The educator to let go of control of the program.
3. The educator to take few, if any, risks.
4. All of the above.
5. I have no idea.

Q16. Critical questions are used to:

1. Incorporate the values of the educator into the program.
2. Generate dialogue.
3. Teach the correct solution to everyday problems.
4. Obtain correct answers from learners.
5. I have no idea.
Q17. Effective critical questions are used to:

1. Generate responses the educator wants.
2. Generate responses the educator has not considered.
3. Assess learner knowledge on a topic.
4. Insure a correct answer.
5. I have no idea.

Q18. The role of the educator in posing questions is to:

1. Know the correct answer.
2. Help learners clarify thoughts.
3. Avoid challenging learners' beliefs or assumptions.
4. Maintain an unstructured learning atmosphere.
5. I have no idea.

Q19. Socratic questioning is designed to:

1. Explore beneath the surface of things.
2. Discuss technical subject matter.
3. Be rhetorical in nature.
4. Promote emotionally charged discussions.
5. I have no idea.
Q20. An effective educator uses critical thinking in teaching to:

1. Listen carefully.
2. Know when a right answer is given.
3. Maintain control over the program time schedule.
4. Avoid controversial topics.
5. I have no idea.

Q21. Critical thinking should be used:

1. Rarely or never in Extension programming.
2. When it is convenient to use in the program.
3. If the subject matter of the program seems appropriate.
4. In most of my programming efforts.
SECTION TWO:

Questions used in an educational setting may be defined as technical, interpretative or critical. These terms are defined as follows:

**Technical questions** are objective and discrete with a ready and observable answer. Technical questions tend to provide information and to have right and wrong or yes and no answers. Example: How does X affect Y? What is the composition of Z? What is the time required to process green beans?

**Interpretative questions** are used as a means to enter into dialogue. They help reflect on perceptions. Example: What is the meaning of X? How did you arrive at that answer?

**Critical questions** provide opportunities to analyze decisions and reflect on knowledge and beliefs. Example: What are the underlying assumptions behind your statement? What are your beliefs about care of aging parents? What is the ethical implication of dumping household hazardous waste?

INSTRUCTIONS: For each of the following questions, identify whether the question is technical, interpretative, or critical. Circle the word which best describes the category into which the questions fit.

Q22. What personal factors affected your decision to become a county Extension agent?

1. Technical
2. Interpretative
3. Critical

Q23. How flexible was your decision to become a county Extension agent?

1. Technical
2. Interpretative
3. Critical
Q24. What were the viewpoints of family members and friends concerning your decision to be a county Extension agent?

1. Technical
2. Interpretative
3. Critical

Q25. What was your goal as a new county Extension agent?

1. Technical
2. Interpretative
3. Critical

Q26. What values supported your decision to accept the position of county Extension agent?

1. Technical
2. Interpretative
3. Critical

Q27. What were your alternatives to being a county Extension agent?

1. Technical
2. Interpretative
3. Critical
SECTION THREE:

INSTRUCTIONS: Picture the circle below as if it were the program you just observed. How would you divide the time? What percentage of the circle was used for lecture time, for group activity time, for educator questions, for educator dialogue, for learner dialogue, for reflection? Choose to either divide the circle into pie shaped pieces indicating the time allocated for each topic OR write out the time spent (in percent of the total time of the presentation) on each.

If you choose to use the circle, label (by exact words or by number) which category each section represents.

Q28. Lecture time
Q29. Group activity time
Q30. Time for educator questions
Q31. Time for educator dialogue
Q32. Time for learner dialogue
Q33. Time for reflection

Total 100%
SECTION FOUR:

INSTRUCTIONS: To the left of each statement, circle the number which best indicates the number of times you used each instructional strategy in today's presentation. To the right of each statement, indicate how much knowledge you have of each instructional technique in Extension teaching by circling the number that gives the best description.

Key

Used in Today's Presentation
1 = Did not use today
2 = Used occasionally
3 = Used frequently

Knowledge Level
1 = I have no knowledge
2 = I have introductory knowledge
3 = I have working knowledge
4 = I have advanced knowledge

Example:

QA. Questions with readily observable answers such as "What color is this sweater?"

