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A Survey of Teaching Strategies Used in California Community College Nursing Programs to Foster Critical Thinking

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A SURVEY OF TEACHING STRATEGIES USED IN CALIFORNIA COMMUNITY COLLEGE NURSING PROGRAMS TO FOSTER CRITICAL THINKING

by

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This study explicated critical thinking teaching strategies being utilized by California Associate Degree Nursing (ADN) faculty, and their perceived effectiveness, to serve as a model for faculties in nursing and other disciplines. Questions addressed by the study included not only teaching strategies in use and their perceived effectiveness, but also exploration of common threads among nursing educators in their definitions of critical thinking, and common themes of "especially effective" techniques.

The study involved a pilot of the survey instrument, utilizing one sample school's nursing faculty, with subsequent distribution to all 69 other ADN program senior nursing course lead faculty. The instrument included demographic school and personal faculty data; closed-form, Likert-scale questions on critical thinking teaching strategies and their perceived effectiveness; and an open-form question requesting a narrative description of an "especially effective" teaching strategy that had been

implemented. Respondents were also asked to articulate a definition of critical thinking. A 70% return rate was obtained, utilizing follow-up letters and phone calls. The typical respondent was female, 41 to 50 years of age, with 11 to 20 years of experience in teaching nursing.

Study results showed that a common definition of critical thinking did not exist among sample respondents, although five major threads could be identified. Respondents defined the concept of critical thinking through one or more of the following lenses: (1) problem-solving (nursing process); (2) Bloom's taxonomy of higher-order thinking skills; (3) reasoning (or informal logic); (4) reflection, imagining alternatives, challenging beliefs, and creativity; and (5) thinking about thinking, interpreting meaning, and metacognition.

Critical thinking teaching strategies used most often, and perceived as very effective by faculty, included brainstorming, use of case studies, class or small group discussion, inductive reasoning techniques, scenarios or role play, written reports, self-study exercises, and teacher role modeling. Narrative descriptions from respondents' teaching experience fell generally into the categories of case studies, class or small group discussion, scenarios or role play, written reports, inductive reasoning techniques, brainstorming, and panel discussions.

The dominant theme that emerged from the data was the use of case studies. Study results display 22 exemplars of

actual teaching strategies that have been implemented by nurse educator respondents, including their commentaries. Discussion and implications of research findings and recommendations for further study are provided.

DEDICATION

This study is dedicated to Cayden Chance with the hope that through this research and my living each day as a critical thinker, I will role model for him to constantly question and search for truth, morality, and a higher social consciousness, both for ourselves and future generations.

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CHAPTER 1

Statement of the Problem

Introduction

The need for critical thinking components in educational programs has been emphasized in the literature for years. But what is critical thinking? When is thinking "critical" rather than just thinking? Even if the process of critical thinking is understood, how does the higher education faculty member promote critical thinking in college-level students?

The Issue

"Being in favor of critical thinking is like being in favor of freedom, justice, or a clean environment" (McPeck, 1981, p. 1). However, the need for critical thinking in today's world is readily apparent. Stephen Brookfield (1987) emphasized the worth of critical thinking in maintaining a healthy democracy. He cited Glaser (1985), stating, "Societies in which citizens scrutinize critically the actions, decisions, and justifications of political leaders will be ones in which the dangers of totalitarianism and demagoguery are substantially reduced" (p. 43). Dale (1972) reported, "Former Harvard president Nathan M. Pusey has said that the job of the university is 'to educate free, independent, and vigorous minds, capable of analyzing events, of exercising judgment, of distinguishing facts from propaganda and truth from half-truth and lies.' He is

talking about critical thinking, a central task of the school from kindergarten through graduate school." (p. 63).

