

AN ANALYSIS OF SELECTED CRITICAL
THINKING SKILLS USED BY OKLAHOMA
VOCATIONAL EDUCATION INSTRUCTORS

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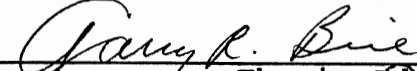
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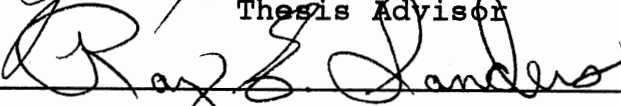
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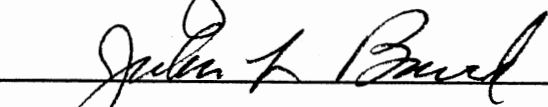
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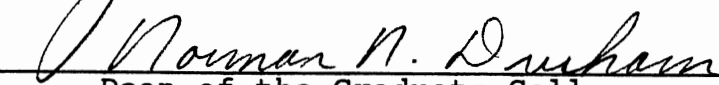
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Dean of the Graduate College

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TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION	1
Statement of the Problem	2
Purpose of the Study	2
Questions Included in the Study	3
Scope of the Study	3
Assumptions of the Study	4
Limitations of the Study	4
Definition of Terms	5
II. REVIEW OF LITERATURE	11
Introduction	11
Historical Overview	12
Integrating Critical Thinking Skills in the Classroom	19
Other Views	24
Summary of Review of Literature	25
III. METHODOLOGY	28
Introduction	28
Questions Included in the Study	28
Population	29
Collection of Data	30
Questionnaire	30
Analysis of Data	31
IV. FINDINGS	33
V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	44
Summary	44
Conclusions	45
Recommendations	51
BIBLIOGRAPHY	54

APPENDIXES 56

APPENDIX A - QUESTIONNAIRE 57

APPENDIX B - COVER LETTER 61

APPENDIX C - REPRESENTATIVE LIST OF
RESPONDENT DEFINITIONS OF CRITICAL
THINKING SKILLS 63

APPENDIX D - REPRESENTATIVE LIST OF
INCORRECT RESPONDENT DEFINITIONS OF
CRITICAL THINKING SKILLS 65

APPENDIX E - REPRESENTATIVE LIST OF
RESPONDENT COMMENTS ON CRITICAL
THINKING SKILLS 67

LIST OF TABLES

Table	Page
I. Chi Square Table of Instructor Opinion of Own Knowledge of Critical Thinking Skills	34
II. Chi Square Table of Actual Instructor Knowledge of Critical Thinking Skills	36
III. Chi Square Table of Actual Instructor Knowledge of Critical Thinking Skills by Educational Level	37
IV. Chi Square Table of Instructor Knowledge of Critical Thinking Skills/View Critical Thinking Skills as Important for Students	38
V. Actual Instructor Knowledge of Critical Thinking Skills/Follow Up Lectures with Demonstration/Application	39
VI. Chi Square Table of Actual Instructor Knowledge of Critical Thinking Skills/Encourage Students to Raise Questions, Break Up Complex Idea; Formulate Hypotheses, and Solve Problems and Make Decisions	40
VII. Actual Instructor Knowledge of Critical Thinking Skills/Apply Knowledge to New Situations	41
VIII. Chi Square Table of Actual Instructor Knowledge of Critical Thinking Skills/Opportunity to Evaluate Information	41
IX. Chi Square Table of Actual Instructor Knowledge of Critical Thinking Skills/Problems Integrating Critical Thinking Skills in Curriculum	42

CHAPTER I

INTRODUCTION

Our every waking moment is filled with decisions, yet formal school does little if anything to prepare students to live in a decision-filled world. Present education attempts to have students internalize everything: to memorize an endless stream of facts, terms, definitions, names, dates, and places, with the futile hope that the student will retain this trivia until such time as it will be needed. (Young, 1986, p. 60).

This approach is illogical for a number of reasons . . . students probably won't ever need to recall most of the information taught in school, except perhaps in a game of Trivial Pursuit . . . to treat the human mind simply as a biological storage device, as schools do now, is somewhat akin to using a 747 as a storage facility (Young, 1986, p. 60).

Instead of memorizing facts, students need to know how to accurately identify problems or issues and how to find information. They need the ability to analyze and synthesize that information to form solutions, and to make decisions (Young, 1986).

Critical thinking is one way to reach this goal. Hopefully, critical thinking skills are one way of preparing students for the analytical, decision-making, and problem-solving skills they will need for the future.

Citing Sternberg, Marbach (1986) said that critical thinking should do more than equip students for school, it

should also prepare them for postclassroom life. "You have to look at the person's ability to use his knowledge in real world context" (p. 59).

Berryman (1988) stated that changes in the American economy and demographics may require basic changes in education. These changes include the need for more analytical and problem-solving skills. Many jobs may demand varied and unpredictable responses to a variety of stimuli and information.

Statement of the Problem

The problem is that many students do not have the ability to use critical thinking skills. It is not known if teachers are in fact teaching those skills or why instructors may not be teaching critical thinking skills.

Purpose of the Study

The purpose of the study was to determine the extent to which Oklahoma vocational education instructors knew what was meant by critical thinking skills and whether they viewed those skills as important. It was also the purpose of the study to discover if those instructors used critical thinking methods in teaching vocational subjects and if they had problems incorporating critical thinking skills into the curriculum. A further purpose was to determine information needed to develop curriculum (according to the results) at the Curriculum and Instructional

Materials Center (CIMC) of the Oklahoma State Department of Vocational and Technical Education.

Questions Included in the Study

To accomplish the purpose of the study, the following questions were posed:

1. Do Oklahoma vocational education instructors know what is meant by critical thinking skills?
2. Do vocational education instructors in all vocational service areas have the same knowledge of critical thinking skills?
3. Does educational level of vocational education instructors have a bearing on whether they know what is meant by critical thinking skills?
4. Do vocational education instructors view critical thinking skills as important for students to deal with changes in jobs/technology in the future?
5. Do vocational education instructors incorporate critical thinking skills into the curriculum?
6. Do vocational education instructors encounter problems in integrating critical thinking skills into the curriculum?

Scope of the Study

The scope of the study included all Oklahoma vocational education instructors from each occupational area (Agriculture, Business and Office, Health Occupations, Home

Economics, Marketing Education, Special Programs, Technology Education, and Trade and Industrial Education).

Assumptions of the Study

In order to answer the questions posed by the study, the following assumptions were made:

1. All of the vocational education instructors surveyed would report accurate information to the best of their ability.

2. The survey instrument would assess sufficient data to answer the questions posed in the study.

3. Critical thinking skills should be taught as an integral part of other subjects because there is no universal skill or curriculum subject known as critical thinking skills (McPeck, 1981).

Limitations of the Study

The study was limited by the following:

1. Although it was recognized that logic is involved to a certain extent in critical thinking, since the area of logic is in itself very complicated and extensive, this study did not deal with logic in the Review of Literature.

2. Programs in the eight occupational areas dealing with inmate training were not included in the study due to differences in those types of programs.

Definition of Terms

The following definitions were developed to guide the study:

Critical Thinking - An understanding of the relationship of language to logic, leading to the ability to analyze, criticize, and advocate ideas, to reason inductively and deductively, and to reach factual or judgmental conclusions based on sound inferences drawn from unambiguous statements of knowledge or belief (Paul, 1984, p. 5).

Analysis - The breakdown of a communication into its constituent elements or parts such that the relative hierarchy of ideas is made clear and/or the relations between the ideas expressed are made explicit. Such analyses are intended to clarify the communication, to indicate how the communication is organized, and the way in which it manages to convey its effects, as well as its basis and arrangement (Bloom, 1956, p. 205.)