By circling the number 2, on the left hand side, I am saying I used this type of question occasionally in today's presentation. By circling the number 3, on the right hand side, I am saying I have a working knowledge of how to use questions with readily observable answers in my Extension programs.
### Used in Today's Presentation

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### Instructional Technique

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<tr>
<th>Q34. Questions that ask cause and effect such as &quot;How does water quality affect your family's health?&quot;</th>
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<th>Q35. Descriptive questions such as &quot;What is meant by public policy?&quot;</th>
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<th>Q36. Questions with a yes or no answer such as &quot;Is the bathrobe hanging on the hook?&quot;</th>
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<th>Q37. Questions which attempt to identify a procedure or method such as &quot;How should you process tomatoes?&quot;</th>
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<th>Q38. Questions which have a right or wrong answer such as &quot;How much detergent should you use to wash green beans?&quot;</th>
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Q39. Questions which generate a dialogue between the facilitator and the learners such as "Why do you feel that way?"

Q40. Questions which identify conflicts, uncertainties, or divergent ideas such as "Do you agree with Sue? If not, why not?"

Q41. Questions which reflect knowledge such as "Based on what you know about sewing, what seam finish would be best?"

Q42. Questions which reflect beliefs such as "From where did your beliefs about parenting come?"

Q43. Questions which will probably not be resolved once and for all such as "What should be done about disposing of household hazardous waste?"

Q44. Questions which examine the impact of our decisions on others such as "How would your decision on a nursing home for mother affect other family members?"

Q45. Questions which encourage learners to improve their answer such as "Can you tell me a little more? What do you mean?"
SECTION FIVE:

INSTRUCTIONS: To the left of each statement, circle the number which best indicates how often you used each critical thinking principle in today's presentation. To the right of each statement, indicate how much knowledge you possess about using this technique to be an effective educator by circling the number that gives the best description.

Key

<table>
<thead>
<tr>
<th>Used in Today's Presentation</th>
<th>Knowledge Level</th>
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<tr>
<td>1 = Did not use today</td>
<td>1 = I have no knowledge</td>
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<tr>
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<td>4 = I have advanced knowledge</td>
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Example:

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<td></td>
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<td>QA. Opportunities for learners to engage in dialogue with other learners.</td>
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By circling number 2 on the left side, I am saying I used this principle of critical thinking on occasion in today's presentation. By circling the number 4 on the right side, I am saying I have advanced knowledge of this principle and could teach the principle to others.

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<th>Used in Today's Presentation</th>
<th>Critical Thinking Principles</th>
<th>Knowledge Level</th>
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<tr>
<td>1 2 3</td>
<td>Q46. Opportunities for learners to consider strengths and weaknesses of opposing points of view.</td>
<td>1 2 3 4</td>
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</table>
Q47. Opportunities to consider a wide range of alternatives during decision making.

Q48. Opportunities for learners to raise ethical questions about consequences of actions and decisions of others.

Q49. Opportunities to identify and question assumptions.

Q50. Opportunities for learners to learn by discovering new information.

Q51. Opportunities to apply a skill or idea learned today to one already practiced.

Q52. Opportunities to discuss creative ideas.
SECTION SIX:

INSTRUCTIONS: The following is a list of instructional techniques. On the blank to the left of each number, check those techniques used in today's presentation. If you are unsure or unfamiliar with the technique, place a question mark (?) in the blank.

___ Q53. role play ___ Q66. audio tapes
___ Q54. lecture ___ Q67. debate teams
___ Q55. questions and answers ___ Q68. dramatization
___ Q56. small group discussions ___ Q69. critical incident
___ Q57. brainstorming ___ Q70. scenario building
___ Q58. case study ___ Q71. creative visualization
___ Q59. demonstration ___ Q72. listening team
___ Q60. films/slides/videos ___ Q73. journal writing
___ Q61. games ___ Q74. thought provoking quotations/cartoons
___ Q62. computer assisted instruction ___ Q75. reflection sheets
___ Q63. handouts ___ Q76. pluses/minuses/implication sheets
___ Q64. panel discussion
___ Q65. open discussion
SECTION SEVEN:

PART A
INSTRUCTIONS: For each of the following questions, circle the best answer or complete the blank.