Smith (1990) described the role critical thinking plays in shaping and reframing values and cultural beliefs. He wrote,

> Why do some cultures elevate the role of women and others demean it? Why do different groups take differing views on abortion, sex, child labor, material wealth, education, and respect for all people, for all animals, for the entire world? Economics or power may have been at the beginning of some or all of these attitudes, but they are perpetuated by stories. They are believed, and held to be natural and right, simply because they make sense to people; it is what they think.
>
> The great problems of the world today -- political, environmental, social, and economic -- are not due to lack of facts, and probably not to lack of thought either. They reflect the values of people and governments, the stories they believe. There will be no solutions if we constantly wait for new skills and knowledge; what is required is an ability to recognize and understand the stories that are currently being played out, their consequences, and how they might be changed, in ourselves and others. (p. 132)

As both the structure and concept of church, family, community, and civic responsibility undergo rapid, extensive change, the importance of critical thinking is intensified. "Making sense of, and trying to feel some sense of control over [such] changes is central to becoming critically thoughtful" (Brookfield, 1987, p. 51). Richard Paul (1992) further noted, "An open society requires open minds. Collectively reinforced egocentric and sociocentric thought, conjoined with massive technical knowledge and power, are not the foundations for a genuine democracy." (p. 180)

Mezirow (1983) also agreed, stating, "the focal concern of adult learning, especially in our culture with its high intensity of change, is with reordering one's life when dislocations occur and inherited recipes for problem-solving do not seem to work" (p. 1). Brookfield (1987) noted the societal expectation that adults be able to reflect critically on the truth of general rules taught to them in childhood.

Kretovics (1985) pointed out the need to develop critical literacy in people so that they have "the necessary tools and skills to make sense of the social relations, material conditions, and cultural milieus in which they exist and their relationship to the wider society and dominant rationality" (p. 56). As Grant (1988) described,

> The secondary school is currently the only social institution specifically designed to develop these

> cognitive skills in adolescents. If higher order thinking is not promoted in the course of learning to read, compose, and calculate, a student may never have an opportunity to move beyond the literal interpretation of information. No other social organization -- not the peer group, the family, religion, or the work site -- requires analytical thought in any sort of systematic manner. Thus, if reasoning is not expected as a part of secondary classroom activities, it may never be developed. (p. 3)

Meyers (1986) added that the need for critical thinking "is particularly acute today when our culture's output of information far exceeds our ability to think critically about that information" (p. xi). Brookfield (1987) cited Schein (1985), stating,

> A factory or business in which a critically informed work force is encouraged to examine the assumptions underlying policies and habitual practices, and to challenge these when they are inimical to communication or demeaning to particular groups, will likely be more productive and less subject to crippling stoppages (p. 43).

Siegel (1988) described four reasons for justifying the educational ideal of critical thinking: (1) respect for students as persons, (2) self-sufficiency and preparation for adulthood, (3) initiation into the rational traditions,

and (4) preparation for citizenry in a democratic society. The need for critical thinking to improve problem-solving and decision-making in college graduates entering business and the professions has been described by Ruggiero (1988b). In particular, he stressed the even greater need for critical thinking instruction in colleges today in response to the societal trend in the sixties and seventies to reject intellectualism. As Norris (1985) noted,

> ...critical thinking is not just another educational option. Rather it is an indispensable part of education, because being able to think critically is a necessary condition for being educated, and because teaching with the spirit of critical thinking is the only way to satisfy the moral injunction of respect for individuals which must apply to students as well as to anyone else. According to this reasoning, students have a moral right to teaching that embodies the spirit of critical thinking and a moral right to be taught how to think critically. Thus, to abide by the moral principle of respect for person, teachers must recognize 'the student's right to question, to challenge, and to demand reasons and justifications for what is being taught' (Siegel, 1980, p. 14). In addition, there is a responsibility to teach them to do

> these things well, because in the end students must choose for themselves: there is no escaping this truth (p. 40).

Curriculum models, textbooks, resource manuals, instructional media, and other educational materials at the secondary level frequently stress the need for critical thinking in developing the minds of our youth (Costa, 1985). In Playgrounds of Our Minds, Barell (1990) wrote that we must create an environment where children can "play" in their minds. Through imagination, creativity, and novelty new realities emerge and background assumptions are reshaped. The notion of "what is" and "what can be" can thereby be dynamic and continually evolving. Munnich (1990) added that current curriculum in schools is relativistic and based on the "tradition" of white, male Western dominance. She advocated including the "different voice" (described by Gilligan, 1982) of not only women, but also various cultures and races in structuring curriculum, writing texts, and designing learning activities. Critical thinking during both the creation and reshaping of background assumptions in our youth can only take place in an environment of such "alternative traditions."