Synthesis - The putting together of elements and parts so as to form a whole. This involves the process of working with pieces, parts elements, etc., and arranging them in such a way as to constitute a pattern or structure not clearly there before (Bloom, 1956, p. 206.)

Evaluation - Judgments about the value of material and methods for given purposes. Quantitative and qualitative judgments about the extent to which material and methods satisfy criteria. Use of a standard of appraisal. The

criteria may be those determined by the student or those which are given to him (Bloom, 1956, p. 207.)

For purposes of this study, Vocational Education is defined as - A type of education offered at the secondary and post-secondary levels which is competency-based and designed to prepare students for entry-level jobs or job preparation and advance training. Training is based on the needs of business and industry in each particular occupational area.

For purposes of this study, Secondary is defined as - Dealing with grades nine through twelve.

For purposes of this study, Post-secondary is defined as - Education beyond grade twelve. This may include two or four-year programs at junior colleges, community colleges, state colleges and universities, and/or adult education courses.

For purposes of this study, Competency-based is defined as - Education which is based on the personal abilities and skills needed to complete a task. The necessary abilities and skills are derived from business and industry needs in each occupational area.

For purposes of this study, Occupational (or Service) Area is defined as - Area for which vocational education courses are offered to prepare students for entry level jobs or job upgrade training in areas which are grouped by related occupations. This is based on the needs of business and industry. Each area combines academic and

technical skills with hands-on training as well as leadership and employment acquisition skills. Program levels range from kindergarten to collegiate level to adult training or short-term adult training, depending on need. Each area has requirements for student eligibility. Each area (except Special Programs) also has a vocational student organization which gives students the opportunity to practice leadership skills, job interviewing skills, etc.

Agriculture Education - Programs which provide instruction in the basic science of agriculture, for those preparing for careers in production agriculture or off-farm agriculture business occupations. Courses include Ag Mechanics, Horticulture, Forestry, Equine Production, and Meat Processing. Vocational Agriculture subject material includes animal science, plant science, soil science, farm business management, leadership, and citizenship (State Department of Vocational and Technical Education, Oklahoma, n.d.).

Business and Office Education - Programs which provide instruction for business and office occupations performed by individuals in public or private enterprise whose duties would include facilitating functions of the office; including activities such as management, planning, organizing, recording, communicating, interpreting, storing, and retrieving data. Courses prepare students for occupations such as banking personnel, bookkeepers and cashiers, office assistants, data processing personnel, office

machine operators, receptionists, secretaries, and word processing (State Department of Vocational and Technical Education, Oklahoma, n.d.).

Health Occupations - Programs which provide instruction in areas such as allied health careers (assistant to a variety of health professionals), dental assisting, medical assisting, practical nursing, surgical technology, respiratory therapy technology, and radiologic technology (State Department of Vocational and Technical Education, Oklahoma, n.d.).

Home Economics - Programs which provide instruction in the areas of consumer and homemaking education, and home economics courses directed toward gainful employment (occupational home economics). Courses include Home Economics I-IV, Personal Clothing Management, Foods and Nutrition, Child Care, Consumer Education, Housing and Home Furnishings, Marriage and the Family, and Clothing Production and Management.

Marketing Education - Programs which provide instruction for those interested in marketing, management, or related occupations in the business operations and management area. Courses cover topics in areas such as fashion merchandising, business management and ownership, and marketing for a variety of occupations. Business management and ownership covers topics such as financing, management controls, purchasing, insurance, and cash flow. Small Business Management courses cover topics such as

accounting, cost control, inventory control, advertising, and personnel management (State Department of Vocational and Technical Education, Oklahoma, n.d.).

Special Programs - Programs which provide instruction for students with vocational education, preparing them for gainful employment in jobs requiring semi-skilled knowledge and training, or preparing them to enter regular high schools or area vo-tech school programs. These programs are intended for youth who possess academic, socioeconomic, or other handicaps that prevent them from succeeding in traditional educational endeavors. Courses may relate to a cluster of occupations such as general construction trades, general mechanical trades, horticultural occupations, and home and community services. Students might then seek employment in areas such as food service, domestic jobs, lodging and related services, and business and office occupations (State Department of Vocational and Technical Education, Oklahoma, n.d.).

Technology Education - Programs which provide instruction from kindergarten through college, including adult education. It provides students with daily hands-on exploratory experiences and insights into modern technology and career opportunities so they can make meaningful occupational and educational choices. Courses relate to four occupational clusters: construction, transportation, communications, and manufacturing. This division may also

be referred to as Industrial Arts (State Department of Vocational and Technical Education, Oklahoma, n.d.).

Trade and Industrial Education - Programs which provide instruction which prepares students for employment in service, manufacturing, or industrial occupations. Students become prepared for gainful employment through practical instruction on industrial-quality tools and equipment and actual industry-level projects. Courses are provided to train for employment in areas such as air conditioning/refrigeration, aircraft mechanics, auto mechanics, commercial art, computer repair, heavy equipment operation, industrial maintenance, motorcycle mechanics, printing, truck driver training, and welding (State Department of Vocational and Technical Education, Oklahoma, n.d.).

CHAPTER II

REVIEW OF LITERATURE

The Review of Literature consists of five sections. The Introduction and Historical Overview cover how the area of critical thinking skills evolved and why it has again become a topic of discussion. The next section tells how critical thinking skills may be integrated in the classroom. Finally, other views of critical thinking skills are presented and a summary is included.

Introduction

Critical thinking has been around at least since the days of Socrates and indeed, "how students think" has been a concern of educators for years. Both have long been a subject of debate. In recent years, there has been a renewed interest in critical thinking skills as well as a renewed interest in the effectiveness of our educational system in general. Educators first wondered "why Johnny can't read" and now wonder "why Johnny can't reason."

According to [an article in Newsweek] (Marbach, 1986)

a nationwide survey by the National Assessment of Educational Progress found that only two of every five students could draw correct inferences from a set of facts, only one of every seven could write a persuasive essay (p. 59).

Marbach (1986) stated that students may remember dates and facts from a history book but they are unable to give a five-minute defense of democracy.

Historical Overview

Glaser was one of the pioneers of research in critical thinking. Urban cites Glaser's 1941 definition of critical thinking as:

1. An attitude of being disposed to consider in a thoughtful way the problems and subjects that come within the range of one's experiences
2. Knowledge of the methodology of logical inquiry and reasoning
3. Some skill in applying these methods (Urban, 1987).

Glaser (as quoted by Urban) also identified the following in 1941 as important elements which are a part of the total thinking process. These are:

- a. supporting evidence
- b. conclusions based upon evidence
- c. recognizing problems
- d. recognizing unstated assumptions and value
- e. use of language with accuracy, clarity, and discrimination
- f. interpreting data, and
- g. disposition to want evidence for beliefs (pp. 396-397).

The purpose of the Glaser study was to (1) develop and present materials and teaching procedures to be used to stimulate critical thinking (for upper-elementary, secondary, and college students); (2) to evaluate the effectiveness of these materials and teaching procedures; and (3) to ascertain whether there was a relationship between

critical thinking and other factors, including reading ability, individual's pattern of interest-values, general intelligence, socio-economic status, and feelings of emotional satisfaction or dissatisfaction (Glaser, 1941). The definition was patterned by Glaser in part from Dewey's 1933 distinction between ordinary thinking and reflective thinking (Glaser, 1941).

Dewey's five phases, or aspects, of reflective thought as quoted by Glaser (1933) are:

(1) Suggestions, in which the mind leaps forward to a possible solution; (2) an intellectualization of the difficulty or perplexity that has been felt (directly experienced) into a problem to be solved, a question for which the answer must be sought; (3) the use of one suggestion after another as a leading idea, or hypothesis, to initiate and guide observation and other operations in collection of factual material; (4) the mental elaboration of the idea or supposition as an idea or supposition (reasoning, in the sense in which reasoning is a part, not the whole, of inference), and (5) testing the hypothesis by overt or imaginative action (p. 20).