Q77. My area of specialization is: (CIRCLE ALL THAT APPLY)
   1. Food and Human Nutrition
   2. Management of Family Resources
   3. Family Life/ Human Development
   4. Leadership

Q78. I am a county chair: (CIRCLE ONE)
   1. Yes
   2. No

Q79. I am a multi-county agent: (CIRCLE ONE)
   1. Yes
   2. No

Q80. I am involved in a cluster: (CIRCLE ONE)
   1. Yes
   2. No

Q81. Total years employed in Extension (either in Ohio or elsewhere):
   ___ Years

Q82. Years taught in public or private school system:
   ___ Years
Q83. My year of birth:

19

Q84. My college major(s) was in the area(s) of: (CIRCLE ALL THAT APPLY)

1. Home Economics Education
2. Agricultural Education
3. Adult Education
4. Journalism
5. A specific subject matter such as Clothing, Foods and Nutrition, Family Life, Resource Management, etc.
6. Other, please specify ________________

PART B
INSTRUCTIONS: For each of the following statements, place a check mark on the blank to the left of the number for those experiences you have had on the topic of critical thinking instructional strategies. (CHECK ALL THAT APPLY)

___ Q85. College course which incorporated the topic of critical thinking.

___ Q86. College course just on critical thinking.

___ Q87. Indepth workshop or conference (at least 8 hours or more).

___ Q88. In-service or mini workshop (less than 8 hours).

___ Q89. Independent study (reading books, journal articles, etc.).

___ Q90. I have received feedback from my supervisor or other observer regarding my ability to utilize instructional strategies that promote critical thinking.
SECTION EIGHT:

INSTRUCTIONS: Following is a continuum representing one's perception of being either learner-centered or teacher-centered in their teaching style. To the far left of the continuum is a person totally teacher centered. A person at the far right of the continuum is totally learner centered. Place an (X) on the continuum where you believe you currently are in relation to the end points.

Learner-centered means learners are actively involved in the learning process. The facilitator believes learners are self directed, informed, and highly motivated. The learner is the center of the teaching effort. The learning environment is unstructured and informal.

Teacher-centered means the teacher is the center of the classroom and learners are more passive in the learning process. The learning environment is formal and structured.

Q91.

Teacher-centered  Learner-centered

Thank you for completing this questionnaire. Please return to your district specialist, Home Economics.
APPENDIX B
COVER LETTERS, PANEL OF EXPERTS AND PILOT TEST PARTICIPANTS
July 18, 1991

Dear ,

I am writing to request your help in developing my dissertation instruments related to the use of instructional strategies by Extension Home Economists which promote critical thinking in adult learners. The objectives of my research project are to:

- Measure the actual use of critical thinking instructional strategies and principles related to questioning, dialogue, and reflection by direct observation.
- Assess the actual knowledge level of Extension Home Economists on three instructional strategies (questioning, dialogue, and reflection).
- Measure the perceived use of three instructional strategies (questioning, dialogue, and reflection) as measured by a self-report instrument.
- Compare the actual use of instructional strategies and principles with the perceived use of the same strategies.

The direct observation form (white) is designed to be used by a trained observer to observe an Ohio Extension Home Economist in a one to two hour group teaching situation. The observer will tally the number of times each strategy is used. Immediately following the presentation, the observer will ask the Extension Home Economist to complete the self-report instrument (yellow). The home economist will report her knowledge of the three critical thinking instructional strategies and how often she perceives she used each strategy in the presentation just completed. The final question on teacher or learner-centered teaching style is related to a future research project and not directly to this one.

Please serve as part of my panel of experts to review both documents. Both instruments have been piloted with a group of Extension educators. Please mark an suggestions for improvement or indicate points which are inaccurate or unclear.

