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The use of critical thinking skills in the elementary and high schools of the Omaha Public Schools

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THE USE OF CRITICAL THINKING SKILLS IN THE ELEMENTARY AND HIGH SCHOOLS OF THE OMAHA PUBLIC SCHOOLS

by

Cathy Christensen

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The Use of Critical Thinking Skills in the Elementary and High Schools of the Omaha Public Schools

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GRADUATE COLLEGE
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THE USE OF CRITICAL THINKING SKILLS IN THE ELEMENTARY AND HIGH SCHOOLS OF THE OMAHA PUBLIC SCHOOLS

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The purpose for conducting this quantitative study was to identify the critical thinking skills inherent in specific teaching methods identified by selected elementary and high school teachers in the Omaha Public Schools. Specific characteristics of the randomly selected teachers that may determine the use of critical thinking skills in the classroom were also examined.

The population in the survey consisted of two groups: elementary school teachers and secondary school teachers from the Omaha Public Schools. A researcher designed survey, "Teaching Styles in the Omaha Public Schools," was developed. The survey contained six items, with a total of forty questions designed to correlate with the six research questions. Four types of statistical analyses were used to analyze the data: descriptive statistics, t-tests, Spearman correlation, and one-way analysis of variance.

The findings of the study were:

1. The elementary and high school teachers in the study reported using critical thinking skills in their teaching methods in the classroom to varying extents.

2. No significant difference was found in the frequency of reported use of critical thinking skills between the selected high school and elementary school teachers.

3. No significant relationship existed between teachers' frequency of reported use of critical thinking skills and their length of teaching experience.

4. No significant difference was found between the teachers' frequency of reported use of critical thinking skills and their education level.

5. A significant difference existed between the amount of time elementary and high school teachers reported spending on critical skills in the classroom setting. Elementary school teachers reported spending more time using critical thinking skills in the classroom setting than high school teachers.

6. No significant difference was found between elementary and high school teachers' perceptions of the critical thinking skills necessary for student achievement.

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CHAPTER I

INTRODUCTION

Interest in critical thinking is greater now than at any time in the past. School officials are determined to find out how well their students think and to improve on that ability. Educational leaders have discovered that critical thinking skills can and must be taught in order for students to function in a technological society and in a democracy (Arter & Salmon, 1987). The educator is at the base of the emphasis on critical thinking.

The roots of critical thinking can be traced from Plato's Academy (Meyers, 1986) to the twentieth century. John Dewey's educational goals, developed in 1933, included the need to think reflectively; he approached critical thinking as a "state of doubt maintained during systematic and protracted inquiry" (Kemp, 1990, p. 35). Dewey stated the only activity needed in schools was the development of a student's ability to think (Parker, 1983).

Bloom's Taxonomy of Cognitive Objectives, developed in 1956, was one of the earliest twentieth century hierarchies designed to serve as a conceptualization of critical thinking skills. Ennis first connected critical, or reflective, thinking with formal and informal logic. Additional critical skills, such as value judgment and deductive and inductive reasoning, were added by Ennis (1985) to his list twenty years later.

In 1982, members of the Education Commission of the United States listed skills they predicted would be necessary for the twenty-first century.

Several critical thinking skills were among those listed: evaluation, analysis, synthesis, application, creativity, and decision making (Costa, 1991a).

The Carnegie Task Force, convened in 1986 for the study of educational needs through the twenty-first century, developed eight recommendations for the improvement of all middle grade schools. The need to teach a core academic program that would result in students who were able to think critically was second on the list. Council officials determined that students must be able to analyze, examine, and synthesize problems and issues.

Because of modern advances in the sciences and changes in educational goals, the development of critical thinking skills has become a priority among educators (McPeck, 1981; Reboy, 1989; Rowland-Dunn, 1989). According to the 1989 Gallup Poll of Teacher Attitudes, 56 percent of the teachers in the United States felt critical thinking skills were a priority in 1984; this number rose to 80 percent in 1989. Despite the teachers' perceptions of need for critical thinking skills, school officials in the United States have failed to develop such skills in their students (Carnegie Council on Adolescent Development, 1989).

Goodlad (1984) found that students were encouraged to use a higher critical thinking level than recall in less than one percent of the teachers' lessons (Costa, 1991b). Irwin (1991) also found that teachers tended to ask literal recall questions which, in turn, elicited student responses at the same level of thinking as the questions asked. The majority of classroom time appeared to be spent in Bloom's taxonomic level of comprehension (Hieman

& Slomianko, 1987). Far too many students were functioning at a low critical thinking level (Cariney, 1990).

Public institution personnel are currently attempting to eliminate this gap in the educational process. California Executive Order Number 338 was formulated to read that no less than nine undergraduate hours for an education student must be in the area of improving communication skills and critical thinking skills. At universities such as Bowling Green University, the University of Nebraska, and the University of Louisville, classes have been designed to help educators use higher-order thinking skills in their classrooms (Reboy, 1989).

There can be no argument that developing the ability to think critically should be a prime objective in education today. In order to understand critical thinking, however, it is necessary to consider specific aspects of teachers and teaching methods and the implementation of these skills into the public school curriculum.

Statement of the Problem

The purpose for conducting this study was to identify the critical thinking skills inherent in specific teaching methods identified by selected elementary and high school teachers in the Omaha Public Schools. Specific characteristics of the randomly selected teachers that may determine the use of critical thinking skills in the classroom were also examined.

The following research questions were addressed:

1. To what extent do selected elementary and high school teachers use teaching methods which contain critical thinking skills?

2. Is there a significant difference in the frequency of use of the critical thinking skills between elementary and high school teachers?

3. Is there a significant relationship between teachers' frequency and use of critical thinking skills and their longevity in the field?

4. Is there a significant relationship between teachers' frequency of use of critical thinking skills and their education level?

5. Is there a significant difference between the amount of time elementary and high school teachers spend on critical thinking skills in the classroom setting?

6. Is there a significant difference between the elementary and high school teachers' perceptions of those critical thinking skills necessary for student success?

Definition of Terms

Bloom's Taxonomy of Cognitive Objectives. An hierarchy of six cognitive learning skills developed by Benjamin Bloom in 1956.

Critical thinking skills. Thinking skills which focus on the reasonable, complex, cognitive processes. Critical thinking is often defined as synonymous with higher-order thinking skills.

Elementary teacher. Teachers in grades one through six in the Omaha Public Schools.

Education level. The last achieved degree or limit of education as defined by the Omaha Public Schools' salary schedule.

High school teacher. Teachers in grades nine through twelve in the Omaha Public Schools.

Longevity in the field. Number of full years taught in a public school.

Assumptions

1. Higher-order thinking skills are cross-curricular.

2. Teachers chosen for this study may have had formal training in the use of higher-order thinking skills in the classroom.

3. Elementary and high school teachers responded to the questionnaire with candor and honesty.

4. The teachers' perceptions and/or interpretation of terms on the questionnaire were grade-level specific; therefore, their perceptions may be defined according to the needs and cognitive abilities of the age level of their students.

Delimitations

1. The population in the study was confined to full-time elementary and high school teachers during the 1992-1993 school term.

2. Because of the greater number of teachers in each Omaha public high school than in each elementary school, three high schools and five elementary schools were chosen.

3. The schools were randomly chosen from the Omaha public schools.

4. All teachers within each randomly chosen elementary and high school comprised the population for the study.

5. The method used for the study was survey.

Limitations

1. The use of higher-order thinking skills may be more appropriate in some curricular areas than others.

2. This study was subject to those weaknesses inherent in survey research.

Significance of the Study

Educators are continuing the process of educational improvement by focusing on the need to use critical thinking skills in the classroom, as well as teaching these skills to students. It is expected this study will have significance for three populations concerned with students: teachers, administrators, and business people.

Parnes (1981) stated that educators can and should develop educational programs in which students are allowed to learn the intellectual processes associated with creativity and intelligence. Through this study, teachers will be able to see the need for thinking skills in three specific areas. First, in order to develop students' minds to engage in active thinking, the need for teachers to implement critical thinking skills into the classroom was recognized (Carnegie Council on Adolescent Development, 1989). Second, the benefits of infusing thinking skills into the curriculum already in place in the classroom was shown (Costa, 1991a). Third, in this study, the specific critical thinking skills currently used by the teachers in the classroom were identified, and the benefits of helping the students transfer these skills to the content areas were demonstrated (Costa, 1991b).

A second population to benefit from this study would be public school and college administrators. Demographics concerning those teachers who use critical thinking skills would be of interest to administrators in coordinating planning teams. In addition, statistics about the use of critical thinking skills would be of benefit to administrators responsible for staff development programs. Further, staff recommendations for advanced study about thinking skill strategies could be the result of these statistics. Also, information concerning teachers who use critical thinking skills and their longevity in the field could be of interest to administrators for curriculum planning at the collegiate level. Teachers who have experience in the classroom and return for advanced degrees may not have been exposed to the current programs or training available for the implementation and use of critical thinking skills.

One important goal of educational programs must be the preparation of the student for the changing American workplace. Modern economic trends have shifted from traditional labor-intensive manufacturing toward information dissemination, problem solving, and services. This shift is a change from dependence on human labor to dependence on the human brain (Jones & Idol, 1990). Currently, the output of data from a variety of sources far exceeds a person's ability to internalize, prioritize, and comprehend the information (Meyers, 1986). Achievement in the future will depend increasingly on critical thinking skills in order to process these data and solve complex problems (Rowland-Dunn, 1989). As a result, educators must work in conjunction with businesses to rethink their teaching roles and methods, as well as their curriculum content, in order to concentrate on

helping students develop the skills in a service-oriented, informational society. A third significance of the study, therefore, is its application for and importance to business and industry.

CHAPTER II

REVIEW OF SELECTED LITERATURE

Introduction

Educators frequently define learning as a process of acquiring skills (McPeck, 1981). Currently, the focus of education is shifting from learning facts to learning to think; however, the emphasis remains on the acquisition of skills. Modern thinking skills are being developed at a higher conceptual level and used at a higher analytical level than in the past. These higher levels of thinking are termed higher-order or critical thinking skills (Foster, 1989).

The concern of this study was teachers' responses to a questionnaire about their teaching styles in the classroom. The responses were then correlated with the terminology of critical and lower-order thinking skills in order to determine the extent of critical thinking skills in the Omaha Public Schools.

A review of selected literature is presented in this chapter. Five sections are included in this chapter: (1) the definitions of critical thinking; (2) importance of critical thinking within the schools; (3) teachers' length of service in the field of education and their use of critical thinking skills; (4) teachers' use of critical thinking skills and their education level; and (5) teachers' use of critical thinking skills and the grade level taught.

Definitions of Critical Thinking

Walters (1989) found that between 1977 and 1984, approximately 1900 analyses of critical thinking were published, most with their own definition of critical thinking. Grant (1988) determined that one major difficulty in discussing critical thinking stemmed from the lack of a common definition. Presseisen (1986) stated that of all the tasks facing educators today, few are as important as determining what is meant by critical thinking. Beyer (1988) said that "developing an accurate, commonly accepted definition of critical thinking is absolutely essential." Smith (1989) noted that concern with the definition and discussion of critical thinking has reached "obsessive proportions" (p. 92). Carr (1988) stated that critical thinking and higher order are "buzz words for 'thinking skills' in education today" (p. 2). To further confuse the issue of terminology, proponents of thinking skills use "higher-order" and "critical" as synonymous terms.