Educational materials, resources, and teaching strategy exemplars for the adult population at the postsecondary level, as opposed to the secondary level, however, are much less plentiful. Literature on critical thinking itself

appears in works in the philosophy and psychology domains. Additionally, critical thinking appears to some degree in education literature aimed at reading, writing, and computational skills. A paucity of instructional methods and teaching strategy exemplars exists, however, across academic and vocational disciplines, with even fewer in the latter. And yet, in a high tech communication society (Naisbitt, 1990) in a global community (Harman, 1979) critical thinking in these disciplines at the college level is imperative.

"Critical thinking involves the ability to raise powerful questions about what's being read, viewed or listened to" (Adams and Hamm, 1990, p. 39). Failure to develop thinking skills impedes the ability to continue to learn as adult workers (Wurman, 1989). Adams and Hamm (1990) stressed the need for both critical thinking and collaboration in a democratic society in order to balance reason, individualism, and community. The lifelong tasks of thinking and learning are especially critical in the global positioning of countries in an era of international competition and continuous, rapid, technological and sociological change.

Catterall (1988) described the importance of noting societal economic trends. The current shift away from manufacturing to focus on information and services means that society is decreasing its dependence on the human hand

and increasing its dependence on the human brain. Tucker (1988) emphasized the need for increasing our students' capacity for higher-order thinking to assimilate complex information, solve problems, and engage in lifelong learning.

McTighe and Schollenberger (1985) emphasized the importance of fostering critical thinking skills in students who will join an "information age" work force. They described the extraordinary rate of emerging knowledge and the brief time in which such information becomes obsolete. Rubinstein and Firstenberg (1987) noted further the increasing demand for critical thinking skills as our technology advances. They stated,

> As the computer increasingly assumes programmable functions, an increasing share of human thinking and problem solving must shift to nonprogrammable activities. These activities include the finding of appropriate problems, the identification of goals in the context of human values, the use of strategies in the acquisition of information that enhance retrieval, the representation of problems and the construction of models from complementary points of view or frames of reference, and the identification of reasonable goals and answers that will do when the 'best' answer cannot be obtained within a reasonable time at the cost of reasonable effort or when it cannot be recognized when

> attained. These nonprogrammable activities require ...attitudes and heuristic guides.... It is true that problems cannot be solved without a knowledge base. But, it is difficult to envision the specific knowledge that will be required in the future. Therefore, the goal of problem-solving education should be to develop tools for thinking that will constitute a shell or framework of action procedures that can be applied on an ever-changing data base. These tools come in the form of heuristics that can be modified and adapted to new situations when appropriate and that can be transferred from one area to another. (p. 34)

Increasing interest in and attention to the need for critical thinking in college level courses became apparent in California in the late 1980s as Assembly Bill 1725 (known as the Educational Reform Act), under the leadership of the Statewide Academic Senate, was passed and entered into state law in 1987. The bill mandated educational reform and demanded accountability in the community colleges. A Master Plan Commission for Higher Education was formed, whose report recommended a strengthening of academic standards via revisions of Title V of the California Education Code. One major revision was the requiring of a "critical thinking component" in every community college course where units are granted toward the associate degree or for transfer into a four year institution.

Over the past four years, to meet the Title V requirement, faculty in California's community colleges have both articulated in writing those methodologies already in use for critical thinking in their courses, and sought resources for developing the course component in those courses where it was absent. Such resources, however, as previously discussed, have been limited and often designed for children at the secondary education level.

In the discipline of nursing, the need for critical thinking in new graduates entering the field has been described by Bandman and Bandman (1988):

> By defining the conditions under which sound and valid conclusions are drawn, critical thinking facilitates the use of the nursing process. Critical thinking is a liberating force in all human thoughtful activity, but especially to nurses.... Nursing is in a state of change; active in defining its theory, practice and social mandate and critical toward its current status. The nursing profession is experiencing distress and pressure from within and without regarding its purposes, educational preparation, practice, roles, theory, research, and in its relation to medicine. This is, therefore, an auspicious time in which to use cannons of critical thinking and logic to inquire openly into the assumptions, beliefs, goals, and values that characterize nursing. (pp. 1-2)

Purpose of the Study

The purpose of this study was to explicate postsecondary critical thinking instructional techniques being used by faculty in the discipline of nursing at the associate degree level to serve as a model for other disciplines. Teaching strategies employed in California Associate Degree Nursing (ADN) programs perceived by faculty as effective in fostering critical thinking in students were examined. Questions addressed by the study were the following:

1. Are there common threads among nursing educators in their definition of critical thinking?
2. Do nursing faculty utilize critical thinking teaching strategies in senior courses and, if so, were they used prior to AB 1725, or have they been added as a result of AB 1725?
3. What critical thinking teaching strategies are being utilized by lead nursing faculty in senior courses and how do they perceive the effectiveness of such techniques?
4. What common themes emerge as lead nursing faculty in senior courses reflect on and describe teaching strategies they feel have been "especially effective in fostering critical thinking in nursing students?"