Please return both instruments in the enclosed envelope by August 2. Your cooperation is greatly appreciated.

Sincerely,

Nancy (Hudson) Bull
Graduate Student, Agricultural Education
Panel of Experts

Jo Jones, Ph.D  
Assistant Professor  
Department of Agricultural Education  
Leader, Personnel Development  
Ohio Cooperative Extension Service  
The Ohio State University

Emmalou Norland, Ph.D  
Associate Professor  
Department of Agricultural Education  
The Ohio State University

Jan Henderson, Ph.D.  
Associate Professor  
Department of Agricultural Education  
The Ohio State University

Jamie Cano, Ph.D  
Assistant Professor  
Department of Agricultural Education  
The Ohio State University

Charles Miller, Ph.D  
Assistant Professor  
Department of Agricultural Education  
The Ohio State University

Larry Miller, Ph.D.  
Professor  
Department of Agricultural Education  
The Ohio State University

Rosemarie Rossetti, Ph.D  
Assistant Professor  
Department of Agricultural Education  
The Ohio State University

Robert Agunga, Ph.D.  
Assistant Professor  
Department of Agricultural Education  
The Ohio State University

Lowell Hedges, Ph.D  
Associate Professor  
Department of Agricultural Education  
The Ohio State University
Panel of Experts - (continued)

<table>
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<th>Name</th>
<th>Title</th>
<th>Department</th>
<th>University</th>
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<tr>
<td>Mike Loyd, Ph.D</td>
<td>Assistant Professor</td>
<td>Department of Home Economics Education</td>
<td>The Ohio State University</td>
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<tr>
<td>Sharon Redick, Ph.D</td>
<td>Professor</td>
<td>Department of Home Economics Education</td>
<td>The Ohio State University</td>
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<tr>
<td>Marilyn Spiegel, Ph.D</td>
<td>Leader, Evaluation</td>
<td>Ohio Cooperative Extension Service</td>
<td>The Ohio State University</td>
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<td>Joan Gritzmacher, Ph.D</td>
<td>Professor</td>
<td>Department of Home Economics Education</td>
<td>The Ohio State University</td>
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<tr>
<td>Janet Laster, Ph.D</td>
<td>Associate Professor</td>
<td>Department of Home Economics Education</td>
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<tr>
<td>Ruth Dohner, Ph.D</td>
<td>Assistant Professor</td>
<td>Department of Home Economics Education</td>
<td>The Ohio State University</td>
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</table>
August 5, 1991

Dear ,

Just what you need, right in the middle of a busy summer, is one more thing to do! To ward off any headaches this letter may cause, I have included two Alka Seltzer.

My research project for my doctoral dissertation involves measuring the knowledge level of Extension home economists on teaching methods which promote critical thinking. Before I can collect data, my instrument needs to be tested--and that is where you come into the picture.

Would you please take 15 minutes from your busy schedule to complete the enclosed questionnaire? When finished, please return the instrument in the enclosed envelope no later than August 15.

Thank you in advance for your cooperation. Your input will directly contribute to improvements in Extension education efforts from which we will all benefit. So here we go: "blop, blop, fizz, fizz."

Yours,

Nancy H. (Hudson) Bull
Assistant Leader, Small Business
August 14, 1991

Dear,

Before you go any further, make yourself a cup of freshly brewed coffee and relax. I have one last favor to ask of you.

First, thank you for completing the pilot of my instrument which is part of my doctoral dissertation. Your help again is needed to check the reliability of the instrument. Reliability is checked by your retaking the instrument. Then, I will compare your first with your second response to check for consistency of answers. The more consistent the instrument, the more reliable the results, and the better quality the study. When finished, please return the instrument in the enclosed envelope no later than August 26.

Thank you in advance for your cooperation. If you would like me to share results of my study at its conclusion in December, I'll be happy to do so. Just indicate your desire on the back of the booklet cover. Now, relax and enjoy your coffee.