Despite these semantic difficulties, educators, psychologists, and curriculum theorists have developed commonly accepted working definitions for critical thinking (Quellmalz, 1985). Popular approaches to defining critical thinking fall into four general categories: taxonomic hierarchies, where critical thinking is arranged in a hierarchical order; a process approach based on a student's activity or skills; a cognitive strategy, with students consciously aware of their thinking; and a pedagogic approach, dependent on teacher knowledge or curriculum content (Smith, 1989).

The first means of defining critical thinking skills is through a thinking skills hierarchy. Learning has been viewed as a process of

acquiring knowledge and skills that are functionally arranged into hierarchies (Foster, 1989). Schlesinger (1984) stated:

> Thinking skills (hierarchies) often involve global constructs of thinking (e.g., "analysis") in a progression (e.g., from "knowledge" to "synthesis"). (p. 183)

Bloom's Taxonomy of Cognitive Objectives ((1956) is one of the earliest hierarchical taxonomic systems for analyzing and defining the critical thinking process. Miller (1990) noted:

> Educators, psychologists, and researchers have presented numerous definitions of higher-order thinking, but in general these descriptions draw on a framework familiar to most educators: Bloom's Taxonomy. (p. 93)

Bloom's Taxonomy is designed to define critical thinking in a hierarchical form and consists of six levels: knowledge, comprehension, application, analysis, synthesis, and evaluation. Bloom divided the taxonomy into these six cognitive learning levels to define critical thinking and to facilitate communication and assist educators in formulating curricula (Kruise, 1987). Each level requires the use of a different kind of thought process, and each level becomes sequentially more difficult. Bloom's Taxonomy functions as a reminder to teachers of the importance of going beyond memorization to critical thinking skills; the taxonomy provides a technique to make use of a student's progressive skills in critical thinking.

Although educators refer to the objectives in Bloom's Taxonomy as fundamental for all thinking skills (Presseisen, 1986), the Taxonomy was developed especially to serve as a definition and a conceptualization of higher-order thinking skills; that is, a system for classifying, describing, and analyzing the critical thinking process (Ennis, 1985). As a hierarchy, this

conceptualization moves from simple to complex cognition and from an emphasis on working to an emphasis on creating (Presseisen, 1986); therefore, the Taxonomy is a practical and effective means of organizing instructional materials for critical thinking (Keroack, 1983).

The current interest in critical thinking has caused researchers and educational institutions to develop independent, hierarchical taxonomies based on Bloom's findings (Beyer, 1988; Ennis, 1985; Heiman & Slomianko, 1987). These critical thinking skill hierarchies encompass a range of specific analytical skills. Quellmalz (1988) stated that a hierarchy of thinking skills develops from lower-order skills of identification, definition, and clarity to the critical thinking skills of judgment and evaluation. In a thinking skills hierarchy, students are frequently deemed ready to advance to higher critical thinking skills only if the lower, preceding skills are satisfactorily demonstrated. Raths (1986) determined that the taxonomies developed recently use "higher" and "lower" to define this movement from simple to complex thinking.

The designation "lower" is generally used for the first three levels of thinking skills taxonomies (Grant, 1988). Lower-order thinking skills include the first three levels in Bloom's Taxonomy: knowledge, comprehension, and application. Lower-order thinking skills have often been connected with content areas and the "basic" skills, while the higher-order, or critical, thinking skills are given the connotation of curriculum process and associated with advanced content material (Foster, 1989). Grant (1988) stated that lower-order processes "reproduce knowledge from

memory or through the application of routine," while higher-order processes produce "new knowledge or knowledge in new forms" (p. 36).

"Higher" or "critical" are the terms used to designate the upper three levels of a critical thinking skills hierarchy: analysis, synthesis, and evaluation (Grant, 1988). Reif (1984) reported that critical thinking skills are much more sophisticated and complex than the lower-order memory skills. In addition, critical thinking skills are more succinctly and completely answered than problems requiring only lower-order knowledge. Critical thinking skills advance knowledge from lower-order areas of comprehension and recall of information toward analysis, synthesis, and evaluation (Rowland-Dunn, 1989). Problems requiring this use of analysis and synthesis, critical thinking areas, are more cognitively complex than problems in the basic skills areas requiring only comprehension. Further, critical learning not only raises comprehension and insight, but also empowers and stimulates (Proceedings of the Twelfth Annual International Conference on Critical Thinking, 1992). Moreover, critical thinking skills are often given the connotation of curriculum process and associated with advanced content matter (Foster, 1989), , which includes problems requiring both knowledge and the ability to apply that knowledge in new situations.

Raths, Wasserman, Jonas, and Rothstein (1986) indicated that the distinction of "upper" and "lower" serves three purposes: (1) to distinguish mankind from lower animals, since animals perform lower-level operations and, as far as is known, do not perform higher-order ones; (2) the quality and quantity of contribution increases as the taxonomy advances; and (3) the

complexity of the individual's contribution increases. The authors went on to report:

> As one compares, analyzes, interprets, and evaluates, the lower processes . . . must be involved. However, the reverse is not true: the lower [orders] do not automatically envelop the higher ones. (p. 86)

A critical thinking taxonomy, therefore, is used for defining thinking and placing these definitions in a hierarchical order according to complexity of the thought processes involved. Hierarchical terms for lower-thinking skills include knowledge, comprehension, definition, and application. Terms for critical thinking skills include synthesis, inference, analysis, selection, and evaluation (Bloom, 1956; Ennis, 1985; Grant, 1988; Kruise, 1987; Presseisen, 1986; Rowland-Dunn, 1989; Stiggins, Rubel, & Quellmalz, 1986).

Some educators employ a second means of defining critical thinking from an operational, or process approach. Critical thinking is perceived as a valuable set of skills which can be learned and, therefore, taught; in other words, a process approach (Grant, 1988; Smith, 1989).

Parker (1983) generalized that one way to perceive critical thinking is to focus on the development of the intellectual thinking process. Heiman and Slomianko (1987) indicated it is reasonable to assume that processes which include the activities of problem solving, as well as analysis and judgment, by use and definition become critical thinking skills. Beyer (1988) reported that critical thinking is a collection of specialized processes. These processes place the emphasis on the pupils' development of ideas, rather than on their retrieval of information (Raths et al., 1986). Kagan (1988) indicated

that critical thinking is a generic term used for several specific critical thinking processes, including problem solving and fluent and divergent thinking. Further, McPeck (1981) emphasized the process aspect of a systematic acquisition in critical thinking, while Ennis (1985) stated:

> It is reasonable to assume that if the activity includes [skills] such as categorizing, problem solving, analyzing, generalizing and evaluating, it becomes a critical thinking activity. (p 202).

In contrast to defining critical thinking as a process, a third means of defining critical thinking is as a generic term used for several specific cognitive abilities (Grant, 1988). Cognition, a component of knowledge which includes both awareness and judgment, is often included as an aspect of critical thinking, in which intelligence acts upon experience (de Bono, 1983; Grant, 1988; Kagan, 1988; Quellmalz, 1985). Hunter (1991) noted that the intellectual capacity to think has its roots in this cognitive development. Reif (1984) also found that critical thinking skills that are important in specific curricular areas have been identified in recent studies of cognition.

Currently, cognitive research is being conducted in the areas of education, psychology, and sociology. Reif (1984) stated:

> Recent years have witnessed significant progress in "cognitive science," an emerging interdisciplinary field encompassing the area . . . of higher-order thinking skills. (p. 3)

A recurring theme in current cognitive research is conscious reflection and self-awareness. Fountain and Fusco (1991) related that a student's awareness and control of the thinking process are critical to his or her

cognitive development in the critical thinking areas. Grant (1988) agreed, stating that critical thinking demands the aspect of awareness as an active, sustained, and cognitive effort. Tuckman (1987) discussed the conscious awareness aspect of critical thinking by stating that the higher mental processes are inherently oriented more to the conscious process. Sternberg (1985) also defined critical thinking as a conscious mental process. He added that critical thinking is used for problem solving, decision making, and concept development. Lipman (1988) maintained there was a logical connection between Sternberg's critical thinking skills or problem solving and decision making and the conscious, cognitive areas of criteria and judgment, discussed by Beyer (1988), Browne and McKeeley (1990), and Tuckman (1987). Lipman added that when these skills of problem solving, decision making, and concept development are used, they must be self-correcting and rely upon criteria which are aspects of conscious thought. Presseisen (1986) and Quellmalz (1988) concurred with Lipman's findings that thinking skills must be actively monitored and self-regulated.

Browne and McKeeley (1990) referred to critical thinking as a set of interrelated, hierarchical questions. These questions are connected to conscious thought and appropriate use and require critical thinkers to maintain this awareness and self-judgment. Kagan (1988) concurred with Browne and McKeeley's determination of conscious thought, but added that cognitive abilities must also include problem solving and fluent and divergent thinking. O'Reilly (1991) agreed that critical thinking involves the conscious hierarchical skills found in many taxonomies, but added the elements of reflection and reason to cognition. In an earlier study, Ennis

(1985) found that critical thinking is reflective and reasonable, but determined that it also leads to decisions about a belief or action. Roberts (1986) agreed with O'Reilly (1991) and Ennis (1985) that critical thinking is reflective and reasonable; however, Roberts added that critical thinking is to focus on a specific outcome for an explicit purpose. Adler, (1987), however, found disagreement with the findings of Ennis and Roberts, stating there is no such thing as conscious thought in and of itself; all thought is accomplished "in the process of performing other acts of the mind" (p. 9).

Judgment is another important aspect of cognition. Beyer (1988) reported that critical thinking demands conscious, thoughtful consideration about important issues while judging its logic or evaluating its accuracy. Lipman (1988) stressed that critical thinking skills must be self-correcting, a skill that requires not only a conscious aspect of awareness (Fountain & Fusco, 1991; Grant, 1988; Tuckman, 1987), but also an aspect of judgment (Beyer, 1988). Browne and McKeeley (1990) referred to this conscious aspect of critical thinking as a system of questioning operations supporting on on-going search for better opinions, decisions, or judgments.

Thus, a third definition of critical thinking includes a conscious process involving questioning, judgment, and problem solving. A purposeful awareness of thought that leads to a solution or decision is prescribed by this definition.

The fourth means of defining critical thinking is pedagogical. The role of the teacher in critical thinking education is vital. Critical thinking is a means of teaching as well as a mode of learning (Raths et al., 1986). Kloss

(1988) stated that it is equally important for instructors and students to concentrate on the critical thinking strategies. Grant (1988) stated:

> In order to develop critical thinking skills in students, teachers need a broad and deep understanding of subject matter and an understanding of the pedagogical strategies of that concept. (p. 50)

Smith concurred with Grant: "Critical thinking does not happen automatically . . . teachers have an obligation to teach critical thinking skills" (p. 424).

Two separate issues arise when the definition of the pedagogical aspect of critical thinking is considered. These issues include the attitude of the teacher toward using critical thinking and the teaching methods involved in teaching critical thinking.

Teachers and their methods of conducting their classrooms are at the core of teaching critical thinking (Raths et al., 1986). McPeck (1981) determined that the attitude of the teacher and the atmosphere of the classroom must influence a student to use critical thinking skills. Jones (1985) concurred, stressing that the effects of the attitude of the teacher are far more significant in teaching critical thinking than the effects of the instructional materials or the curriculum. Teachers need self-motivation to examine their teaching effectiveness in order to improve the quality of teaching thinking (Robinson, 1987). This self-motivation, according to Berkowitz and Berkowtiz (1987), will determine the ultimate success of a critical thinking program.