Glaser (1941) found that

transfer of training from the study of logical reasoning and methods of evaluating the adequacy of evidence in a subject-matter field such as geometry or general science can be brought about, but it does not occur automatically (p. 69).

Glaser further concluded from Dewey that "an individual's personality traits and attitudes affect his ability to think" (p. 71).

The study, done in 1938 by Glaser, was conducted on two 12th grade English classes in each of two high schools (one in New York City and one in Newark, New Jersey).

Each class was taught by a different teacher. These four groups were matched with four control English classes in the same two schools, each taught by a different teacher. There was an almost even distribution of male-female students in all eight of the classes (Glaser, 1941).

Teachers in both the experimental and control groups of Glaser's study were trying to teach students to think critically. Both groups took the Watson-Glaser tests of critical thinking, which were revised from the Watson tests of fair-mindedness, as well as the Maller-Glaser Interest-Values Inventory, and other tests. Students went through a series of eight units, including prejudice and propaganda. (Glaser, 1941).

Students involved in the study were enthusiastic and began to apply their acquired skills in other classes and continued to do so in succeeding years of classes. Teachers were pleased with the results of the experiment. It was found that students with both higher and lower IQs gained on the critical thinking tests, and abilities in critical reading were highly correlated with critical thinking ability. The average gain in test scores of experimental classes was significantly higher than the average gain of the four control classes, suggesting that the teaching units could be used effectively to teach critical thinking (Glaser, 1941).

Glaser (1941) discovered that "improvement in ability to think critically is somewhat general in character" and "an

attitude of wanting evidence for beliefs is most subject to general transfer" (p. 175). Ability to think critically was limited by an individual's acquisition of knowledge and facts concerning the problem or subject. Intelligence, reading ability, and school marks were most closely related to scores made on critical thinking tests. Age, sex, home-background rating, and score on the Interest-Values Inventory were not significant. Individuals with IQs of less than 100 were among those who profited the most from critical thinking skills training (Glaser, 1941).

McPeck (1981) stated that the most notable characteristic of critical thought

is that it involves a certain skepticism, [sic] or suspension of assent, towards a given statement, established norm or mode of doing things...it does not take the truth for granted. Instead, it considers alternative hypotheses and possibilities (p. 6).

According to McPeck (1981), critical thinking is "the appropriate use of reflective skepticism within the problem area under consideration" (p. 7) and one must know something about the field in question to apply reflective skepticism effectively. Just because a person thinks critically in one area does not mean he or she can do so in another.

McPeck (1981) stated his concept of critical thinking in this formula:

Let X stand for the available evidence from the pertinent field or problem area. Let E stand for the available evidence from the pertinent field or

problem. Let P stand for some proposition or action within X. Then we can say of a given student (S) that he is a critical thinker in area X if S has the disposition and skill to do X in such a way that E, or some subset of E, is suspended as being sufficient to establish the truth or viability of P (p. 7).

Critical thinking involves both the cognitive and affective domains of a student's learning in an area, and also both a "propensity and a skill." McPeck (1981) felt that it may be just as difficult to get people to think critically as it can be to get them to act morally.

McPeck (1981) refuted Ennis's view of critical thinking. Since Ennis said that critical thinking is "the correct assessing of statements," then he allows "neither degrees nor mistakes" in thinking, said Peck. A person may be right about something for reasons that "have little or nothing to do with critical thinking" (p. 43).

The most notable contribution Ennis made to critical thinking (according to McPeck, 1981), which McPeck calls an integral part of critical thinking, was Ennis's list of the "three dimensions of critical thinking," which are:

1. Logical dimension: judging the alleged relations between terms, statements and sets of statements. This includes knowing the meanings of the terms and statements and their implications.
2. Criteria dimension: covers knowledge of the standards and subject-related criteria for judging statements, for example, statistical judgments in the social sciences.
3. Pragmatic dimension: judging, in context, when one has 'enough' evidence in the light of the statement's purpose and practical consequences (p. 48).

Ennis (1987) felt that both dispositions and abilities were needed for critical thinking. His list of required dispositions is summarized as:

1. Seek a clear statement of the question
2. Seek reasons
3. Try to be well-informed
4. Use and mention credible sources
5. Take into account the total situation
6. Try to remain relevant to the main point
7. Keep in mind the original and/or basic concern
8. Look for alternatives
9. Be open-minded
10. Take a position (and change it) when evidence is sufficient to do so
11. Seek as much precision as the subject permits
12. Use critical thinking abilities
13. Be sensitive to feelings, knowledge level, and degree of sophistication of others.

Certain abilities were also needed for one to think critically, according to Ennis (1987). Ennis suggests twelve abilities which could be included in a college-level critical thinking course. These are summarized as follows:

1. Focusing on a question
2. Analyzing arguments
3. Asking and answering questions to clarify or challenge
4. Judging the credibility of a source
5. Observing and judging observation reports and criteria

6. Deducing and judging deductions
7. Inducing and judging questions
8. Making value judgments
9. Defining terms and judging definitions
10. Identifying assumptions
11. Deciding on an action
12. Interacting with others.

Beyer (1987) distinguished critical thinking from problem solving as follows:

Critical thinking begins with a previous claim, conclusion or product and considers the question, Of what truth or worth is it? Problem-solving, on the other hand, begins with a perceived problem and asks, How might this difficulty be resolved? (p. 33).

Beyer (1987) said that critical thinking is a "set of specific operations that may be used singly or in any combination, and in any order" (p. 33). He felt that critical thinking was not a strategy, but each critical thinking operation contained both analysis and evaluation.

Beyer (1987) listed ten critical thinking skills as follows:

1. Distinguishing between verifiable facts and value claims
2. Distinguishing relevant from irrelevant information, claims, or reasons
3. Determining the factual accuracy of a statement
4. Determining the credibility of a source
5. Identifying ambiguous claims or arguments
6. Identifying unstated assumptions
7. Detecting bias
8. Identifying logical fallacies
9. Recognizing logical inconsistencies in a line of reasoning
10. Determining the strength of an argument or claim (p. 27).

Thinking was classified into three levels by Beyer (1987). He said that critical thinking was more complex than micro-thinking skills listed in Level I, but less complex than thinking strategies listed in Level III.

Beyer (1987) said that "the most all-inclusive act of critical thinking is that of argumentation -- argument making and argument analyzing" (p. 34). Most of the critical thinking skills Beyer listed are used in producing and examining arguments.

Beyer (1987) cited McPeck, who said that critical thinking involved not only knowing "when to question something and what sorts of questions to ask" but an inclination to do so (p. 35).

Integrating Critical Thinking Skills in the Classroom

As cited previously in the literature by McPeck (1981), it is not feasible to teach critical thinking skills in a specific class. Instead, critical thinking skills should be taught in all classes.

In reviewing the literature, it was found that much of the current information on teaching critical thinking skills concerns general education (at elementary, middle, and secondary levels) rather than vocational education. However, the methods and approaches described can be localized and modified to work in the vocational education setting also.

For example, critical thinking skills can be taught through the use of analogies. Swick and Miller (1975) defined an analogy as "a resemblance of a principle in terms of objects, situations, or ideas" (p. 180) which can often be used for explanation, definition, or clarification.

Four types of analogies are listed by Swick and Miller (1975) as commonly used in everyday life and appropriate for use in the classroom. The four are: justification analogies, illustrative analogies, cause-effect analogies, and fantasy-fact situational analogies.

In the cause-effect analogy, 'reasoning assesses events in terms of "if this . . . then that.'" Swick and Miller (1975) used the example that overpopulation was often cited as a major cause of war, famine, and/or civil disorders. Critical thinking skill questions to use to clarify this analogy are "Was the war really an outgrowth of overpopulation?" "Was there really a shortage of needed life resources?" "What causes of the war have yet to be explored?" etc. In other words, "Is the cause really the cause?" (p. 180).