Yours,

Nancy H. (Hudson) Bull
Assistant Leader,
Small Business
### Pilot Study Participants

<table>
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<tr>
<th>Name</th>
<th>County</th>
<th>Extension Agent</th>
<th>Home Economics</th>
<th>County</th>
<th>Extension Service</th>
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<td>Nancy K. Layman</td>
<td>County Extension Agent, Home Economics</td>
<td>Allen County</td>
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<td>Cheryle Jones Syracuse</td>
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<td>Lois Clark, Chair</td>
<td>County Extension Agent, Home Economics</td>
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<td>Diane Johnson</td>
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Pilot Study Participants - (continued)

Joyce Fittro
County Extension Agent, Home Economics
Delaware County
Ohio Cooperative Extension Service
The Ohio State University

Karen Burns
County Extension Agent, Home Economics
Fairfield County
Ohio Cooperative Extension Service
The Ohio State University

Linnette Mizer Goard
County Extension Agent, Home Economics
Fayette County
Ohio Cooperative Extension Service
The Ohio State University

Susan Shockey
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Franklin County
Ohio Cooperative Extension Service
The Ohio State University

Barbara Drake
County Extension Agent, Home Economics
Geauga County
Ohio Cooperative Extension Service
The Ohio State University

Karen Williams
County Extension Agent, Home Economics
Hamilton County
Ohio Cooperative Extension Service
The Ohio State University

Lana Hardy
County Extension Agent, Home Economics
Lawrence County
Ohio Cooperative Extension Service
The Ohio State University
Pilot Study Participants - (continued)

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<td>Nancy W. Hudson</td>
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<td>Ruth Anne Foote</td>
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<td>The Ohio State University</td>
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Dear

All of us as educators constantly strive to improve our teaching methods. One technique for doing so is to have a co-worker observe us teaching and to provide feedback on our teaching style. We are very fortunate to have Nancy (Hudson) Bull working on a statewide effort to do just this. Nancy is conducting her Ph.D. dissertation research on teaching methods used by Extension Home Economists.

The purpose of the project is to gather information to strengthen our in-service offerings by identifying teaching methods most often used by Extension Home Economists like yourself. Once identified, training may be offered incorporating methods not currently used to reenforce teaching skills. The expected outcome of the study is to provide us with suggested improvements of our teaching efforts. You have been selected to be part of this project which involves you being observed in a teaching situation.

What does being in the study mean to you? You have been selected as a potential subject in this project which involves you being observed in a teaching situation one to two hours which may or may not be part of an ongoing series. Your participation in this study is voluntary and you are free to withdraw from the study at any time without prejudice. The observation will be done by and will be audio tape recorded to insure an accurate record. Following the completion of the dissertation, all audio tapes will be destroyed.

The only advance preparation needed on your part is to contact and arrange for a date to be observed. The observation should occur between September 15 and December 1. This will allow time for you to select your choice of fall programs.

In no way will this observation be part of your performance appraisal. The purpose of the observation is to collectively examine teaching methods used to improve future in-service opportunities.

How do you make a commitment to participate? Call today and schedule a time to be observed. Remember, times will be on a first come basis. Nancy will contact you by phone to confirm your willingness to participate and your scheduled observation time. If you will be unavailable at that time, please leave word with your secretary. Following the observation, you will be asked to complete a questionnaire on the program you just taught. Plan to spend no more than 15 minutes completing the questionnaire.
Thank you in advance for your cooperation. There is little doubt that the results of this study will make an impact on the quality of our in-service training efforts. If you have questions concerning the study, please contact Nancy at 614-292-8436.

Sincerely,

Keith L. Smith  
Associate Director

cc: County Chair  
    District Director  
    District Specialist, Home Economics
November 14, 1991

Dear ,

Thank you very much for participating in my research project on teaching methods used by Extension Home Economists. As you may have noted from the self-report instrument you completed, I am looking at three specific instructional methods which promote critical thinking in adult learners; these three methods are questioning, dialogue, and reflection. Specifically, are these methods being used by Extension Home Economists to foster critical thinking? My premise is that in Extension education we are so busy giving the "right" answer we forget to develop the thinking in our adult learners.