A second part of the pedagogical aspect of critical thinking is the teaching method used by the teacher. Teaching with an emphasis on critical

thinking skills is different than teaching through lecture. Teachers who have grown accustomed to a specific teaching style experience awkwardness that comes with any new approach. A teacher finds it more difficult, for example, to lead students in discussion then to lecture them or to keep pace with the syllabus requirements (Robinson, 1987). Many taxonomies were developed to allow teachers to solve this type of dilemma and to implement a curriculum that directly infuses critical thinking. Often, a single assignment or an entire course may be developed around the students' "incremental exercise of hierarchical skills" (Schlesinger, 1984, p. 184). Raths et al. (1986) determined that teachers must require higher-order thought in conjunction with teacher-student interactions in order to invite and challenge a pupil's critical thinking. Swartz (1986) found that teachers who have worked to infuse critical thinking in their own teaching learn that it tends to bring out their best abilities, as well as those of their students.

There is no controversy about the need to emphasize thinking in the classroom (Raths et al., 1987). In the final analysis, the task of each educator is to enable students to think "in the modes necessary to learn subject matter and, perhaps more importantly, to know that they know these modes" (Ashby-Davis, 1984, p. 2).

Although most educators and taxonomies have their own definition of critical thinking skills, Smith (1989) stated that it is clearly not necessary to wait for a precise, commonly accepted definition of critical thinking before engaging in it. Certain generalities, however, seem apparent in most critical thinking definitions. Any consideration of critical thinking skills includes four components in its definition. The first of these components is a

taxonomy, or a hierarchical range of thinking activities which develops on a logical basis from simple to complex. The terminology commonly associated with a critical thinking taxonomy includes analysis, problem solving or synthesis, and judgment or evaluation. The second consideration is the element of cognition, or self-monitoring. Critical thinkers must be consistently aware of their use of critical thinking skills. The third component in a definition of critical thinking skills is critical thinking as a process. These skills must be consciously taught by teachers and consistently implemented by students. Finally, critical thinking is defined as a pedagogy, dependent upon the knowledge of the educator and the content of the course.

Importance of Critical Thinking to the Educator

The need for critical thinking skills pervades the educational system. Quellmalz (1985) stated:

> Educators, policy-makers and the public agree that critical thinking skills are important but neglected in curricula and tests and, therefore, underdeveloped in students. (p. 4)

Thus, the importance of critical thinking within the school system may be defined in three ways: as it pertains to the students, is developed, and is implemented into the curriculum.

The public has generally assumed that one of the tasks of the school system is to teach children how to think (Rosenblum-Cale, 1987). Adler (1986) reported:

> There can be no question that developing in the minds of our students the ability to think . . . critically . . . should be

> a prime objective of basic schooling. Unless students can be trained to think critically, none of the other objectives of basic K-12 schooling can be achieved. They cannot develop skill in language arts, in the operations of mathematics, and in the procedures of scientific investigation. Their understanding of important ideas and issues cannot be increased and deepened. (p. 9)

Student performance on measures of critical thinking ability indicates a crucial need for students to develop the skills and attitudes of effective thinking. Officials of the International Conference on Critical Thinking (Proceedings of the Twelfth Annul International Conference, 1992) stated:

> What students often learn well--that school is a place to repeat back what the teacher or textbook said--blocks them from thinking seriously about what they are learning. Though there are circumstances in everyday life where lower order, rote learning is sufficient, those circumstances are diminishing rapidly. (p. 3)

Of increasing importance is that students master the thinking and reasoning skills they will need for future activities (Meyers, 1986). A few decades ago students could be satisfactorily prepared to "think" by learning a substantial amount of factual knowledge which could stand them in good stead for the future years. In the face of knowledge that is rapidly growing in size and complexity, such educational approaches are becoming more and more inadequate (Reif, 1984). The thinking tools necessary for effective understanding of the technological world must go beyond the scientific and technological to include communication and critical thinking. Students need the ability to judge, analyze, and think critically in order to function in a society of increased technology and in an advanced democracy (Arter & Salman, 1987). Today, both teachers and students have an overwhelming

abundance of information available; the information that can be accessed through computers and the media seems to have outstripped a person's abilities to process and use that information. Students, however, feel the onslaught of this information age even more acutely than their teachers and are less capable of coping with its demands and making sense of the complex world (Meyers, 1986).

A future thinking society demands the development of students with critical thinking abilities (Parker, 1983). Advances and improvements in technology have mandated that teachers should be teaching students how to think (Parker, 1983). Reif (1984) added that the "recent scientific and technological advances offer significant opportunities to implement more effective teaching of higher-order thinking skills" (p. 73). In addition, the use of thinking skills prevalent in assignments allows teachers to diagnose specific student difficulties in cognitive progression (Keroack, 1983).

Teachers sometimes despair of knowing how all these new developments in technology and information systems can be sorted through to determine what students need to know. Teachers can help their students cope with this complexity of information through the teaching of critical thinking skills (Meyers 1986). Kruise (1987) pointed out:

> Teachers of all subjects can help their students develop and apply these [critical thinking] tools by building on the natural skills students possess. (p. 27)

Thinking skills are not of value for current educational tasks and activities alone. If students are to become adults capable of making reasoning judgments about the complex problems facing society, they must learn to use critical thinking (Johnson & Johnson, 1988). Schlesinger (1984)

indicated that the "ability to think critically is tied closely to the citizenship, attitudes, and skills needed to preserve and strengthen our democratic state" (p. 184). Yet, the teaching skills of problem solving, reasoning, conceptualization, and analysis are among the neglected basics needed in society (Sternberg, 1985)). Reif (1984) stated that today's students must be prepared to cope with a critical thinking world if they are to function effectively in their future jobs and social roles. Costa (1991a) found:

> Societal demands for higher-order thinking are increasing. Employability studies document the need for a future work force capable of more sophisticated thinking than was generally required in the past. Such skills as independent analysis, flexible thinking, and collaborative problem solving are now considered basic requirements for many jobs. (p. 2)

Rowland-Dunn (1989) concurred with Costa:

> To solve our planet's complex problems, our young people will need proficiency in critical thinking, rather than a good recall of data. (p. 46)

In addition, Hunter (1991) determined that thinking is not simply a collection of useful skills but a way of life in the developing and maturing young person. Hunter added:

> In this social environment there are two valid qualities we can pass on to future generations: the ability to cope with rapid change, and the use of our higher intellectual capacities. (p. 73)

Many researchers have determined that, in addition to the development of critical thinking skills to facilitate citizenship, the use of critical thinking skills will be of benefit to adults wishing to improve their ability to succeed in the workplace (Robinson, 1987). Knowledge is

growing so rapidly that many persons run the risk of becoming professionally obsolete unless they continually keep learning and updating themselves (Reif, 1984). Members of the International Conference on Critical Thinking stressed that to maintain and enhance the quality of life "a leading-edge economy must be developed based on workers who can think" (Proceedings of the Twelfth Annual International Conference, 1992, p. 2).

Thus, researchers have shown an imperative to develop broad-based students capable of critical thinking, with the ability to decode, prioritize, and apply the vast amount of information that is being processed. deBono (1983) stated that the teaching of thinking is not tomorrow's dream, but today's reality. McTighe and Schollenberger (1991) concurred:

> Societal demands for higher order thinking are increasing .... Such skills as independent analysis, flexible thinking, and collaborative problem solving are now basic requirements for many jobs. (p. 2)

Clark (1991) contended: "More than to give information, a teacher needs to help guide a student's mind to think.... Giving information is easy. Forming a thinking mind is hard" (p. 164).

The procedure to develop such students is to be found in a comprehensive curriculum based on critical thinking skills. This can be accomplished through a thinking skills course or through the infusion of critical thinking skills into an existing class.

Some educators have indicated that critical thinking skills should be taught directly as an independent course (deBono, 1983; Reif, 1984). McPeck (1981) defined critical thinking as both a task and an achievement which, like other skills, can be taught within the context of other subjects or

independently. Heinman and Slomianko (1987) maintained that critical thinking, like all other skills, can be taught and improved. They asserted that teachers of all subjects can teach their students to develop and apply all levels of skills by building on the natural skills possessed by all students. Meyers (1986) added that teachers in all disciplines must teach these integrated skills explicitly and directly. Teachers who present concepts through activities using critical thinking have discovered that students remember the concepts longer and show a greater enthusiasm for learning (Chancellor, 1991).

One should note, however, that in the greatest amount of literature concerning critical thinking skills and the curriculum, researchers have indicated critical thinking skills are best taught and learned if they are infused into the total curriculum. Swartz (1987) stated:

> There are indications that when a separate program is used as the sole vehicle for instruction in thinking, however effective it might be otherwise, the transfer of what is learned into other academic work . . . is far less than we would like. (p. 1)

The possession of critical thinking skills by a pupil is not by itself an indicator of success with these skills (McPeck, 1981), nor does it demonstrate that the student is in the habit of using the skills (Morse & McCune, 1971). Most critical thinking proponents have indicated that direct teaching of critical thinking skills must be coupled with the infusion of these skills into the curriculum. Raths et al. (1986) indicated that not only should critical thinking be taught in each area of the curriculum, but it should be a primary objective.

Miller (1970) and Reboy (1989) found that in order to be effective, critical thinking skills must be taught as an integral part of other subjects; they cannot be used or learned in isolation. Berkowitz and Berkowitz (1987) stated that the success of using critical thinking skills depends not only on the ability to question effectively at all levels of the thinking skills taxonomy, but also on the teacher's ability to infuse these skills into the student's curriculum.

In the report by the Carnegie Council on Adolescent Development (1989), the authors reported that a student cannot develop a disciplined mind separate from the subject matter; the core curriculum must contain the elements of critical thinking skills. Students must learn to think critically as a part of the system, rather than with isolated data which are available to them. McPeck (1981) stated that components tacked on to the curriculum or taught in isolation are usually transitory in nature. Reboy (1989) reported that thinking skills, being generic in nature, can be infused into the various subject areas with equal success. Rosenblum-Cale (1987) stated that thinking must be required to be integrated into on-going schedules and assignments.

According to Meyers (1986), critical thinking skills are best taught through a variety of discipline perspectives; Rowland-Dunn (1989) stressed the importance of integrating these critical thinking skills into the basic content areas. Ruggiero (1988) stated two overarching reasons for the integration of critical thinking into as many courses as possible: (1) if critical thinking is taught in isolation or in only a few places, it is not likely

to take root; and (2) whenever higher-order thinking skills are taught or used, they tend to increase a student's excitement for the course.

Rosenblum-Cale (1987) stated there is no single methodology or teaching strategy for all grades or all subjects when teaching the thinking skills; however, some appear to be more beneficial at a specific grade level than others. This infusion of higher-order skills into various subjects is facilitated by the non-subject-specific nature of thinking skills. Ruggiero (1988) maintained there is impressive evidence against subject-specific thinking skills. Thinking skills in a variety of classrooms reveal some variations in terminology according to the subject area, but the basic hierarchy and terminology of thinking skills do not change. Schlesinger (1984) stated:

> The pedagogies serving [critical thinking] are largely independent of subject matter and curricular sector. Those fields one would think of as natural havens for the teaching of thinking skills--basic skills, remedial skills, introductory courses, philosophy, English--lay no more claim than any other field. (p. 182)

Historically, critical thinking skill activities were implemented into gifted classes only. Current researchers have found that the infusion of critical thinking skills is a critical priority in the regular classroom, as well as gifted programs (Chancellor, 1991). In most current critical thinking skills programs, these skills are best taught in the context of regular classroom instruction (Costa, 1991b). The use of a critical thinking skills program not only reinforces basic areas of study, but, if properly taught and infused into the curriculum, can expand and challenge students of all ability levels (Kruise, 1987).