The study's results, including exemplars, serve as a resource for college faculty in both nursing and other disciplines as they search for methods to foster critical thinking in their college level students.

Assumptions and Limitations

A major assumption of the study was that nursing educators had some notion of the construct of critical thinking. No background information was given when asking faculty to articulate a definition of critical thinking. Nor was any definition or description of critical thinking teaching strategies provided as faculty were asked to identify those techniques they were using, to indicate their perceived effectiveness of each, and to provide a detailed narrative of one they found "especially effective." Although this approach was purposeful, in order to allow the participants to reflect on the concept of critical thinking without subjecting them to the researcher's bias, it did cause some study limitations. The faculty member's own perception and description of critical thinking influenced their responses on the survey instrument. For example, the meaning of "case studies" may differ from one individual to another. Also, responses by faculty on their perception of effectiveness of various teaching strategies do not necessarily indicate such techniques' actual effectiveness, only the teacher's perception of their effectiveness.

The study also assumed that the ADN faculty participants, as community college faculty, would be familiar with AB 1725, a piece of legislation which greatly effected all faculty at this level of education, throughout all regions of the state.

Lastly, the study was limited by the fact that its sample, although inclusive of the entire population of California ADN programs (N = 69), was confined to one discipline (i.e. nursing), in one educational level (i.e. associate degree), in one state in the United States. Though limited in its generalizability, the study makes an important contribution to the literature, providing actual teaching strategy exemplars and generating questions for further research.

Definition of Terms

AB 1725: California Assembly Bill, also known as the Educational Reform Act, passed into law in 1987, one aspect of which was to require a critical thinking component in each college level credit course in California community colleges.

Associate Degree Nursing (ADN) Program: A two year program in registered nursing which leads to the associate degree and provides the educational preparation for application to take the National Council Licensing Examination for Registered Nursing (NCLEX-RN).

Critical thinking: The examination and exploration of statements, problems, issues, beliefs, and social constructs through reflection, reasoning, and imagining, resulting in their affirmation or reconstruction and requiring active involvement of generative and metacognitive thought processes. (Refer to Chapter Two for further explication of this definition.)

Critical thinking teaching strategy: An instructional technique whose purpose is to cause the learner to employ critical thinking in the contexts of both the discipline and the learner's own biopsychosocial, ethnocultural, spiritual and ethical being.

Senior nursing course: That course in the last term of the program, prior to graduation, where leadership content is included.

Senior nursing course lead instructor: That faculty member so designated by the ADN program director, as approved by the California Board of Registered Nursing.

Summary

The need for critical thinking in today's society is apparent as individuals strive to understand, assimilate, and participate in decision making in a rapidly changing global community. The integration of critical thinking into the secondary education system has been a primary goal in our schools.

A similar thrust at the postsecondary level, among adult college students, has been less intense. Resources for college educators remain sparse and often not applicable to their adult population or specific discipline. A recent effort has been made in California however, for educational reform in the passing of AB 1725 in 1987. One aspect of the bill, known as the Educational Reform Act, was to require the incorporation of a critical thinking component into all college level community college courses.

This study surveyed postsecondary critical thinking instructional techniques utilized by faculty in senior courses in California ADN programs. It also examined the effectiveness of these techniques as perceived by faculty of these programs. The study's results, although not generalizable to other populations, serve as a resource for faculty both in nursing and in other college disciplines.

CHAPTER 2

Review of the Literature

Introduction

In reviewing the literature on critical thinking, one is hard pressed to find a common definition for the concept. Authors have described it as creative thinking, reflective thinking, reasoning (or application of logic), the correct assessment of statements, and problem-solving. Many that view critical thinking as problem solving see it as assimilation of information into schemas, such as solving strategies, or steps, or as a heuristic matrix. Because of its "slipperiness", a number of authors have chosen to outline activities involved in critical thinking, delineate themes in critical thinking, or provide an operational definition of critical thinking processes.