The observation of your teaching will add to the body of knowledge for my study. Once completed, I will send you a summary of the results.

I do appreciate the time and effort it took to arrange to be observed and to complete the instrument. Again, thank you very much.

Yours,

Nancy (Hudson) Bull
Assistant Leader,
Small Business
APPENDIX D
OBSERVERS AND AGENDA FOR OBSERVERS TRAINING
<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
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<th>University</th>
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<tr>
<td>E. Linda Ferris</td>
<td>District Specialist, Home Economics</td>
<td>East</td>
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<td>Hannah H. Beish</td>
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<td>Deanna L. Tribe</td>
<td>District Specialist, Home Economics</td>
<td>South</td>
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<tr>
<td>Ann W. Miller</td>
<td>District Specialist, Home Economics</td>
<td>Southwest</td>
<td>The Ohio State University</td>
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</tbody>
</table>
July 11, 1991

TO: DISTRICT STATE SPECIALISTS, H.E.
   STATE SPECIALISTS, H.E.
   MARILYN SPIEGEL
   DONNA BROWN
   SHARRON COPLIN
   RUSSELL WILLIS

FROM: RUTH M. CONONE

RE: DISTRICT/STATE SPECIALIST MEETING
   JULY 31 - AUGUST 1, 1991

AGENDA

        INN AT HONEY RUN

JULY 31

   9:30 A.M.                                       Coffee/Welcome J. Russell Willis
   10:00 A.M.                                      Update from July Administrative
                                                         Cabinet - Marilyn Spiegel
   10:30 A.M.                                      Needs Assessment Summary
                                                             Statewide Basis
                                                             District Basis
                                                             Implications for Programming
                                                             Administrative Cabinet Interpretation
                                                             State Issues - Objectives - Key Words
                                                             1. Family/Individual Development
                                                             2. Economy
                                                             3. Environment
                                                             4. Leadership
                                                             5. Health
                                                             6. Community Development
                                                             7. Agriculture Stability
                                                             8. Youth Development Education

   12:00 noon                                     LUNCH
1:00 P.M. Plan of Work - R. Conone/M. Spiegel
3:00 P.M. State/District Specialist Role/Guidance in POW Preparation & Impact Assessment
4:00 P.M. Preprogram Planning for 1992/1993
5:00 P.M. ADJOURN

AUGUST 1
8:30 A.M. Inservice - To Be Offered in 1992
9:00 A.M. District Specialist Sharing
to be completed from last meeting
9:45 A.M. State Specialist Sharing
L. Ferris include update on Family Life Month Packet and Family Life Tabloid
11:30 A.M. LUNCH
1:00 - 4:00 P.M. Critical Thinking Assessment Orientation - N. Bull and J. Jones
Documentation of critical thinking strategies. All specialists encouraged to participate. District Specialists required to participate.

sg
cc: ✓ Nancy Bull
    Jo Jones
    Dean Bailey
    H.E. Dept. Chairs

REGISTRATION

Please return to Ruth Conone by JULY 24.

NAME ______________________________________________
PREFERRED ROOMMATE ________________________________

Will participate in August 1, 1:00 - 4:00 P.M. Session ___ YES ___ NO

Registration Fee = $6.25 (MAKE CHECKS PAYABLE TO THE OHIO STATE UNIVERSITY)

Rooms and meals will be paid by you individually then turned in on your expense accounts.
May 21, 1991

TO: DISTRICT/STATE SPECIALISTS, H.E.
   MARYLON SPIEGEL
   DONNA BROWN
   SHARRON COPLIN

FROM: RUTH M. CONONE

DISTRIBUTION/STATE SPECIALISTS, H.E. MEETING
JUNE 12 - 13, 1991

ANIMAL SCIENCE BUILDING, ROOM 212
(2029 FYFFE ROAD)

JUNE 12

9:30 - 10:00 District H.E. Specialists. Nancy Bull's
         Doctoral Proposal

10:00 - 11:30 "Letting Go" - Marilyn Spiegel et al
         A process of examining how we use our resources in order to help us
         make changes we want to make.