Bloome (1985) claimed that a student's repetition of lower-order skills lesson after lesson will develop a narrow, limited range of skills and strategies. Higher-order thinking skills, while traditionally implemented in honors or gifted classes, cannot be limited to these two areas for maximum success (Chancellor, 1991; Rowland-Dunn, 1989). Foster (1989)and Keating (1980) indicated that thinking skills of lower achievers need to be cultivated as much as those of higher achievers. Rowland-Dunn (1989) stated that lower achievers and the majority of students would be at a disadvantage when critical thinking skills are confined to gifted classes, as is still the case in many public school classrooms. This disadvantage, according to Ruggiero (1988) would inhibit the students' potential to meet future demands in their careers, citizenship, and full potential as humans.

Parker (1983) reported:

> Because our world is faced with accelerating change, a major goal in education should be to develop the learner's capacity to adapt to change using higher-order thinking processes which will enable him/her to engage in lifelong learning. (p. 3)

The interest in critical thinking has caused researchers and educational institutions to infuse independent critical thinking skills programs into the total curriculum (Beyer, 1988; Ennis, 1985; Heinman & Slomianko, 1987). An effective critical thinking skills program provides opportunities for children to become higher-level, independent, and divergent thinkers, thus providing children with chances to solve problems by thinking both critically and creatively (Robinson, 1987).

The use of a critical thinking program is especially convenient for the infusion of critical thinking skills into all areas of the curriculum to facilitate

instruction of content (Keroack, 1983; Schlesinger, 1984). Further, the use of a critical thinking program aids in the precision of definition and classification of terms used in different instructional institutions, programs, and areas of the curriculum (Bloom, 1956).

Thinking and writing have been viewed as interdependent processes of higher-order thinking. Kemp (1990) stated that many educators believe critical thinking, reading, and writing are joined together almost as if they "made up a single tool of learning" (p. 34). Jones (1991) noted that reading is "fundamentally higher-order thinking at every stage of comprehending and responding to text" (p. 157).

The importance of higher-order thinking skills within the parameters of other curricular areas, however, has also been noted. In 1982, officials of the National Council of Teachers of English observed the link between language and thinking and decided that one of the main duties of an English teacher was to teach students to use higher-order thinking skills (Keroack, 1983). The authors of the Colorado State Department of Education's Task Force Report (1986) stated:

> The higher order thinking skills . . . especially judging information, determining alternatives, and solving problems are readily taught through the humanities. (p. 5)

The use of critical thinking skills has been determined to help students read more actively and with better comprehension (Heiman & Slomianko, 1987). This important connection between reading and critical thinking skills was emphasized by McPeck (1981):

> There is a distinction between the skills necessary for the acquisition of the skill of reading itself and those necessary

> for accomplished reading. Those concerned with acquisition are likely to stress decoding (a lower level skill) while those interested in accomplished reading are likely to stress comprehension. A person's ability to derive meaning from print is limited by his [or her] ability to interpret the message. (p. 128)

Chancellor (1991), in agreement with the National Council of Teachers of Mathematics, stated:

> Critical thinking skills are vehicles for planning interesting and challenging activities in mathematics to engage the intellect of our students--not just those identified as having special talents in mathematics. (p. 48)

Moreover, critical thinking should be infused into the subject matter of history (Kemp, 1990). History involves gathering historical evidence and thinking about that evidence, as well as the critical aspects of evaluation, inference, and interpretation (O'Reilly, 1991). Moore (1992) stated that critical thinking encourages "teaching students the value of basing science decisions on logic and evidence, not mythology and hocus-pocus" (p. 5).

According to Costa (1991b), the main goal of education in arts should be the use of critical thinking skills presented through arts instruction as a compound discipline. Similarly, home economics teachers should design their courses to emphasize discussion focused on practical reasoning, sound judgment, and ethical thought (Copa, Hultgren, & Wilkosz, 1991).

The strongest proponents of the teaching and use of critical thinking skills within the public schools are those in the area of business education and vocational education. Miller (1990) stated that the ideal vocational education class should teach critical thinking as routinely as skills demonstrations or written tests. Demands for employees capable of critical

thinking are increasing. As a result of instantaneous global communication, skills such as rapid, independent analysis, flexible thinking, and problem solving are a requirement for most careers (Costa, 1991a). Concurrent with the development of improved communication is the movement away from manpower and toward automation. No longer is it sufficient to be able to do manual work; all areas of modern industrialization demand the ability to prioritize, synthesize, correlate, and judge solutions. An adaptable work force that is cross transferable for a variety of critical thinking skills is mandatory (Miller, 1990).

Naisbitt (1984) found that only five percent of the almost 20 million new jobs created in the 1970's were in manufacturing. Almost 90 percent of the new jobs were in information, knowledge, or service jobs. The world has entered an information age in which knowledge of the "basics" is insufficient. Costa (1991b) summarized the report of the National Science Board on Pre-College Education in Mathematics, Science, and Technology:

> We must return to the basics, but the "basics" of the 21st century are not only reading, writing and arithmetic. They include . . . higher problem solving skills . . . the thinking tools that allow us to understand the technological world around us. (p. 1)

Ruggiero (1988) noted:

> Business will always prefer people who have broad-based skills--people who can think critically . . . and teach themselves. A person who is taught today's skills may have obsolete skills by the time he or she reaches the work force. But a person who is taught to think well will always be able to adapt. (p. 8)

A curricular plan was issued in the Omaha Public Schools, which was the focus of this study, designed to prepare students for the twenty-first century. Titled Omaha 2000 (1991), the plan mandates that

> . . . all students within the Omaha metro area must demonstrate basic and advanced thinking skills for graduation: acquisition, interpretation and evaluation of data, communicate effectively, have the ability to learn, reason, think creatively, make decisions, and solve problems. (p. 3)

The purposes of the program include creating and strengthening within all students an awareness of critical thinking abilities, as well as

> . . . providing students with the knowledge, methods and techniques needed to learn, analyze information and problems, and to apply a variety of appropriate problem solving strategies. (p. 3)

Specific curricular goals include an infused program of instruction for critical thinking. Outcomes must be developed, course guides written, textbooks adopted, and assessment procedures designed.

Critical Thinking Skills and Longevity

Recent researchers who have examined the relationship between classroom teacher behavior and teaching experience support the notion that differences between behavior and experience can be identified (Pearce & Loyd, 1987). These behavioral differences, resulting from experience or longevity in the profession, may be classified as differences in attitude and in ability.

Teaching critical thinking in and of itself is not sufficient. A positive attitude by the teacher toward the use of critical thinking skills is also

important (Pearce & Loyd, 1987). Berkowitz and Berkowitz (1987) stated that the success of using critical level thinking skills depends not only on asking the right questions at all thinking skill levels, but also having appropriate expectations of the students. Unfortunately, the ability to ask the right questions, as well as the talent to have appropriate expectations for the students, is a skill that a teacher develops primarily through experience (Pearce & Loyd, 1987).

Melnick, Iwanicki, and Gable (1989) found that novice teachers experienced a period of adjustment in attitude, struggling both with their new role and with concerns about performance. In conjunction with this concern about performance, novice teachers perceived a higher need for inservice training. These inservices were to be in areas not covered or partially covered in teacher education classes, such as critical thinking skills. The attitude of a novice teacher toward inservice programs was substantially more positive than the attitude of teachers who had taught for several years (Kaiser, 1982). Thus, according to Kaiser, the longer a teacher was in a classroom, the less likely the teacher was to accept additional education in areas such as critical thinking.

As some teachers gain more experience, they continue trying to improve the quality of education in their classrooms through advanced education courses and self-improvement seminars; other teachers, however, resign themselves to the status quo (Kaiser, 1982). Consequently, those teachers who try to improve their instructional quality tend to maintain a more positive attitude within the classroom, while the second group may be less enthusiastic about their students, the curriculum, their teaching, and

professionalism. This lack of enthusiasm becomes evident in a negative attitude toward implementation of new programs and skills by teachers.

Melnick, Iwanicki, and Gable (1989) found that by the twentieth year of experience in teaching there appeared to be a decline in satisfaction with the profession and a determination to get "out of the rut" of education. This often manifested itself in a negative attitude toward students, programs, and the profession in general. As teachers approached retirement, their attitude toward the profession and new teaching methods further deteriorated. Often, the teacher showed a loss of energy and a pulling way from teaching.

The second behavior difference in teachers resulting from their length of time in the profession is ability. Teacher behavior differs with different levels of experience. Peace and Loyd (1987) explained that experience is perceived as a primary way teachers develop their teaching skills and abilities; inservices, advanced education, and seminars are a distant second. Sandefur (1982) indicated that certain teaching behaviors are significantly and positively modified by teaching experience, including selected teaching methods. Beginning teachers appear to try a variety of behaviors (Pearce & Loyd, 1987), while experienced teachers appear to be concentrating on improving and infusing those behaviors previously learned.

In 1989, Melnik, Iwanicki, and Gable studied 1737 teachers according to level of experience. Through the use of a one-way ANOVA, a significant difference was found in two attributes of teacher ability: fostering thinking and communication skills. The researchers found that as teachers gained experience, the ability to foster critical thinking and enhance communication

skills in their students increased. This was especially true following the eleventh year of teaching.

Melnik, Iwanicki, and Gable (1989) also found that teachers' levels of experience also played an important role in formulating staff development plans. Teachers who had experience in the classroom showed a desire to participate in inservice programs in areas such as critical thinking. Burden (1981), however, found the need for staff development training to decline as teachers became more experienced and the interest in helping to develop these plans decreased.

Critical Thinking Skills and Level of Education

Educators and critics of education in the 1980's and 1990's found that the training of teachers for the critical thinking skills in the basic subject areas was not sufficient (McPeck, 1981; Presseisen, 1986; Ruggiero, 1988). Presseisen (1986) pointed out that previous generations of teachers were rarely trained to teach thinking. Powell and Solity (1990) found little research to suggest that teacher education courses were sufficient for teacher training in critical thinking. According to Moore (1990):

> The training of isolated bits of information and the restricted student teaching experience is evidence of the focus of such training on "presented" problems. Knowing how [to teach critical thinking] is a different kind of knowing. (p. 6)

The education of teachers unquestionably influences their teaching of critical thinking (Grant, 1988). Morse and McCune (1971) found that critical thinking skills are often neglected because of the limited amount of training which teachers receive in this area and the lack of stress on critical

thinking in higher education. Robinson's (1987) research, conducted in 1986, contained a needs assessment of educators in the field , which supported Morse and McCune's findings. Robinson pointed out that most teachers surveyed lacked effective thinking skill strategies, causing a need for advanced training in critical thinking skills. Several probable causes were found for this lack of effective thinking skill strategies; however, the primary cause was found to be the limited training in critical thinking received by the teachers in college.