A factual situation is established with exemplary fantasy situations in the fantasy-fact situational analogy. For example, Swick and Miller (1975) said that "the shortage of fuel oils was long predicted through the use of exemplary fantasy situations; one of which (the Arab oil embargo) became factual" (p. 181).

In the justification analogy, the analogy is used as a persuasive technique to gain acceptance for a claim by attempting to gain acceptance for the supposed logic inherent in the analogy. These analogies are usually references to conditions which are held, known, and/or easily understood by most people (Swick and Miller, 1975).

An example of this is "I don't want to predict that any more than I want to predict tomorrow's football game." This answer was given when a person was asked in an interview to make a prediction concerning the gross national product for the next fiscal year (Swick and Miller, 1975). However, in this case, is predicting tomorrow's football game very risky?

Swick and Miller (1975) suggested that the instructor should use critical thinking questions such as:

Is the analogy used to justify the original event logically and psychologically valid? Is the situation and the analogy used simply an absurd, rhetorical exercise to focus attention on the individual and his ideas? If so, are the ideas of the individual of substantive value? (p. 181).

In an illustrative analogy, the analogy itself is often the only statement, such as "Hang in there" or "You blew it." The instructor should ask such questions as "Why," "What do you mean by that," and "What do you have to support that," according to Swick and Miller (1975).

Problem-solving skills can be solved through six basic steps, according to Dewald-Link and Wallace (1983). These are summarized as:

1. Identify the problem
2. Interpret the problem (collect data)
3. List alternatives
4. Select the solution (considering the consequences of each alternative)
5. Implement the decision
6. Evaluate the consequences

Activities to promote problem-solving, according to Dewald-Link and Wallace (1983), included simulation, case studies, games, panels, debates, and brainstorming. They stated that group discussion is of primary importance to help students understand their own perceptions and the perceptions of others related to a specific problem.

Dewald-Link and Wallace (1983) recommended various questioning techniques including descriptive questions; explanatory questions ("Why did you choose . . . ?" or "What causes . . . ?"); synthesizing questions, which require students to combine information, ("What implications" or "What conclusions can you make about?"); and judgmental questions, which require students to choose among alternatives when judgment criteria is already established, ("On what grounds?").

These skills can be used for a variety of subjects, including controversial issues, management issues, nutrition issues such as fad dieting, human relations issues such as stereotyping, etc. The list is endless.

Dewald-Link and Wallace (1983) stated that "critical thinking has as its basis the exploration of problems" (p. 215).

Social studies is another area which lends itself to teaching critical thinking, since critical thinking is important for effective citizenship (Smith, 1983). A plan was presented by Smith to assess credibility of sources of information, which included questions such as "Who is the authority?", "What is the basis for claimed credibility?", "What is the authority's purpose in speaking or writing?", "Are there reasons to question the authority's credibility such as contradictions in statements?", and "Is the statement objective and qualified or is it propagandistic and dogmatic in tone?".

According to Smith (1983) the instructor should provide students with appropriate practice situations to make judgments and promote transfer of learning, said Smith. He cited an example of how a history teacher could have students evaluate personal testimony about the Boston Massacre when teaching a unit on the American Revolution.

Heiman and Slomianko (1985) provided various examples in Critical Thinking Skills to integrate such skills into the classroom. They suggested several general guidelines, such as: making critical thinking skills exercises relevant to students, making learning an active process for students, using problem-solving methods that prevent students from skipping steps (working in pairs, talking

aloud as they think), and focusing on the process of problem-solving instead of memorization of facts.

Instructors should always show students the big picture when introducing a concept, according to Heiman and Slomianko (1985). This is recommended by Heiman and Slomianko so that students can see the relationship between disparate facts and ways to break down a complex idea into its component parts.

Other Views of Critical Thinking Skills

A former college logic instructor contended that programs in critical thinking are "minuscule and oversimplified versions" of the logic courses he taught (Adler, 1987) and he predicted that programs in critical thinking would be just as ineffective in producing students who can think critically in other courses. Instead, Adler said that students should be coached in thinking in every course that is taught, by teachers who "one hopes" know how to think. Adler (1987) felt that

if all teaching required students to think about what is being taught, that by itself would suffice. Teaching that does not do this is indoctrination and learning that does not involve thinking is nothing but the memorization of facts not understood, resulting in the formation of mere opinions, not the possession of genuine knowledge and understanding (p. 11).

De Bono (1984) felt that critical thinking

has long been the bane of society and of education. It is reactive. It lacks the creative, constructive, and design elements necessary for social progress . . . Adults have to plan, decide, choose, construct, take initiative, make things happen.

All this is reactive thinking. It requires operacy (p. 16).

Operacy is a word De Bono invented to describe the skills of "doing."

He also stated that critical thinking breeds a foolish arrogance. If you teach people to pick out errors in thinking, they will conclude that if there are no errors, the thinking must be right. But error-free thinking is not necessarily superior thinking (p. 16).

De Bono has developed a CoRT (Cognitive Research Trust) program which deals with two aspects of perception: breadth and change. Breadth means looking

more widely, more deeply -- we try to see more of the road map and more details on it . . . Change means that we try to see something in a different way. The glass of water is not half empty, it is half full (p. 17).

This is the creative aspect of perception -- lateral thinking. De Bono argued that lateral thinking as well as critical thinking should be taught.

Summary of Review of Literature

Critical thinking has been a concern since the days of Socrates. In recent years, it has again surfaced as an important issue in education as the nation wonders "why Johnny can't reason."

Glaser defined critical thinking in 1941 after considerable research. He found that students who were taught critical thinking were able to transfer their acquired skills in other areas and continued to do so in succeeding

years of study. McPeck, Glaser, Ennis, Beyer, and others often disagreed in the specifics of what constitutes critical thinking but all agreed that it was important and all cited similar characteristics. Some of the characteristics are: judging when one has enough evidence to conclude that information or sources are credible; considering problems in the range of one's experiences; using logical inquiry and reasoning to formulate hypotheses; synthesize data; make decisions; solve problems, and evaluate decisions or conclusions.

McPeck (1981) stated that critical thinking skills can and should be taught as a part of other subjects as there is no universal critical thinking skills course or subject. The review determined that this can be done in a variety of ways at virtually all educational levels.

The literature reviewed made clear that critical thinking is essential for informed, responsible citizens. It can be inferred from the literature that critical thinking is a skill needed throughout life.

The literature reviewed also determined that while much has been written in this area, most information deals with general education at the elementary and secondary levels. There was a clear lack of information on critical thinking as related to vocational education, although critical thinking is applicable in the vocational education setting as well.

We are in an age where economic and demographic changes may require critical thinking skills in order for workers to have the analytical and problem-solving skills needed to deal with uncertainty and change. Therefore, it becomes necessary to determine if critical thinking skills are viewed as important by Oklahoma vocational education instructors and if those instructors are able to incorporate critical thinking skills into their curriculum. It is also necessary to discover whether instructional materials developed by the Curriculum and Instructional Materials Center (CIMC) of the Oklahoma State Department of Vocational and Technical Education need to be modified accordingly.

CHAPTER III

METHODOLOGY

Introduction

This study was designed to determine whether Oklahoma vocational education instructors knew what was meant by critical thinking skills and if they believed critical thinking was important. Another purpose was to discover if those instructors were able to incorporate critical thinking skills in the curriculum. A further purpose was to determine information needed to develop curriculum (according to the results) at the Curriculum and Instructional Materials Center (CIMC) of the Oklahoma State Department of Vocational and Technical Education.

Questions Included in the Study

To meet the purpose of this study, the following questions were posed:

1. Do Oklahoma vocational education instructors know what is meant by critical thinking skills?
2. Do vocational education instructors in all vocational service areas have the same knowledge of critical thinking skills?