11:30 - 1:00 LUNCH

1:00 - 5:00 Workshop - Writing at a Limited Literacy Level
         Dr. Kevin Freer,
         Brenda Chaney, Ph.D. candidate

We will receive inservice education on writing at a basic literacy level. Our
workshop conveners have copies of BWAF fact sheets that they will have evaluated
for reading level. Come prepared to participate in an active workshop.

(NOTE FROM BRENDA CHANEY):

One of the tasks for the June 12 workshop is to discuss a computer analysis of the
readability of a sample of your written work. Rather than taking the time on June 12 to
analyze the materials, this will be done in advance of the workshop. In order to do this you
will need to send a sample of your work by June 5 to Ruth Conone's office.

The writing sample will be analyzed by a computer program called RightWriter. For the
analysis you will need to type your writing sample onto a 5 1/4 inch diskette on an IBM
compatible computer. (Stephanie can convert your 3 1/2" disk to a 5 1/4" disk here in our
office) You will create an ASCII file using the instructions in your work processing manual for "Creating an ASCII File", "Sharing DATA with Other Programs" or "Creating a Text File." Any word processing program will work but it must be IBM compatible. The diskette and the written copy should be sent to Ruth Conone's office by June 5. Be sure to label the diskette and written copy with you name.

**JUNE 13**  
**ANIMAL SCIENCE BUILDING, ROOM 212**  
**ANN MILLER**

8:00 a.m. Results of Program Needs from BWF Impact Study  
- Marilyn Speigel and Ruth Conone

8:30 a.m. Review of BWF Resources for April 24-25 Marketing Inservice  
- Video of Carole Fromer, Program Educator, Marketing, University of Connecticut Cooperative Extension system

9:15 a.m. Review of RFP from ES-USDA on Programming for Limited Resource Audiences - Ruth Conone

9:25 a.m. Recommendations for Program Direction from BWF Task Force  
- Ann Miller and Hannah Beish  
(Topics for men, delegation, elder care, weight control, child care issues, grief management)

9:45 a.m. BREAK

9:55 a.m. Small Group Discussions on Program Resource Needs by Economic, Emotional and Physical Well-Being Sub-groups

10:55 a.m. Reports from Sub-groups

11:20 a.m. Video - *Another Call From Home* - Managing Work and Family, Inc.

11:45 a.m. LUNCH - UNIVERSITY RAMADA INN  
We will remain there for our 1:15 - 3:00 p.m. meeting and will be in a separate room.

1:15 - 1:45 p.m. Administration Update - Ruth Conone  
Satellite Application - Limited Resource Audience  
(Two reference articles attached for your review and consideration prior to this meeting. They are from *Journal of Marriage and Family*.)  
"The Impact of the Family on Health..."  
"Economic Distress and Family Relations..."  
Both of these articles summarize research conducted in the 80's on these topics.

1:45 - 3:00 p.m. Sharing by District Specialists  
What's happening in the district that we should all know about?  
Feed Back on coaching "team support concept".
LINDA JOHNSON HAS CLARIFIED THAT LUNCHES CAN ONLY BE REIMBURSED ON EXPENSE ACCOUNT IF THEY ARE PAID AS PART OF REGISTRATION FOR A MEETING. THEREFORE, YOUR LUNCHEON FOR JUNE 13 IS INCLUDED AS SEPARATE ITEM IN THE REGISTRATION. WE WILL EAT AT THE FAWCETT CENTER ON JUNE 12 AND STATE STAFF WILL NOT BE ABLE TO BE REIMBURSED. THIS IS IN ACCORDANCE WITH THE OHIO STATE UNIVERSITY TRAVEL POLICY GUIDELINES - CURRENT INTERPRETATION.