According to Moore (1990), teacher training has tended to focus on academic subject matter knowledge, rather than instructional skills:

> The emphasis on facts and the recall of facts [being used in the classroom] demonstrates not just the difficulty of teaching critical thinking . . . but the probability that most teachers simply do not know how to teach for higher levels of thinking. (p. 237)

Adler (1987) found:

> The programs in critical thinking . . . advocated coast to coast will not train teachers how to think critically. The training should have been accomplished by the education they received before they started to teach. (p. 11)

Therefore, since researchers have shown that training of critical thinking skills for pre-service teachers is lacking, advance training becomes imperative (Powell & Solity, 1990). Despite this apparent lack of preservice training, Presseisen (1986) found, "The response of educators to the thinking movement in recent years suggests that teachers are eager to remedy this deficiency" (p. 23).

Parker (1983) agreed with Preseisen's findings; however, Parker indicated that while teachers are willing to remedy this situation and teach for critical thinking, they do not know how to correctly implement such training. Researchers have found that critical thinking skill training beyond teacher education courses is important (Martin, 1989). Teachers must be trained to become aware of thinking skills and of the techniques for creating an "open, supportive, and structured classroom environment that will set the stage for the development of critical and creative thinking" (Gough, 1991, p. 29). This advanced training comes from conferences, institutes, advanced degrees, classes, and journals which service higher education (Presseisen, 1986). These educational programs are increasingly devoted to curricular goals and pedagogical techniques of critical thinking (Schlesinger, 1984).

Careful consideration should be focused on inservice training programs because of their prevalence and the emphasis placed on their importance (Robinson, 1987). Parker (1983) stated that inservice programs in which critical thinking skill instruction is integrated into the classroom must be implemented and monitored carefully. Gough (1991) pointed out that a coherent thinking skills program depends on the creation of a comprehensive scope and sequence plan by a trained teacher. Further, in the new thinking skills programs, the changed roles in instruction are stressed to achieve student progress in critical thinking (Kloss, 1988).

The teacher is no longer a lecturer in a silent classroom, but a facilitator of critical thought. Kloss (1988) indicated that teachers who are trained and inducted to use critical thinking skills produce students who are more likely to use them. A comprehensive training as an undergraduate

should lay the foundation for critical thinking skills that can be enhanced by further training after graduation.

Critical Thinking Skills and Grade Level

A great deal of research has been compiled in which the integration of critical thinking skills into the various areas of the curriculum has been discussed. Although this need to teach critical thinking skills exists for elementary as well as secondary teachers, the difference between the high school teacher and the elementary teacher is significant (Ruggerio, 1987).

In the Colorado State Department of Education (1986) task force report, the authors determined that critical thinking skills should not be taught in isolation, but must be integrated into all subjects at all grade levels. Hunter (1991) stated that "now is the time to undertake [critical] thinking skill instruction--not in isolated grades and single classrooms, but across the curriculum" (p. 73). Hunter further stressed that all academic areas and grades are to be responsible and accountable for this infusion. Gough (1991) concurred, stating that the inclusion of critical thinking skills into all academic levels is a "unifying theme . . . . this belief that thinking skills should not be taught in isolation, but rather integrated throughout the curriculum" (p. 1). Carr (1988) further agreed with Gough and Hunter, indicating that at every level--elementary, secondary, and college--thinking must be applied and practiced within each content field.

In the Proceedings of the Twelfth Annual International Conference on Critical Thinking and Educational Reform (1992), the authors reported that the teachers who teach early grades need to "understand and appreciate the

superstructure that is to be built upon the foundations they help to lay." Robinson (1987) found:

> The teaching of thinking skills is particularly important to the success of all early childhood programs because it prepares young children to better understand and cope with an ever-changing society. (p. 13).

A study of teaching critical thinking at the secondary level deserves attention, since the secondary school is an institution specifically designed to develop those skills in adolescents (Grant, 1988). Often, many high school teachers operate under the myth that thinking skills cannot be taught and that teaching thinking skills is not their responsibility (Hunter, 1991). Hunter stated:

> The high school student intellectually has reached the teachable moment and the maturation level at which . . . [critical] thinking skills instruction can be effectively undertaken. (p. 73)

Rosenblum-Cale (1987) found that high school students who are college or employment-bound often assume the responsibility of an adult and need critical thinking skills more than at any other time in their educational careers. Therefore, those who teach the later grades should "provide the capstones that will solidify the skills, insights, and passions that can secure lifelong learning grounded in deeply internalized critical thinking skills" (Ruggerio, 1988, p. 243).

The focus of any implementation of critical thinking skills must be throughout the curriculum. There is no one grade level where the skills could "best" be integrated within the curriculum; they are "best" integrated from kindergarten on.

Summary

The importance of critical thinking was described in this chapter in five sections: the definition of critical thinking, the importance of critical thinking for the teacher, and critical thinking in conjunction with the teacher's education level, grade level taught, and number of years in the profession.

As Walters (1989) indicated, most analyses and texts of critical thinking contain a unique definition. Beyer (1988), Presseisen (1986), and Smith (1989) stressed the need to find a common semantic agreement for the study of critical thinking.

Critical thinking definitions, therefore, were synthesized into four general categories. First, Foster (1989), Miller (1990), and Schlesinger (1984) defined critical thinking as a taxonomy, or hierarchical range of skills, from simple (knowledge) to complex (evaluation). In addition, Grant (1988) indicated that critical thinking uses the element of cognition, a conscious awareness of the thinking process, higher-order thinking in particular. Further, critical thinking was defined as a process systematically taught to and used by students (Parker, 1983; Smith, 1989). Finally, Raths (1986) defined critical thinking pedagogically, stating that it is a means of teaching, as well as a mode of learning.

From the research, it was apparent that authorities from various fields such as education, educational psychology, and educational administration, as well as lay persons interested in the topic, had a different connotation and used a variety of definitions for critical thinking. Developing a succinct,

comprehensive definition would benefit communication between and among educators, administrators, and others interested in critical thinking.

The importance of critical thinking skills for the teacher was discussed. This importance was determined to include several elements. Swartz (1987) and Raths (1986) indicated that the skills must be an integral part of the curriculum, while Miller (1970) and Reboy (1989) stated that the critical thinking skills must be cross-curricular. Further, classroom instruction must be planned and conducted in a careful manner, with the use of critical thinking skills an integral part of the total program (Rowland-Dunn, 1989). In addition, the student should be taught to transfer these skills to other curricular and non-curricular areas (Costa, 1991a), as well as in gifted, core, and special education classes.

The need to implement various aspects of higher-order thinking at all grade levels and in all areas of the curriculum was emphasized throughout the literature. From the extent of material available on critical thinking skills in the classroom, the conclusion can be made that this is a crucial area in education.

In the third section, the teacher's length of service in education was discussed in conjunction with the use of critical thinking skills. Melnick, Iwanicki, and Gable (1989) have shown a relationship between an educator's length of service and certain behaviors which influence the use of critical thinking skills in the classroom. These behaviors included the attitude a teacher displays toward critical thinking and the teacher's ability to implement these skills into the curriculum.

Critical thinking and the teacher's education level were discussed. Morse and McCune (1971) attributed the neglect of critical thinking skills in the classroom to the lack of emphasis on these skills in the public schools. Frequently, this stems from the limited amount of training received by teachers (Powell & Solity, 1990). Along with the mastery of the basics, Martin (1989) stressed that the teacher must be carefully trained to plan and infuse these skills as a part of the lesson.

According to the literature reviewed, the education level a teacher attains may determine whether or not that teacher is predisposed to use critical thinking skills in the classroom. Further, the extent of use by those teachers who use these skills in the class may vary according to their education level.

Finally, critical thinking skills were discussed according to the grade level taught by the educator. Ruggerio (1987) found the infusion of critical thinking skills to be critical at all grade levels, elementary through college. Carr (1988) and Gough (1991) maintained no specific grade level was determined to be more critical for the implementation of critical thinking skills. From this, it can be concluded that teacher education programs at all levels need to emphasize the implementation of critical thinking into the curriculum.

According to the research discussed in this chapter, critical thinking skills were determined to be important and of benefit to students at all grade levels. Further, according to the research reviewed, these skills must be systematically and consistently taught to the students. The purpose of this

study, therefore, was to determine if teachers in the Omaha Public School system used critical thinking skills in their classes and the extent of this use.

CHAPTER III

DESIGN OF THE STUDY

Introduction

This quantitative study was based on the desirability and utilization of critical thinking skills in the Omaha Public Schools. The study was a self-reporting survey of teachers in two randomly selected Omaha high schools and five elementary schools. The researcher hoped that by maintaining anonymity and assuring that completion of the survey was voluntary, the responses of the teachers would be candid and accurately reflect their teaching styles in the classroom.

Population

The population included in the survey consisted of two groups: elementary school teachers and secondary school teachers from the Omaha, Nebraska Public Schools. Omaha is the largest urban area in the state, with a population of approximately 350,000. Omaha is a community with a diverse cultural background, consisting primarily of White, Black, Hispanic, Native American, and Asian people. Omaha is the headquarters for several corporate businesses and insurance companies. In addition, one college and two universities with teacher education programs are located in Omaha.

The Omaha Public School district has seven Class A high schools and fifty-six elementary schools, with a population of 43,158 students. A total of

1547 elementary school teachers and 712 high school teachers are employed by the district.

The total population of high schools in the Omaha district was assigned a number, and a cluster random drawing took place through cluster sampling until three high schools were chosen. Teachers in one high school chose not to participate; 230 teachers were involved from the two high schools which participated.

Five elementary schools were randomly selected through the cluster sampling method. A higher number of elementary schools was chosen because of the unequal number of teachers in high schools and elementary schools. One hundred eleven elementary teachers were asked to participate in the survey; teacher participation was voluntary.

The sample frame consisted of all full-time teachers within the selected schools. A response rate of approximately 40 for each educational level sub-group was determined to be adequate for statistical accuracy. Because of the anonymity of the design and the method of dissemination and collecting the questionnaire, a return of approximately 70 percent was anticipated in each building. From the total population of 341 teachers in the seven schools, 252 teachers, or 74 percent, responded to the survey (see Table 1).

Instrumentation

The survey method was selected for the data collection since the topic of the study was a specific learning method used in the Omaha Public School classrooms. The survey method is an excellent method for

Table 1

Number of Teachers Assigned to Each Responding Building and Number of Responses from Each Building

	Total Number of Teachers	Number of Respondents	Percent
Elementary Schools			
Spring Lake	25	22	88.0
Hartman	23	19	83.0
Chandler View	25	19	76.0
King Science Center	21	17	81.0
Marrs	17	12	71.0
Total	111	89	80.0
High Schools			
Central	113	92	81.0
North	117	71	61.0
Total	230	163	71.0
Overall Total	341	252	73.90

"exploring and evaluating many aspects of the school system, such as procedure, teaching staff, learning objectives, curriculum, and teaching method" (Borg & Gall, 1989, p. 417). A research designed survey, "Teaching Styles in the Omaha Public Schools," was developed to correlate with the six research questions (see Appendix A). The concept of critical thinking skills, however, was not mentioned in the survey in order to eliminate respondent bias toward the use of critical thinking skills in the classroom and to assure validity of the instrument.

Using critical thinking terminology derived from the review of literature, especially the terminology of Bloom (1954), Ennis (1985), Kruise (1987), Grant (1988), Rowland-Dunn (1989), and Stiggins, Rubel, and Quellmalz (1988), the survey was divided into five sections concerning the students' time in the classroom, homework and assessment, and skills and aptitudes necessary for student success. A sixth item was added containing demographic questions to correlate with the research questions concerning the number of years in teaching, educational level, and grade level taught.