3. Does educational level of vocational education instructors have a bearing on whether they know what is meant by critical thinking skills?

4. Do vocational education instructors view critical thinking skills as important for students to deal with changes in jobs/technology in the future?

5. Do vocational education instructors incorporate critical thinking skills into the curriculum?

6. Do vocational education instructors encounter problems in integrating critical thinking skills into the curriculum?

Population

The population for this study consisted of all Oklahoma vocational education instructors from each occupational area (Agriculture, Business and Office, Health Occupations, Home Economics, Marketing Education, Special Programs, Technology Education, and Trade and Industrial Education).

The population of vocational education instructors in the state was 2,125. A random (20%) purposive sample (425) was drawn. It was decided that a satisfactory response rate for this type of survey was 50%. This would be 10% of the total population or 212 instructors, which is considered the minimum for descriptive statistics (Gay, 1981).

Collection of Data

The data were obtained from 218 instructors selected in a random purposive sample. Twenty percent of instructors in each of the eight occupational areas were surveyed. The population was identified by obtaining an updated list (September, 1988) of all vocational education instructors from the Information Services Division of the Oklahoma State Department of Vocational and Technical Education. Four hundred twenty-five survey instruments were sent out, 218 were returned. This represented a 51.3% response rate. Data were collected during October, 1988.

Questionnaire

Appendix A contains a copy of the questionnaire that was mailed to a random purposive sample of Oklahoma vocational education instructors in each of the eight occupational areas. The questionnaire was clarified by five instructors from Oklahoma State University and five staff members of the Oklahoma State Department of Vocational and Technical Education, and the researcher's committee chairman. This was done to make the questionnaire more readable and thus improve the response rate. After a few revisions based on their suggestions, the instrument was mailed to the sample population.

The researcher mailed the questionnaires on October 4 and 5, 1988 to each instructor's work address. The

questionnaire was accompanied by a cover letter (see Appendix B) which stated the purpose of the study, assured confidentiality of the responses, and requested a return by October 18, 1988. A self-addressed, stamped envelope was included for easy return of the questionnaire.

By October 18, 1988, a response rate of 51.3% was obtained from respondents in each occupational area (218 total). This number met the minimum requirement for descriptive statistics of 10% of the population (Gay, 1981). Therefore, a follow-up study was not conducted.

Analysis of Data

After the questionnaires were collected, the results were compiled to determine whether or not Oklahoma vocational education instructors knew what was meant by the term critical thinking skills, whether they viewed it as an important skill for students to have, whether they taught critical thinking skills, and whether or not they had difficulty in teaching these skills.

On the questionnaire, instructors were asked if they knew what was meant by the term critical thinking skills. If instructors answered "no," then they were asked not to complete the rest of the questionnaire (and results from the rest of their questionnaires were not tabulated). If instructors answered "yes" then they were asked to define critical thinking skills. A determination was then made by the researcher (after reviewing the literature) as to

the validity of these definitions. Determinations were made according to their similarity to criteria mentioned in definitions of critical thinking, analysis, synthesis, and evaluation as listed in this study; and/or if these elements were mentioned in respondent definitions. (See Appendices C and D). The number of instructors who thought they were familiar with critical thinking skills (but in fact were not) and the number of instructors who actually knew the term is listed in Chapter IV.

Respondents were grouped by occupational area. The descriptive statistical method used was a chi square test of independence. An alpha level of .05 was selected by the researcher. Gay (1981) defined chi square as

A nonparametric test of significance appropriate when the data are in the form of frequency counts; it compares proportions actually observed in a study with proportions expected to see if they are significantly different" (p.430).

Jaccard (1983) defined the chi square statistic as follows:

$$\chi^2 = \sum_{i=1}^k \frac{(O_i - E_i)^2}{E_i}$$

where E is the expected frequency of group i, (male Republicans); O is the observed frequency of group i; K is the number of groups, and χ^2 is the chi square statistic." (p. 291).

The findings are discussed in Chapter IV.

CHAPTER IV

FINDINGS

Using an updated list (September, 1988) of 2,125 Oklahoma vocational education instructors in the eight occupational areas, the researcher drew a random (20%) purposive sample of 425 instructors in each occupational area. They represented a wide cross-section of secondary and post-secondary schools throughout the state.

Of the 425 questionnaires mailed, 218 were returned within two weeks with responses which were applicable for tabulation and analysis. The 218 returned represented a 51.3% response rate.

Following are responses to Question 1, "Do Oklahoma vocational education instructors know what is meant by critical thinking skills?" Of the respondents, 79.8% believed they knew what was meant by critical thinking skills and 20.2% did not know the term and did not attempt to define it. (See Table I for specific breakdown by occupational area). Seventy-one respondents (those who did not attempt to define the term) were instructed not to complete the rest of the questionnaire. A determination was then made by the researcher as to the validity of respondent definitions of critical thinking skills. (Refer to Appendices C

TABLE I
 CHI SQUARE TABLE OF INSTRUCTOR OPINION OF OWN
 KNOWLEDGE OF CRITICAL THINKING SKILLS

Knowledge of CTS	Agric. Educ.	Bus. & Office	Health Occup.	Home Ec.	Marketing Educ.	Special Programs	Technology Educ.	Trade/Ind. Educ.	Total	%
No	12	2	2	9	3	4	1	10	43	20.2
Yes	30	20	10	41	7	10	7	45	170	79.8
Total	42	22	12	50	10	14	8	55	213	100.0
Percentage	19.7	10.3	5.6	23.5	4.7	6.6	3.8	25.8		100.0

DF = 7
 CV = 5.393
 Prob. = 0.612

and D for representative respondent definitions of critical thinking skills which were considered valid and invalid, respectively, by the researcher).

Responses to Question 2, "Do Oklahoma vocational education instructors in all vocational service areas have the same knowledge of critical thinking skills?" were significant. The chi square calculation (0.032) indicated that results were something other than what was expected. By visual inspection of data in the tables, it appeared that Agriculture Education instructors' lack of knowledge of critical thinking skills (11 of 27) was part of the problem. Marketing education instructors' knowledge level could also be a problem, but the small number (2 of 5) is inconclusive. Overall, 79.6% of instructors who attempted to define critical thinking skills had definitions considered valid by the researcher, and 20.4% had definitions which were considered incorrect. Results are recorded in Table II.

As listed in Table III, responses to Question 3, "Does educational level of Oklahoma vocational education instructors have a bearing on whether they know what is meant by the term critical thinking skills?" revealed that of 147 respondents, 20.4% could not define critical thinking skills correctly (who thought they could). More respondents had 1) more than a college degree (40.8%) or 2) a master's degree (41.5%). Answers to Question 4, "Do vocational education instructors view critical thinking skills

TABLE II
 CHI SQUARE TABLE OF ACTUAL INSTRUCTOR KNOWLEDGE
 OF CRITICAL THINKING SKILLS

Knowledge of CTS	Agric. Educ.	Bus. & Office	Health Occup.	Home Ec.	Marketing Educ.	Special Programs	Technology Educ.	Trade/Ind. Educ.	Total	%
No	11	5	0	2	2	2	1	7	30	20.4
Yes	16	16	6	37	3	7	4	28	117	79.6
Total	27	21	6	39	5	9	5	35	147	100.0
Percentage	18.4	14.3	4.1	26.5	3.4	6.1	3.4	23.8		100.0

DF = 7
 CV = 15.370
 Prob. = 0.032

TABLE III
 CHI SQUARE TABLE OF ACTUAL INSTRUCTOR KNOWLEDGE OF
 CRITICAL THINKING SKILLS BY EDUCATIONAL LEVEL

Knowledge of CTS	Educational Level						Total	%
	High School	Some College	4-yr. College Degree	College Degree +	Master's Degree	Doctoral Degree		
No	0	3	3	8	15	1	30	20.4
Yes	1	9	9	52	46	0	117	79.6
Total	1	12	12	60	61	1	147	100.0
Percentage	0.7	8.2	8.2	40.8	41.5	0.7		100.0

* Totals (horizontal) equal 100.1% due to rounding off

DF = 5
 CF = 6.974
 Prob. = 0.223

as important for students to deal with changes in jobs/technology in the future?" are recorded in Table IV. Findings revealed that 79.3% of respondents did feel that critical thinking skills were important for students to deal with changes in jobs/technology in the future, while 20.7% of respondents disagreed.