NAME ______________________________________

Enclosed is registration for the June 12/13, 1991 State/District Specialist quarterly meeting. Send to Ruth Conone by JUNE 7. (The number of attendance needs to be confirmed by that day)

Make checks payable to The Ohio State University

____ $ 2.50 Registration fee for June 12 & 13, 1991

____ $10.00 Lunch at University Ramada Inn
    (includes charge for meeting room)

____ $ TOTAL ENCLOSED

Check luncheon you want. Same price for each luncheon

____ Club Croissant w/ chips, coffee/tea - hot or iced (only these beverages are concluded in this price)

____ Roast Beef Pita Sandwich w/ chips, coffee/tea - hot or iced (only these beverages are included in this price)
AGENDA FOR OBSERVER TRAINING
Thursday, August 1, 1991
1:00 to 4:00 p.m.
The Inn At Honey Run

What is direct observation as a data collection method?

View video of examples of points to be observed

Practice generating questions of an interpretative and critical nature

Practice using observation form with sample video clip

Actual use of observation form with video clip

Procedure for intra-rater reliability

Procedure for observing agents
November 14, 1991

Dear ,

Thank you very much for the time and effort you devoted to observing five agents in your district for my research project. I know the project probably took more time and effort than you had anticipated. But, I hope as a result of doing the observations, you gained some insights into the home economics programs in your district.

I will share a summary of my results when the study is finished. In order to maintain anonymity, results will only be summarized on a state wide basis, not by district.

If you have additional comments about what you observed or about the study in general, I would appreciate hearing them. Please accept the enclosed as a small token of my appreciation for all you did.

Again, thank you very much for your help and support.

Yours,

Nancy H. Bull
Ass't. Leader, Small Business

cc: District Director
    Assistant Director, Home Economics
    Acting Director
Sample for Study and Program Observed

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<tr>
<td>Ella Mae Bard</td>
<td>Licking</td>
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<td>Hancock</td>
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<td>Jean Clements</td>
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<td>Karen Faust</td>
<td>Clermont</td>
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<td>Susan Zies</td>
<td>Lucas</td>
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Map Showing Sample For Study

Prepared by: Sam Crawford, The Ohio State University/The Ohio Cooperative Extension Service
APPENDIX F
HUMAN SUBJECTS REVIEW
RESEARCH PROTOCOL:
91B0146 CRITICAL THINKING INSTRUCTIONAL STRATEGIES UTILIZED BY OHIO COOPERATIVE EXTENSION HOME ECONOMICS, Jo M. Jones, Nancy H. Bull, Agricultural Education

presented for review by the Behavioral and Social Sciences Review Committee to ensure proper protection of the rights and welfare of the individuals involved with consideration of the methods used to obtain informed consent and the justification of risks in terms of potential benefits to be gained, the Committee action was:

[ ] APPROVED
[ ] DEFERRED*
[X] APPROVED WITH CONDITIONS*
[ ] DISAPPROVED
[ ] NO REVIEW NECESSARY

*CONDITIONS/COMMENTS:

Subjects were deemed NOT AT RISK and the protocol was unanimously APPROVED WITH THE FOLLOWING CONDITION:

Revise the letter to extension subjects as follows and forward a copy to the Committee:

1. Revise to read, "You have been selected as a potential subject in this project which involves you being observed in a teaching situation."

2. Inform subjects that participation is voluntary and that they can withdraw from the study at any time without prejudice.

3. Inform subjects of the disposition of the tapes upon completion of the study.

If you agree to the above conditions, PLEASE SIGN THIS FORM IN THE SPACE PROVIDED BELOW AND RETURN WITH ANY ADDITIONAL INFORMATION REQUESTED TO THE HUMAN SUBJECTS REVIEW DESK, 300 RESEARCH FOUNDATION, 1960 KENNY ROAD, CAMPUS, within one week. Upon such compliance, the approval form will be mailed to you. (In case of a deferred protocol, please submit the requested information at your earliest convenience. The next meeting of the Committee will be two weeks from the meeting date indicated above.)

DATE 9/1/91 Signature(s) [Signature(s)]
(Principal Investigators)

HS-025A (Rev. 2/91)
(CONDITIONS/COMMENTS)