The first part of the survey consisted of five questions that determined which critical and lower-order thinking skills were being used in the classroom and specified the extent to which these thinking skills were employed. This section of the survey was divided into five areas which included:

1. In the daily classroom setting, how was most of the students' time spent?

2. In the classroom, which skills were perceived by the teacher to be necessary for student achievement?

3. In the classroom, which aptitudes did the teacher perceive were necessary for student success?

4. How would average daily homework assignments be described?

5. What type of tests were given?

The Omaha Public Schools developed the Omaha Instructional Process Learning Goals (1992) as guidelines for teachers to implement learning objectives in the classroom. These objectives utilized Bloom's (1954) descriptors to determine expected learning outcomes required at each grade level. Each major area on the teachers' surveys contained five to eight descriptors taken from the Omaha Instructional Process guidelines. Using these O.I.P. descriptors, teachers we requested to rank their perceptions of their teaching style on a Likert-type scale. The range of the scale included "always," "often," "sometimes," "rarely," and "never." According to Cates (1985), surveys with a Likert-type ranking will "help the researcher identify types of behavior, attitude, [and] achievement to be measured" (p. 13). This survey was designed to investigate the teachers' attitudes toward critical thinking behaviors, as well as behaviors they expected to find in their classrooms.

The descriptors in each of the five areas were labeled as critical or lower-order thinking for statistical purposes. The definition of the descriptors as critical or lower-order thinking was described from research by Bloom (1954), Ennis (1985), Kruise (1987), Grant (1988), Rowland-Dunn (1989), and Stiggins, Rubel, and Quellmalz (1988) (see Table 2).

The second part of the survey contained demographic questions. The respondents were asked to supply their education level, longevity in the

Table 2

Descriptors of Critical Thinking and Lower-Order Thinking Skills Used to Develop the "Teaching Styles in the Omaha Public Schools" Survey

	Higher-Order Thinking Skills	Lower-Order Thinking Skills
A. In the daily classroom setting, how is most of the students' time spent?	Small-group work Partner/pair activities Discussion Hands-on activities	Lecture/listening Worksheets Reading Equipment activities (calculator, computer)
B. In the classroom, which skills are necessary for student achievement?	Research skills Problem solving Organizing Interpretation or restatement Sequencing Predicting	Memorization skills Notetaking
C. In the classroom, which aptitudes are necessary for student success	Construct or create Rate, evaluate, or assess Compare, contrast, expand Choose and support	Define, describe Apply Translate Identify
D. Describe the average daily homework assignment	Theme/project Experiment Readings	Review/report Question/answer
E. What type of test is given?	Essay Production	Multiple-choice True/false Fill in the blank Application

field, and teaching level. The descriptors helped to define those teachers who did or did not use critical thinking skills in the classroom (see Table 3).

Table 3

Education Level of Respondents

	Frequency	Percent
Bachelor of Arts	77	30.6
Bachelor of Arts + 18	44	17.5
Master of Arts	98	38.9
Master of Arts + 30	29	11.5
Ph.D. or Ed.D.	4	1.5
Total	252	100.0

Two pilot studies were conducted on the survey instrument for content validation and reliability. The original draft of the survey was administered to a panel of five principals, teachers, and administrators from various districts in Nebraska. The educators further reviewed the instrument for design and clarity. Following the response from the panel of educators, the survey was administered to teachers at Millard North High School and Sunnyslope Elementary. These suburban schools were similar in size, location, and socioeconomic criteria to the Omaha public schools, which

were the sites for the study. As a result of feedback from the panel of administrators and a review of the survey responses from the teachers in the two pilot schools, appropriate revisions were made on the survey instrument.

Internal consistency was established through the piloting process, as described by Converse and Presser (1986) who note that one way to insure consistency is by using "insiders" for the pilot, i.e., professional experts, critical insiders, or borrowing questions from other sources.

In addition, measurement error of the sample was reduced through the two pilot studies. Measurement error reflects the sureness that a true interpretation of the instrument will be indicated (Henderson, Morris, & Fitz-Gibbon, 1978). By correlation of two pilot studies for teachers' responses to the survey, the instrument became a valid measure of the teacher's attitudes for statistical purposes.

Non-response error of the sample was controlled by the researcher distributing and collecting the questionnaire personally within the time frame of one teachers' meeting. Further, the test was administered only by the researcher to minimize administration bias.

External validity was controlled through a large "N" due to the inclusion of seven schools. According to Henderson, Morris, and Fitz-Gibbon (1978), using a large number of teachers for the survey will reduce the possibility of error due to fluctuation of mood, conditions of the administration of the survey, and random effects of respondents who check alternatives without concern for the accuracy of their responses.

Collection of Data

Permission was given by the superintendent's office of the Omaha Public Schools to conduct the survey during the 1992-1993 school year. A systematic cluster sampling of elementary and high schools was conducted in July, 1992, to select the population for the study. In August, 1992, a letter was mailed to the building principals of the five elementary and three high schools that were selected from the random drawing (see Appendix B). Through this letter, the principals were informed about the survey and its purpose, and the researcher requested a time to meet with the staff to complete the survey.

Teachers' meetings for the high schools in the Omaha Public Schools were traditionally conducted for the total staff only in the fall. The researcher attended the fall teachers' meetings at the selected high schools to disseminate the survey and cover letter. The completed surveys were collected at that time.

The elementary schools in the Omaha Public Schools conducted monthly or bimonthly teachers' meetings for their staffs. The researcher attended one of these meetings for each of the five selected elementary schools. The survey was disseminated and collected at that time.

Data were tabulated from the surveys and the appropriate statistical tests were conducted. A return rate of 74 percent appeared to be a sufficient return to test the survey questions and draw conclusions; no further attempt was made to solicit additional returns. Conclusions and recommendations were made from the statistical analysis of the data.

Analysis of Data

Four types of statistical analyses were used to treat the data. Descriptive statistics were employed for the first research question to determine which, if any, critical thinking skills teachers were using in the classroom. Frequency counts, means, and standard deviations were calculated and interpreted.

A t-test was employed for the second research question. This test was used to determine if a significant difference existed in the frequency of use of critical thinking skills between elementary and high school teachers.

Since the number of years that each teacher had taught was ordinal data, a Spearman correlation was calculated for the third research question. The Spearman correlation was used to measure the significant relationship between the teachers' use of critical thinking skills and their longevity in the teaching profession.

A one-way analysis of variance was implemented to determine if there was a significant difference between the teachers' frequency of use of critical thinking skills and their education level. The ANOVA consisted of five levels, correlated to the five educational levels described in the policies and procedures manual of the Omaha Public Schools.

Finally, t-tests were administered to answer the last two research questions. A t-test was administered to determine if a significant difference existed between high school and elementary school teachers in the amount of time spent in the classroom on critical thinking skills tasks. A second t-test was administered to determine if a significant difference existed between

elementary and high school teachers' perceptions of the critical thinking skills necessary for student achievement.

Summary

A rationale for the development of a survey instrument used to conduct a quantitative study of critical thinking skills in selected high schools and elementary schools in the Omaha Public Schools was provided in this chapter. The instrument, entitled "Teaching Styles in the Omaha Public Schools," was distributed to two high schools and five elementary schools. The pilot studies were discussed, and an explanation was given about the dissemination of the survey instrument. Seven questions yielded information regarding the teachers' critical thinking skill activities in the classroom setting, amount of time spent as a public school teacher, education level, and amount of training beyond the bachelor's degree. A description of the population and the collection of data was given. The findings of the survey are presented in Chapter IV.

CHAPTER IV

FINDINGS OF THE STUDY

The purpose of this study was to identify the critical thinking skills inherent in specific teaching methods identified by selected elementary and high school teachers in the Omaha Public Schools. The major objective of the study was to determine if specific characteristics of elementary and high school teachers, such as education level, number of years in teaching, and grade level taught, determined their use of critical thinking skills in the classroom.

To present the data, the chapter is divided into two sections. The statistical results are reported in section one, and a discussion of the findings is presented in section two.

Statistical Results

Research Question One

To what extent do selected elementary and high school teachers use teaching methods which contain critical thinking skills?

The elementary and high school teachers' frequency of use of the critical thinking teaching methods and the percentage of use for each descriptor are shown in Table 4. The means and standard deviations for each teaching method is indicated.

Table 4

Teachers' Frequency of the Use of Critical Thinking Skills, Means, and Standard Deviations

	Always		Often		Sometimes		Rarely		Never			
	No.	%	No.	%	No.	%	No.	%	No.	%	Mean	Standard Deviation
A. In the daily classroom setting how is most of the students' time spent?												
Small-group work	8	3.0	99	39.0	113	45.0	23	9.0	9	4.0	2.29	.819
Partner/ pair	9	4.0	105	42.0	98	39.0	25	10.0	15	6.0	2.27	.910
Discussion	61	24.0	137	54.0	42	17.0	7	3.0	5	2.0	2.96	.836
B. Which skills are necessary for student success?												
Research	35	14.0	88	35.0	86	34.0	32	13.0	11	4.0	2.42	1.020
Problem solving	119	47.0	104	41.0	27	11.0	0	0.0	2	1.0	3.34	.732
Organizing	120	48.0	108	43.0	20	8.0	0	0.0	4	2.0	3.35	.761
Restatement	95	38.0	113	45.0	38	15.0	0	0.0	6	2.0	3.16	.849
Sequencing	53	21.0	117	46.0	72	29.0	7	3.0	3	1.0	2.89	.830
Predicting	56	22.0	122	48.0	54	21.0	10	4.0	10	4.0	2.81	.959
Creating	62	25.0	129	51.0	53	21.0	4	2.0	4	2.0	2.96	.815
Rate/ evaluate	54	21.0	108	43.0	74	29.0	12	5.0	4	2.0	2.78	.892
Compare/ contrast	73	29.0	130	52.0	41	16.0	2	1.0	6	2.0	3.04	.836
Choose/ support	75	30.0	109	43.0	51	20.0	8	3.0	9	4.0	2.93	.973
C. Homework												
Themes	10	4.0	70	28.0	90	36.0	44	17.0	38	15.0	1.88	1.098
Projects	22	9.0	87	35.0	87	35.0	27	11.0	29	12.0	2.19	1.111
D. Tests												
Production	22	9.0	50	20.0	67	27.0	45	18.0	68	27.0	1.66	1.301
Essay	30	12.0	65	26.0	59	23.0	36	14.0	62	25.0	1.85	1.360

Research Question Two

Is there a significant difference in the frequency of use of the critical thinking skills between selected elementary and high school teachers?

A t-test was employed to determine if a significant difference existed in the frequency of use of critical thinking skills between the selected high school and elementary school teachers (see Table 5). No significant difference was found at the 0.05 level.

Table 5

Comparison of Elementary and High School Teachers' Frequency of Use of Critical Thinking Skills

Variable	X	df	t-Value	Two-Tail Probability
Elementary	2.6550			
		250	.63	.528
High School	2.6157			

$p > 0.05$

Research Question Three

Is there a significant relationship between teachers' frequency of use of critical thinking skills and their longevity in the field?

A Spearman correlation was performed to determine the relationship between the teachers' number of years in the teaching profession and their use of critical thinking skills in the classroom. No significant relationship was found between the teachers' frequency of use of critical thinking skills and their length of teaching experience. The results are shown in Table 6.