TABLE IV
CHI SQUARE TABLE OF INSTRUCTOR KNOWLEDGE
OF CRITICAL THINKING SKILLS/VIEW
CRITICAL THINKING SKILLS AS
IMPORTANT FOR STUDENTS

Knowledge of Critical Thinking Skills	View Critical Thinking Skills as Important			Total	%
	Yes	No	Undecided		
No	28	1	1	30	20.7
Yes	113	0	2	15	79.3
Total	141	1	3	145	100.0
Percentage	97.2	0.7	2.1	100.0	

DF = 2

CV = 4.185

Prob = 0.123

The responses to Question 5, "If so, do vocational education instructors incorporate critical thinking skills into the curriculum?" is reported in Tables V-VIII. As each table reveals, almost all respondents indicated they incorporated critical thinking skills in the curriculum. This was determined by asking instructors if they follow up

classroom lectures with demonstration and application; (refer to Table V) and if they give students the opportunity to apply various skills which involve critical thinking as listed in Tables VI-VIII.

As Table V illustrates, 79.9% of respondents who knew of the term critical thinking skills reported they follow classroom lecture with demonstration and application in the lab or shop, and those unfamiliar with the term (20.1%) also felt they did so.

TABLE V
ACTUAL INSTRUCTOR KNOWLEDGE OF CRITICAL
THINKING SKILLS/FOLLOW UP LECTURES
WITH DEMONSTRATION/APPLICATION

Knowledge of Critical Thinking Skills	Follow Up with Demonstration/ Application			%
	Yes	No	Total	
No	29	0	29	20.1
Yes	115	0	115	79.9
Total	144	0	144	100.0

Out of a sample size of 147 respondents, 138 said they gave students the opportunity to raise questions, and 104 said they have students break up a complex idea into smaller parts. Those who felt they had students draw upon prior knowledge to make decisions numbered 142, but only

72 of the 147 respondents had students formulate hypotheses. (See Table VI).

TABLE VI

CHI SQUARE TABLE OF ACTUAL INSTRUCTOR KNOWLEDGE OF CRITICAL THINKING SKILLS/ ENCOURAGE STUDENTS TO RAISE QUESTIONS, BREAK UP COMPLEX IDEA; FORMULATE HYPOTHESES, AND SOLVE PROBLEMS AND MAKE DECISIONS

Encourage Students to	Instructor Knowledge of Critical Thinking Skills	
	Yes	No
Raise Questions	111	27
Break Up Complex Idea	87	17
Formulate Hypotheses	60	12
Solve Problems/Make Decisions	114	28

*Totals (vertical) add up to more than the sample.

As Table VII reveals, 100% of respondents said they gave students the opportunity to apply knowledge to new situations. All but one of the 147 respondents (99.3%) said they gave students the opportunity to evaluate information, as Table VIII illustrates.

The response to Question 6, "Do vocational education instructors encounter problems in integrating critical thinking skills into the curriculum?" as illustrated in Table IX indicated that 72.4% of respondents expressed difficulty in this area, while 27.6% of respondents did not

feel they had problems in integrating critical thinking skills into the curriculum.

TABLE VII

ACTUAL INSTRUCTOR KNOWLEDGE OF CRITICAL THINKING SKILLS/APPLY KNOWLEDGE TO NEW SITUATIONS

Knowledge of Critical Thinking Skills	Apply Knowledge		Total	%
	No	Yes		
No	0	30	30	20.4
Yes	0	117	117	79.6
Total	0	147	147	100.0

TABLE VIII

CHI SQUARE TABLE OF ACTUAL INSTRUCTOR KNOWLEDGE OF CRITICAL THINKING SKILLS/OPPORTUNITY TO EVALUATE INFORMATION

Opportunity to Evaluate Knowledge of Critical Thinking Skills	Information		Total	%
	No	Yes		
No	0	30	30	20.4
Yes	1	116	117	79.6
Total	1	146	147	100.0
Percentage	0.7	99.3	100.0	

DV = 1

CV = 0.258

Prob = 0.611

TABLE IX

CHI SQUARE TABLE OF ACTUAL INSTRUCTOR KNOWLEDGE OF
CRITICAL THINKING SKILLS/PROBLEMS INTEGRATING
CRITICAL THINKING SKILLS IN CURRICULUM

Knowledge of Critical Thinking Skills	Problems Integrating Critical Thinking Skills in Curriculum			%
	No	Yes	Total	
No	10	19	29	20.0
Yes	30	86	116	80.0
Total	40	105	145	100.0
Percentage	27.6	72.4	100.0	

DF = 1
CV = 0.863
Prob = 0.353

As these tables illustrate, 79.8% of instructors surveyed felt they were familiar with critical thinking skills and could define it correctly. Of this number, 79.6% actually had valid definitions of the term (according to the researcher). More respondents in Agriculture Education could not correctly define critical thinking skills. It appeared that Marketing Education instructors also had inaccurate knowledge of critical thinking skills, but due to the small number of respondents in this area, the evidence was inconclusive. Educational level of vocational education instructors was not significant although more respondents had more than a college degree or a master's degree. Refer to Appendix E for representative

respondent comments on the topic of critical thinking skills. Conclusions and recommendations based on the findings of the questionnaire responses are presented in Chapter V.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

Research was conducted to determine whether Oklahoma vocational education instructors were familiar with the term critical thinking skills and if they believed critical thinking skills were important. Research was also conducted to determine if those instructors were able to incorporate critical thinking skills in the curriculum and if they experienced difficulty in doing so.

A review of literature was conducted concerning historical views of critical thinking and methods of integrating critical thinking skills in the classroom. Other views not entirely in favor of critical thinking skills were also examined. The literature determined that critical thinking skills are transferrable to other subject areas and indeed should be a part of other subjects as there is not a universal critical thinking skills course.

A questionnaire was developed and reviewed by five instructors at Oklahoma State University and by five staff members of the Oklahoma State Department of Vocational and Technical Education. The questionnaire was then modified

to make it more readable. The questionnaire was mailed out in October, 1988 to 425 instructors selected by a random (20%) purposive sample. After a two-week period, a 51.3% response rate was obtained. This number met the minimum (descriptive statistics), so a follow-up study was not considered necessary (Gay, 1981). The findings reported in Chapter IV are based on these return rates.

Conclusions

The first objective of this study was to determine whether Oklahoma vocational education instructors knew what is meant by the term critical thinking skills. They were then asked to define it on the questionnaire. A determination was made by the researcher (after reviewing the literature) whether or not the definitions were correct. The findings as listed in Table I illustrated that 79.8% of respondents believed they knew the meaning of the term, and 20.2% did not know the term and did not define it. Results on the rest of the questionnaire of each respondent who did not attempt to define critical thinking skills were not tabulated.

To determine whether vocational education instructors in all service areas have the same knowledge of critical thinking skills was the second objective.

Of those who attempted to define the term, Table II findings indicated that 79.6% did so correctly and 20.4% defined critical thinking skills incorrectly. More respon-

dents in Agriculture Education (11 of 27) and Marketing Education (2 of 5) were not able to define the term correctly. However, due to the small number of Marketing Education respondents, the evidence is inconclusive. Agriculture Education instructors' lack of knowledge of the subject is a definite problem. All but two of 39 respondents in Home Economics defined critical thinking skills correctly, as did all respondents from Health Occupations.

Based on the findings in Table II, it can be concluded that Home Economics instructors know more about critical thinking skills than instructors in other occupational areas. It appears that instructors in the Health Occupations area also know more about critical thinking skills than instructors in other areas, but this is inconclusive due to the small number of respondents.

The lack of knowledge on the part of Vocational Agriculture instructors in regard to critical thinking could possibly be a result of poor teacher education and/or poor instructor in-service. Table II findings were the only significant results of the study, with a calculation of 0.032.

Many respondents simply thought critical thinking was the ability to solve a problem or apply knowledge in the specific trade area (something students were already familiar with) but did not include transfer of knowledge, ability to solve problems or formulate hypotheses, or

evaluate information in areas unfamiliar to them. Consequently, it can be inferred that the term "critical thinking skills" is confusing in itself, and many Oklahoma vocational education teachers have poor training in this area.

The third objective of the study was to discover if educational level of Oklahoma vocational education instructors had a bearing on whether they knew what was meant by the term "critical thinking skills." Although more respondents who did not know about critical thinking skills had 1) more than a college degree or 2) a master's degree, more respondents overall were in these categories.

Based upon the findings in Table III, it can be concluded that more instructors at this educational level chose to answer the survey because they are more likely to have conducted research studies themselves. They are also more likely to have been exposed to the topic, either through formal education or outside reading, especially since the whole subject of critical thinking skills has seen a resurgence of interest beginning in the early 1980's. From this, it may also be concluded that there is probably an even greater number of instructors with a college degree or less (who were not surveyed) who are not familiar with critical thinking skills.

To determine if Oklahoma vocational education instructors viewed critical thinking skills as important for students to deal with changes in jobs/technology in the future was

the fourth objective of the study. Findings recorded that 79.3% of respondents did feel that critical thinking skills were important for students. Based upon this finding, it may be concluded that the same instructors (79.6%) who had knowledge of critical thinking skills would consequently view it as important for students. Instructors who were not familiar with it would not have a basis for viewing it as important.

The fifth objective of this study was to determine if instructors who viewed critical thinking skills as important for students incorporated these skills into the curriculum. Instructors were asked if they followed classroom lectures with demonstration and application in the lab or shop; if they encouraged students to raise questions, break up complex ideas into small components, formulate hypotheses, or draw upon prior knowledge to solve problems and make decisions.

None of the findings of these questions were particularly startling. All but three of 147 respondents indicated that they used demonstration and application in the lab or shop, and most gave students the opportunity to use higher-level thinking skills. Based upon these findings, it can be concluded that nearly all believe that they are teaching higher-level thinking skills in their own areas. Consequently, it could be inferred that some Oklahoma vocational education instructors (20.4%) may be teaching some aspects of critical thinking skills but are not aware that

they are doing so. However, these may be the better teachers using better methods, as it would be difficult to believe that all instructors would be teaching something effectively that they themselves are not familiar with.

Other items instructors were asked in Question 5 were if they gave students the opportunity to apply knowledge to new situations and to evaluate information. One hundred percent gave students the chance to apply knowledge to new situations, and all but one of the 147 (99.3%) had students evaluate information. This is encouraging, but one wonders how much more effectively all instructors could be utilizing critical thinking skills as a method of teaching vocational education subjects (who were not familiar with the term) if they were aware of it and of various methods of teaching these skills. And, one has to wonder just how objective these instructors are about their own teaching, as we all know that "time on task" is not always as much as we would like, and classes are often overcrowded.

The last objective of the study was to discover if Oklahoma vocational education instructors encountered problems integrating critical thinking skills into the curriculum. Most respondents (72.4%) indicated they did have problems integrating critical thinking skills into the curriculum. Based on this finding, it may be inferred that several factors may contribute to this difficulty. These may include lack of adequate training for instructors, lack of adequate curriculum materials, lack of

classroom time, and learning level of students in class. (See Appendix E for selected respondent comments).

Since several instructors commented that their students were not used to thinking or solving problems on their own and were at first hesitant or unwilling to do so (see Appendix E); it can be concluded that students generally do not receive critical thinking skills training in the elementary, middle, or high school grade levels before becoming vocational education students.

Of instructors surveyed (20.4%) who thought they knew of critical thinking skills but could not define the term correctly, they also did not feel critical thinking skills were needed for students to deal with changes in jobs/technology in the future (20.7%). A little larger number of instructors (27.67%) did not feel they had problems integrating critical thinking skills into the curriculum.

Conversely, of instructors surveyed who felt they were knowledgeable on critical thinking skills, 79.6% did know the term. Most of these instructors (79.3%) believed it was an important skill for students to have, and most (72.4%) also experienced difficulty integrating critical thinking skills into the curriculum.

It could be concluded that most of the instructors (20.4%) who could not define critical thinking skills were probably the same ones who did not view it as important, and therefore would not feel they encountered problems in teaching it. Conversely, those instructors (79.8%) who

were familiar with the term and could define it would have been more likely to view it as important for students and to encounter problems in teaching it; since they probably put more emphasis on it in the classroom if they feel it is important.

Recommendations

Many of the findings have implications in curriculum development and teacher in-service for vocational education. More in-service workshops for instructors on critical thinking skills need to be provided in all occupational areas, but especially in Agriculture Education, which had more respondents who were unfamiliar with critical thinking skills. In-service workshops and teacher education courses need to address critical thinking and how to teach it.

Further research needs to be done to determine if instructors in Marketing Education and Business and Office need more education in this area since many respondents in those areas expressed a lack of knowledge and the data was not conclusive.

Home Economics had the highest numbers of respondents who were familiar with critical thinking. But these instructors, along with those in Business and Office, Health Occupations, Marketing Education, Special Programs, Technology Education, and Trade and Industrial Education also need in-service training and teacher education courses on

how to better teach these skills. This is needed since 72.4% of respondents expressed difficulty in doing so.

The Oklahoma State Department of Vocational and Technical Education is one agency which can provide more instructor support in these areas. Occupational divisions of organizations such as the Oklahoma Vocational Association (OVA), or the American Vocational Association (AVA) could address ways of integrating critical thinking skills specifically in their occupational areas at meetings and conferences. The AVA or OVA as a group could bring in guest speakers to address the topic.

Curriculum manuals developed by the Curriculum and Instructional Materials Center (of the Oklahoma State Department of Vocational and Technical Education) need to feature more test questions which allow for the use of critical thinking in all program areas, but especially in Agriculture Education.

Vocational education instructors who have found ways of integrating critical thinking skills in their classes should share their knowledge with others. More articulation is needed between Oklahoma vocational education and general education (possibly through the State Department of Education) since the literature cited many examples of how to integrate critical thinking skills in general education areas.

Further research needs to be done to determine why the majority of instructors have difficulty integrating

critical thinking skills into the curriculum: whether or not lack of adequate curriculum materials, lack of classroom time, learning level of students in class, lack of instructor training, etc. are indeed factors. Until further research is done and improvements are made in teacher education and vocational education curriculum materials, educators will still have problems with helping students to realize their fullest potential.

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APPENDIXES

APPENDIX A

QUESTIONNAIRE

APPENDIX A

QUESTIONNAIRE (CRITICAL THINKING SKILLS)

1. Please list your name _____
2. What is your age? (check appropriate blank)
____ age 25 or under
____ age 26-35
____ age 36-45
____ age 46 or older
3. Please list subject(s) you teach _____
4. What is the highest educational level you have achieved?
____ high school
____ some college
____ four-year college degree
____ college degree +
____ master's degree
____ master's degree +
____ doctoral degree
5. How many years of teaching experience do you have? _____
6. How many years of work experience do you have? (in the field you teach) _____
7. What grade levels do you presently teach? (check each that applies)
____ 9th
____ 10th

_____ 11th

_____ 12th

_____ Adult

8. Are you familiar with what is meant by "critical thinking skills?"

_____ Yes _____ No

(If you answered "No" to question #8, please go to question 19 at end of questionnaire. It is not necessary to complete the rest of the questionnaire. Please return the questionnaire in the self-addressed, stamped envelope provided. Thank you for your help).