Table 6

Spearman Correlation of Teachers' Use of Critical Thinking Skills and Length of Teaching Experience

Variable	Correlation	Number	Significance
Higher-order thinking skills	.0105	235	.436
Lower-order thinking skills	.0005	235	.497

$p > .05$

Research Question Four

Is there a significant relationship between teachers' frequency of use of critical thinking skills and their education level?

A one-way analysis of variance was used to determine if a significant difference existed between the teachers' frequency of use of critical thinking skills and their education level. The educational level distribution for the teachers is shown in Table 2, Chapter III. The education level distribution for the five levels of advanced degrees described in the policies and procedures manual of the Omaha Public Schools is shown in Table 7.

Table 7

Frequencies, Means, and Standard Deviations of the Teachers' Education Level as Described in the Policies and Procedures Manual of the Omaha Public Schools

Education Level	Number	Mean	Standard Deviation
Bachelor of Arts	77	2.66	.4845
Bachelor of Arts + 18	44	2.60	.4313
Master of Arts	98	2.64	.5008
Master of Arts + 30	29	2.63	.4271
Ph.D. or Ed.D.	4	2.84	.2647
Total	252	2.63	.4712

The results of the analysis of variance are shown in Table 8. No significant difference at the .05 level was found between the elementary and high school teachers' total scores (F = .9086).

Research Question Five

Is there a significant difference between the amount of time elementary and high school teachers spend on critical thinking skills in the classroom setting?

Table 8

Analysis of Variance of the Relationship Between Teachers' Use of Critical Thinking Skills and Their Education Level

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	F Probability
Between	4	.2261	.0565		
				.2515	.9086
Within	247	55.5064	.2247		
Total	251	55.7325			

$p > 0.05$

A t-test was used to determine if a significant difference existed between elementary and high school teachers' amount of time spent on critical thinking skills in the classroom setting. As seen in Table 9, a significant difference at the .05 level was found between the amount of time spent on critical thinking skills by elementary and high school teachers.

Research Question Six

Is there a significant difference between elementary and high school teachers' perceptions of those critical thinking skills necessary for student success?

A t-test was used to determine if a significant difference existed between elementary and high school teachers' perceptions of the critical

Table 9

Comparison of the Elementary and High School Teachers' Amount of Time Spent on Critical Thinking Skills in the Classroom Setting

Variable	X	Standard Deviation	Number of Cases	t-Value	df	Two-Tail Probability
Elementary	2.81	.487	89			
				5.86	250	.000*
High School	2.35	.674	163			

$p < 0.05$

thinking skills necessary for student achievement. No significant difference was found at the 0.05 level. The results are shown in Table 10.

Discussion of the Findings

The findings of this study are examined in relation to the six specific questions addressed.

Research Question One

The data on the teachers' frequency of use of critical thinking skills inherent in selected teaching methods are shown in Table 3. In addition, the means and standard deviations for the use of each teaching method is

Table 10

Comparison of Elementary and High School Teachers' Perceptions of Critical Thinking Skills Necessary for Student Achievement

Variable	X	Standard Deviation	Number of Cases	t-Value	df	Two-Tail Probability
Elementary	3.00	.520	89			
				.34	250	.738
High School	2.97	.608	163			

$p > 0.05$

indicated. The overall mean for the elementary and high school teachers' frequency of use of critical thinking skills was 2.633. The elementary and high school teachers used teaching methods which contained critical-thinking skills more than half of the time in their teaching methods. Certain skills reported by the teachers had a high frequency of use, with a mean slightly higher than "often" (3.0). These skills included comparing/contrasting (3.030), restating (3.155), problem solving (3.341), and organizing (3.349). Three of the critical-thinking methods described in the survey were "rarely" used by the teachers in the classroom. These methods included the use of themes as a homework tool (1.881), essay-type tests (1.861), and development of a product as an assessment tool (1.655).

Research Question Two

No significant difference was found in the frequency of use of critical thinking skills between elementary and high school teachers; however, the mean for the high school teachers' use of lower-order thinking skills (2.5518) was slightly higher than the elementary teachers' mean (2.3265). High school teachers used more lower-order thinking skills than did elementary school teachers (see Table 11).

Table 11

Comparison of Elementary and High School Teachers' Frequency of Use of Lower-Order Thinking Skills

Variable	X	df	t-Value	Two-Tail Probability
Elementary	2.3265			
		250	-4.03	.000*
High School	2.5518			

$p < 0.05$

Research Question Three

No significant relationship existed between the teachers' number of years in the teaching profession and their use of critical thinking skills in the classroom. Research question three, concerning the teachers' number of

years in the teaching profession, and research question four, concerning their education level, appeared to be related. The longer a teacher was in the profession, the greater the possibility that a post-graduate degree had been attained. Because of post-graduate classes, a greater possibility should have existed that the teacher had received training in the use of teaching methods about critical thinking. Although teachers may have been in the profession for a long time and received advanced degrees, the subjects in this study did not appear to make greater use of critical thinking skills in their teaching methods.

Research Question Four

No significant difference existed between the teachers' frequency of use of critical thinking skills and their education level. In other words, the advanced education a teacher received did not significantly determine an increase in the use of critical thinking skills within the classroom.

A mean difference, however, existed in the frequency of the use of critical thinking skills between the bachelor's and master's levels and the Ed.D/Ph.D. level. Considering the small number of respondents in the Ed.D/Ph.D. level (4) the means (2.6 for the first four levels and 2.84 for the Ed.D./Ph.D. level) suggest a possibility of significance if additional respondents with Ph.D.s/Ed.D.s were added.

Research Question Five

A significant difference existed between the amount of time elementary and high school teachers spent on critical thinking skills in the

classroom setting. Elementary school teachers used critical thinking skills in the classroom setting more than high school teachers.

Research Question Six

No significant difference existed between elementary and high school teachers' perceptions of the critical thinking skills necessary for student achievement. However, when both the elementary and high school teachers indicated the skills they determined necessary for student achievement, the teaching methods with inherent critical-level thinking skills were found to be important to these teachers ("always" or "often") an average of 74 percent of the time.

Summary

The statistical results for this study and a discussion of the findings were presented in this chapter. The results of the study were:

1. No significant difference was found at the 0.05 level in the frequency of use of critical thinking skills between the selected high school and elementary school teachers in the Omaha Public Schools.

2. No significant relationship existed between Omaha Public School teachers' frequency of use of critical thinking skills and their length of teaching experience.

3. No significant difference was found between the teachers' frequency of use of critical thinking skills and their education level.

4. A significant difference existed between the amount of time elementary and high school teachers spent on critical thinking skills in the classroom setting.

5. No significant difference was found between elementary and high school teachers' perceptions of the critical thinking skills necessary for student achievement.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to identify the extent to which critical thinking skills were used in the Omaha Public Schools and to determine if there was a significant difference between high school and elementary school teachers and their use of critical thinking skills teaching methods. From the findings of the study, recommendations have been made relative to assisting teachers and administrators in the integration of critical thinking skills into the teaching methods of teachers in the Omaha Public Schools.

Research Questions

1. To what extent do selected elementary and high school teachers use teaching methods which contain critical thinking skills?

2. Is there a significant difference in the frequency of use of these critical thinking skills between elementary and high school teachers?

3. Is there a significant relationship between teachers' frequency of the use of critical thinking skills and their longevity in the field?

4. Is there a significant relationship between teachers' frequency of the use of critical thinking skills and their education level?

5. Is there a significant difference between the amount of time elementary and high school teachers spend on critical thinking skills in the classroom setting?

6. Is there a significant difference between elementary and high school teachers' perceptions of those critical thinking skills necessary for student success?

A review of literature pertaining to the definition of critical thinking and its use in the classroom was presented in Chapter II. In addition, literature concerning differences between elementary and high school teachers according to their number of years in teaching, their education level, and the grade level taught was discussed. Through the survey of literature, the following issues emerged:

1. Researchers have indicated the lack of a common definition for critical thinking.

2. According to the literature, there has been insufficient teacher training in critical thinking.

3. Critical thinking should be inculcated in all areas of the curriculum and at all grade levels.

4. A relationship exists between an educator's length of service and certain behaviors which influence the use of critical thinking skills in the classroom.

The instrument used for this study was a survey entitled, "Teaching Styles in the Omaha Public Schools." The purpose of the instrument was to allow teachers to identify those teaching methods they regularly used in their classroom. The teaching methods were designated as lower-order or critical-thinking, using the descriptors formulated by such researchers as Bloom (1956), Ennis (1985), Grant (1988), Kruise (1987), Rowland-Dunn (1989), and Stiggins, Rubel, and Quellmalz (1986).

In addition, the teachers reported demographic information concerning their education level, number of years they had taught, and the grade level they were currently teaching. A random sample of two high schools and five elementary schools was selected. The survey was administered to 341 high school and elementary school teachers at seven schools in the Omaha Public Schools in the fall of 1992. A response rate of 74 percent was obtained.

Because of the purpose of the study and the specific research questions that were posed, a quantitative design was selected. Data from the survey were collected and tabulated. Frequency distributions, percentages, standard deviations, and mean scores were calculated to determine the frequency of use of critical thinking skills by elementary and high school teachers. Independent t-tests were used to determine significant differences between the teachers' use of critical thinking skills and the grade level taught, elementary and high school teachers' perceptions of the critical thinking skills necessary for student success, and the amount of time spent on critical thinking skills activities in the classroom by elementary and high school teachers. The differences between the groups, as well as the differences within the groups, were measured by ANOVA procedures. In addition, a Spearman correlation was tabulated to determine the relationship between the teachers' number of years in the teaching profession and their use of critical thinking skills in the classroom.

Findings

1. The elementary and high school teachers' frequency and percentage of use of critical-thinking teaching methods was determined by examining research question one. The overall mean for the Omaha Public School elementary and high school teachers' frequency of use of critical thinking skills was 2.633. Omaha Public School elementary and high school teachers used teaching methods which contained critical-thinking skills more than half (2.50) of the time in their teaching methods.

2. No significant difference was found at the 0.05 level in the frequency of use of critical thinking skills between the selected Omaha Public School high school and elementary teachers.

3. No significant relationship existed between the Omaha Public School teachers' frequency of use of critical thinking skills and their length of teaching experience.

4. No significant difference was found between the teachers' frequency of use of critical thinking skills and their education level.

5. A significant difference existed between the amount of time elementary and high school teachers spent on critical skills in the classroom setting. Elementary school teachers spent more time using critical thinking skills in the classroom setting than high school teachers.

6. No significant difference was found between elementary and high school teachers' perceptions of the critical thinking skills necessary for student achievement.

Research Question 1. The results of research question one indicated the extent to which critical thinking skills were used in the Omaha Public

Schools. According to the survey, Omaha Public School elementary and high school teachers used teaching methods which contained critical thinking skills more than half (2.50) of the time in their teaching methods.

Research Question 2. There was no significant difference in the frequency of use of critical thinking skills between the selected Omaha Public School high school and elementary teachers. Possible explanations for the lack of a significant difference include the possibility that a high proportion of the Omaha Public School teachers went to the same college and received similar training. In addition, by going to the same institution, high school and elementary teachers may have been in the same history and philosophy or educational psychology classes, which would tend to lessen the difference. Further, the possibility existed that colleges or universities traditionally did not teach or stress the importance of critical thinking skills. District-sponsored staff development training for all teachers, regardless of grade level taught, should also be considered.

Research Question 3. There was no significant relationship between the Omaha Public School teachers' frequency of use of critical thinking skills and their length of teaching experience. This supported Kaiser's (1982) findings that teachers in their classrooms tend to become comfortable in their particular teaching style and do not easily change. Another explanation for finding no significant relationship, as found in Pearce and Loyd's (1987) research, is the emphasis beginning teachers place on teaching behaviors rather than critical skills, while experienced teachers concentrate on improving those skills previously learned.

Research Question 4. When research question four was examined, no significant difference was found between the teachers' frequency of use of critical thinking skills and their education level. Possible explanations include Ruggiero's (1988) findings on the lack of emphasis on critical thinking skills in teacher-training classes. Robinson (1987), in his research, expanded this lack of training to post-graduate seminars, classes, and inservices.

Research Question 5. A significant difference existed between the amount of time elementary and high school teachers spent on critical thinking skills in the classroom setting. Elementary school teachers used critical thinking skills in the classroom setting more than high school teachers. This discrepancy might have occurred because of differences in the methods classes of high school and elementary teachers. Also, class size is usually greater in the high school than in elementary school, which could significantly alter teaching methods. As class size becomes larger, it becomes more difficult for teachers to help students independently. In addition, with the greater number of students traditionally found in a high school class, paper work increases; daily assignments that are critical thinking in nature are not as quickly or easily graded as lower-order short answer assignments. Further, it is easier to assess advanced high school subject matter through lower-order means, such as true-false or multiple-choice tests.

Child development must be taken into account as a possible explanation for the difference between the amount of time spent by elementary and high school teachers on critical thinking skills in the

classroom setting. A greater emphasis is traditionally placed on child development in elementary methods classes than in high school methods classes. Elementary teachers are expected to be well-versed in a variety of instructional strategies, learning styles, and means of assessment, whereas the focus for high school teachers is on content/subject matter knowledge. Maturity of the child can significantly alter teaching methods, such as the hands-on approach found in elementary schools, while lecture-type teaching is more appropriate in high school.

The make-up of elementary and high school classrooms may also determine a difference in the amount of time spent on critical thinking skills. Elementary teachers teach the same students throughout the day, whereas, in high school, classes change each period. Thus, elementary teachers are able to apply thinking skills across subject matter, as well as involving the students in a variety of small group and partner activities.

Research Question 6. When research question six was examined, no significant difference was found between elementary and high school teachers' perceptions of the critical thinking skills necessary for student achievement. A possible explanation for this lack of difference is similar to those explanations found in the section addressing research question two; similar teacher education training in the same institutions would tend to lead to similar attitudes and perceptions.

Conclusions

Based upon the findings from the survey, the following conclusions are drawn for this study:

1. The elementary and high school teachers in the Omaha Public Schools reported using critical thinking skills in their teaching methods in the classroom to varying extents.

2. Elementary school teachers reported spending more time using critical thinking skills in the classroom setting than high school teachers.

3. The educational background and length of service in education did not determine the teachers' use of critical thinking methods in the classroom.

4. Elementary and high school teachers perceived those critical thinking skills necessary for student success in a like manner.

Recommendations

The following recommendations, based on the findings and conclusions of this study, are set forth.

1. Teachers should increase instructional and curricular emphasis of critical thinking skills at all grade levels. Educators must rethink their teaching roles and methods and concentrate on helping students develop the skills vital to an information society. Teachers must continually plan and implement instruction with critical thinking skills as a priority.

2. Teacher education classes, graduate level classes, and teacher inservices should prepare teachers to be proficient in the teaching and use of critical thinking skills. The importance of critical thinking as a tool must be

taught and used in the general curriculum of the public schools. While many educators and administrators value critical thinking and use methods that encourage its development, a number of researchers have indicated these educators do not represent the norm. A greater awareness of this need to teach critical thinking skills should be promoted at all grade levels.

3. Only the identification and implementation of critical thinking skills have been dealt with in this study. Researchers should continue to investigate the assessment of critical thinking skills. Currently, assessment focuses primarily on specialized tests or within-subject matter tests. Most often, these tests are in a multiple-choice or true-false format, with an emphasis on specific, isolated skills. If students and teachers are to knowledgeably use and feel comfortable with the information they process, a clear and reliable assessment of critical thinking skills must be developed that is focused on skills rather than recall.

4. An examination should be made of the educational objectives school districts have adopted for their staff to implement into the classrooms. Often these objectives are based on the critical thinking skills taxonomy developed by Bloom (1956). An update of these objectives might be beneficial.

5. This survey was developed as a quantitative study to determine the extent of the use of critical thinking skills in the Omaha Public Schools. There are several qualitative aspects of critical thinking that could be addressed in further study, such as teachers' perceptions concerning critical thinking. Observation of teachers in the classroom to determine not only what critical thinking skills are used but also how they are implemented

would be of interest. Interviews of teachers would yield further data on critical thinking and its use. In addition, it might be of interest to conduct a longitudinal study of students who received extensive training of critical thinking skills as they enter the work force.

There are several reasons for the recent interest in improving students' critical thinking skills. First, several researchers have documented the fact that many students lack critical thinking abilities. Second, thinking skills instruction--as opposed to instruction that is rote memorization, drill, and repetition--will promote excitement and enthusiasm in the classroom, resulting in areas of overall student achievement. Perhaps most importantly, thinking skills are viewed as crucial for future-thinking persons to cope with a rapidly changing world. Many educators believe that specific knowledge will not be as important in the future as the ability to learn and interpret new information.

It is hoped that the findings presented in this paper will be useful to educators, administrators, and others interested in the future of critical thinking skills and students who think critically.

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APPENDIX A

Cover Letter and Survey

Spring Lake Elementary
4215 South 20th St.
Omaha, NE 68107
August 20, 1992

Dear Colleague:

Today, educators need to be actors. Our classrooms must compete for student attention with television, Nintendo, and the movies. Many of you in the district have found a way to incorporate a variety of methods leading to successful education. This survey is designed to compile those methods, to determine why our district's standardized test scores consistently go up!

Your school was selected at random from a list of elementary and high schools to complete this questionnaire. You can be absolutely certain that all of the information you provide will be strictly confidential. Your school will be identified through a code number only to differentiate elementary and high schools; no individual teacher can be identified. Your responses will be combined with those of other teachers in elementary or high school for statistical purposes only. The questionnaire has been designed so that you can complete it quickly and easily in approximately ten minutes by circling or writing down a number.

The value of this study will be determined by the number of you who respond and by the accuracy of your responses. If you would like a compilation of these learning styles, please feel free to write your name and address on a separate piece of paper and place it in the school mail envelope along with the completed surveys. The compilation should be returned to you in four to six weeks.

Please complete the form and return it by September 1, 1992. A return envelope has been provided for you to send through school mail. If you have any questions about the survey, please call me at Spring Lake, 978-7180. Again, thank you for your help.

Sincerely,

Cathy Christensen

Teaching Styles in the Omaha Public Schools

Please remember: The purpose of this survey is to compile the great variety of methods teachers use in their classroom that lead to successful education. This information is confidential and for statistical purposes only.

Using this scale, please circle your answer in the areas below:
4=Always 3=Often 2=Sometimes 1=Rarely 0=Never

A. In your daily classroom setting, how is most of your students' time spent?

	A	O	S	R	N
1. Small group work	4	3	2	1	0
2. Partner/pair activities	4	3	2	1	0
3. Lecture/listening activities	4	3	2	1	0
4. Worksheets	4	3	2	1	0
5. Reading	4	3	2	1	0
6. Hands-on activities: experiments, creating,demonstrations, singing, role-playing	4	3	2	1	0
7. Discussion	4	3	2	1	0
8. On computers,graphic calculators, or other equipment	4	3	2	1	0
9. Other_____	4	3	2	1	0

B. In your classroom, which skills do you feel are necessary for student achievement?

	A	O	S	R	N
1. Research skills	4	3	2	1	0
2. Memorization skills	4	3	2	1	0
3. Note taking	4	3	2	1	0
4. Problem solving	4	3	2	1	0
5.Organizing	4	3	2	1	0
6. Interpretation or restatement of information	4	3	2	1	0
7.Sequencing	4	3	2	1	0
8.Predicting	4	3	2	1	0
9.Other_____	4	3	2	1	0

Please continue on next page...

4=Always 3=Often 2=Sometimes 1=Rarely 0=Never

C. In your classroom, which aptitudes do you feel are necessary for student success?

	A	O	S	R	N
The ability to:					
1. Define, describe, or explain	4	3	2	1	0
2. Apply what has been learned to new situations	4	3	2	1	0
3.Construct or create	4	3	2	1	0
4. Rate, evaluate or assess	4	3	2	1	0
5. Translate, interpret	4	3	2	1	0
6. Compare, contrast, transfer or expand information	4	3	2	1	0
7. Identify from a diagram, drawing or chart	4	3	2	1	0
8. Choose and support their choice	4	3	2	1	0
9. Other_____	4	3	2	1	0

D.How would you describe your average daily homework assignments?

	A	O	S	R	N
1. Reviews or short reports	4	3	2	1	0
2. Question/answer from the text, dittos, overhead, chalkboard, workbook	4	3	2	1	0
3. Themes, projects	4	3	2	1	0
4. Readings	4	3	2	1	0
5. In-class projects or experiments	4	3	2	1	0
6. Other_____	4	3	2	1	0

E. What type of tests do you give?

	A	O	S	R	N
1. Production	4	3	2	1	0
2. True-false	4	3	2	1	0
3. Multiple choice, matching	4	3	2	1	0
4. Essay	4	3	2	1	0
5. Short answer/fill-in-the-blank	4	3	2	1	0
6. Application of learned knowledge	4	3	2	1	0
7. Other_____	4	3	2	1	0

Please continue on the next page...

F. Information about you:

1. Current teaching level:
_____Elementary (Kindergarten through six)
_____High School (Nine through twelve)

2. How many years have you taught full time? (Please count Omaha Public School and any other *public* schools only). Include the current year as one year and round up to the nearest year, please:_____

3. What is your education level, according to Omaha Public Schools guidelines:
_____B.A./B.S.
_____B.A./B.S. plus 18
_____M.A./M.S.
_____M.A./M.S. plus 30
_____Ed.D./ Ph.D.

As soon as you are finished, please place this in the envelope provided and send it immediately through **inter-school-mail** to:

Cathy Christensen
c/o Spring Lake Elementary
4215 South 20th Street
Omaha, NE 68107
(402) 978-7180

Thank you for your help; it is greatly appreciated!

APPENDIX B

Letter to Principals

10327 Sunburst Circle
Omaha, NE 68134
August 11, 1992

Dear Mrs. Epstein,

This fall as a teacher with the Omaha Public Schools, I am thinking about beginnings; as a doctoral student at the University of Nebraska, Lincoln, I am also thinking about endings. I am currently near the end of my studies for my Doctor of Education; for my dissertation I would like to survey your teachers concerning their various teaching styles. I have enclosed a copy of the permission letter from Dr. Young, as well as a copy of the survey and cover letter.

Answering the survey should take the teachers no more than ten minutes. I understand the time limitations at the beginning of the school year; however, in order for the survey to be statistically accurate, I would like as great a response as possible. I would appreciate it if I could either take ten minutes of your staffs' time during an all-staff meeting August 20-25, or request that your curriculum specialists disseminate and collect the questionnaire at one of their meetings during the same time frame.

Thank you for your help with this project. I will call you early next week to see if one of these options is acceptable, or if you wish to suggest an alternate means for implementing the survey.

Sincerely,

Cathy Christensen