9. If you answered yes to question #8, what is your definition of critical thinking skills?

10. Do you view critical thinking skills as important for students to deal with changes in jobs/technology in the future?

_____ Yes _____ No _____ Undecided

11. Do you follow up classroom lectures with demonstration and application in the lab or shop?

_____ Yes _____ No _____ Sometimes _____ Never

12. What kinds of test questions do you use? (check each that applies)

_____ true/false

_____ matching

_____ short answer

_____ multiple choice

_____ fill in the blank

_____ essay

_____ hands-on (performance)

_____ other (explain type of test question) _____

13. In what proportion (to the entire test) do you use each type of test question?

true/false _____ percent

matching _____ percent

short answer _____ percent

multiple choice _____ percent

fill in the blank _____ percent

essay _____ percent

hands-on (performance) _____ percent

other _____ percent (explain type of test question) _____

14. Do you encourage your students to (check each that applies)

_____ raise questions

_____ break up a complex idea into smaller components

_____ formulate hypotheses

_____ draw upon prior knowledge to solve problems and make decisions?

15. Do you give students the opportunity to take information they have learned and then apply it to new situations?

_____ Yes _____ No _____ Sometimes _____ Never

16. Do you give students the opportunity to evaluate information?

_____ Yes _____ No _____ Sometimes _____ Never

17. Do you encounter problems while integrating critical thinking skills into the curriculum?

_____ Yes _____ No

18. Do you think that we should place greater or less emphasis on "critical thinking" in the classroom? (Choose one answer).

_____ Greater emphasis _____ Less emphasis No change _____

19. Do you have any comments, thoughts, or concerns about critical thinking you would like to share? (Please list below or on back of this sheet. See first page for address to return questionnaire. Thank you!)

APPENDIX B

COVER LETTER

APPENDIX B

October 4, 1988

Dear Vocational Education Instructor:

I am currently working on a master's degree at Oklahoma State University in Occupational and Adult Education and would appreciate your assistance in filling out the enclosed questionnaire.

I would like to determine if Oklahoma vocational education instructors view critical thinking skills as important and if they are able to incorporate critical thinking skills into their curriculum.

Although the questionnaire looks rather lengthy, it will only require a few minutes of your time. All information will be kept confidential. No individual data will be released, all data will be summarized. There are no right or wrong answers. Please do not discuss the questions with anyone, I am interested in your opinion.

Please answer the questions to the best of your ability and return the questionnaire in the self-addressed, stamped envelope provided. I would appreciate your prompt reply by October 18, 1988. Thank you for your assistance in this research endeavor.

Sincerely,

Terri L. Barnes

APPENDIX C

REPRESENTATIVE LIST OF RESPONDENT
DEFINITIONS OF CRITICAL
THINKING SKILLS

APPENDIX C

1. "Skills required to process the information and arrive at a solution. No answers are given and the student must arrive at a solution with the information given. Reasoning skills."
2. "The ability to gather information from reliable sources, categorize the information, draw accurate conclusions, formulate a plan of action, carry out the action and evaluate the results of the action."
3. "Ability to apply information to present circumstances and store for future situations."
4. "Distinguishes between fact and opinion. Draws valid conclusions from given data. Identifies assumptions underlying conclusions. Identifies the limitations of given data."
5. "Analyzing things, using previous knowledge to help you solve problems."
6. "Using the problem-solving steps (technique), thinking of different solutions to problems which arise, evaluating results, etc."
7. "The skills necessary to solve problems and make decisions."
8. "The student's being able to read and/or analyze a situation making decisions using reasoning, logic, deduction, etc. and come up with a solution or answer to 'problem.'"
9. "Putting information learned from discussion or classroom lectures to use in problem-solving, daily encounters and adapting to new stimuli."
10. "Decisions involving judgement and evaluation."

APPENDIX D

REPRESENTATIVE LIST OF INCORRECT RESPONDENT
DEFINITIONS OF CRITICAL THINKING SKILLS

APPENDIX D

1. "To be sure you understand the problem fully before you start. This saves time, money, material and down-time. Critical thinking is the only method, is the only way to keep up with the latest technology."
2. "In my adult program situation--being able to develop skill to make choices that will turn good management into profit."
3. "Skills needed to understand and use the new technology of today--hands-on experience."
4. "Skills required to participate in support system successfully."
5. "A term used in education classes to describe the ability to distinguish fact from fiction."
6. "Using what information you have to develop the best answer based upon your information."
7. "Being able to do a task after an explanation of how to do it by themselves."
8. "Critical thinking skills are skills taught to students for them to apply at crucial times--skills they will need to secure a career in an area of their strongest interest."
9. "Critical thinking skills--how well you can think under a pressure or critical situation."
10. "Critical thinking skills deal with the how and why and not totally on the outcome."

APPENDIX E

REPRESENTATIVE LIST OF RESPONDENT COMMENTS
ON CRITICAL THINKING SKILLS

APPENDIX E

1. "Students would rather be spoon-fed--requiring little thinking. It's hard to stimulate their ability to think and make learning desirable."
2. "The curriculum, as it has been, does not go far enough with limited proficiency (ED, LD, EMH, etc.) students on a level they can comprehend. The skill of the educator appears to be the deciding factor in reaching the depth of critical thinking skills. I use everything available to me, make up my own, and do my best to prepare my students for the skills necessary."
3. "Critical thinking skills allow a student to be able to work on his/her own which is what today's employers are looking for to fill job positions."
4. "Sometimes it is hard to come up with or find resources with critical thinking skills for Home Economics. Although much of our studies require much of the thought and decision-making process."
5. "Usually juniors have to be slowly introduced to this. Advanced students usually benefit the most from critical thinking skills. America's school systems are not set up for critical thinking or self-directed learning."
6. "Greater emphasis needs to be on more time to conduct classroom instruction and fewer activities, especially in single teacher departments. It seems as if classroom is hurry!! so you can cover lots of material (like college). Not enough time for practical use."
7. "Not enough time to teach this. It is an inadvertent/along-the-way teaching."
8. "To prepare students for jobs, to be able to handle new situations and to grow and advance in job skills, critical thinking is very important."
9. "Critical thinking is absolutely necessary in our efforts to know truth. Too often people are led by dogmatic loyalty, by organizations, by most religious

denominations. There is only one truth for any given concept. This will also harmonize with pure scientific investigation."

10. "There are many opportunities for the incorporation of higher order thinking skills into the computer assisted instruction program... Some of the areas in which we will encourage development and improvement of skills are observation, reasoning, values clarification, and definition of goals for the adult student... It is hoped that the use of more critical thinking will help students in all aspects of their lives, from defining and stating their own personal goals, right up to developing the most desirable affective attitudes which will be essential to their success in the world of work."

VITA

Terri Lynn Barnes

Candidate for the Degree of
Master of Science

Thesis: AN ANALYSIS OF SELECTED CRITICAL THINKING
SKILLS USED BY OKLAHOMA VOCATIONAL EDUCATION
INSTRUCTORS

Biographical:

Personal Data: Born in Salina, Kansas, February 12,
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Education: Graduated from Bishop McGuinness High
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ism and Spanish from Central State University in
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Professional Experience: Editorial Assistant,
American Institute of Ultrasound in Medicine,
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nical Curriculum Editor I, State Department of
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1980 to October, 1982; Technical Curriculum
Editor II, October, 1982 to February, 1984; Tech-
nical Curriculum Editor IV, February, 1984 to
September, 1988; Technical Writer, September,
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Honors: Outstanding New Member, New and Related
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