Controversy continues over whether critical thinking is a "process," whereby a thinking skills program can provide the learner with exercises to develop the skills of critical thinking, or, instead, critical thinking can only be done in context (i.e. thinking "about something") and therefore is unique to each discipline. Although proponents of thinking skills curricula have in more recent years expanded their definitions to augment such list of operational skills and proficiencies with "tendencies" or "dispositions", the argument over teaching the "skills plus tendencies" versus

"critical thinking in context" remains, and is presented in this chapter.

Other questions have been raised in the debate over critical thinking in and out of context. What, if any, role does the context (culture, background assumptions) of the thinker play? How do these same contextual factors in the teacher effect classroom instruction and perhaps impede critical thinking in students? Increasing criticism has emerged in recent years regarding the preponderance of the "white, male tradition" as context in educational materials across disciplines and the necessity of frame-breaking for critical thinking to truly exist (Munnich, 1990).

Also heavily discussed in the literature is the concept of creative thinking. While there is controversy over the relationship of creative thinking to critical thinking - namely whether or not one encompasses the other or if they are distinct, discrete forms of thinking - there is agreement that they work synergistically to produce "good thinkers".

Additionally, the role of metacognition has received increased attention in recent years, with proponents of both the thinking skills approach and the critical thinking in context approach emphasizing the importance of "thinking about thinking" via judgment, monitoring, and self-regulatory control processes.

The notion of critical thinking as an innate general ability remains under fire by philosophers, who point out flaws in empirical studies using standardized critical thinking tests developed by psychologists. Informal logic advocates continue to receive criticism from avid "in-context" proponents such as McPeck (1981; 1990). Amidst ongoing controversy over informal logic versus contextual approaches, and the difficulty in assessing critical thinking ability, experts agree on the need for educational form and the inclusion of thinking skills and "learning to learn" teaching strategies among all educational levels.

As critical thinking about critical thinking, and literary dialogue among the experts continues, authors such as Siegel (1988), Paul (1990), and Marzano (1991) search for new answers and a restructuring of the traditional didactic educational paradigm to a critical theory, wherein critical thinking teaching strategies and the concepts of teaching and learning can be reframed.

A variety of strategies for teaching critical thinking can be found in the literature, though few focus on the postsecondary level (i.e. college student). Discipline-specific strategies that are discussed are usually found in the literature and arts category or in science and mathematics, with analysis and reflective thinking prominent in the former, and logic and problem solving common in the latter.

Recent literature has provided several case study exemplars, purporting role modeling as one of the best enablers of critical thinking skill development. Some vocational discipline-specific literature (e.g. in nursing) has begun to emerge, though its emphasis is based on more traditional notions of critical thinking as informal logic or problem solving. Such modeling techniques by teachers and discipline-specific experts are particularly helpful in fostering creativity and metacognitive skill development.

Critical Thinking Defined

As a concept, critical thinking has been defined and interpreted in numerous ways. Ruggiero (1975) and Hallet (1984) equated critical thinking with the development of logical reasoning abilities. Scriven (1976) described it as assumption hunting. Halpern (1984) defined critical thinking as a rational and purposeful attempt to use thought in moving toward a future goal, while Kitchener (1986) viewed it as the application of reflective judgment.

Consistent with Kitchener, O'Neill (1985) stressed that the major concept in critical thinking is the ability to distinguish bias from reason and fact from opinion. This is difficult, at best, as Brookfield (1987) described, because critical thinking is not seen as a wholly rational, mechanized activity. It involves such emotive aspects as feelings, intuition, and sensing. As Bar-Levav (1988) pointed out, "Feelings are the residues of our lifelong

individual experiences....Rather than reflecting current reality, feelings express our expectations based on what we already know from before. They are therefore totally unreliable as a guide to actions in the present" (p. 116). The "ability to imagine alternatives to one's current ways of thinking and living is one that often entails a deliberate break with rational modes of thought in order to prompt forward leaps in creativity" (Brookfield, 1987, p. 12).

A common definition for critical thinking is yet to be articulated, although it continues to evolve over time. In the early 1900s psychologists and others viewed critical thinking as problem solving, including creative thinking and what Dewey (1933) termed "reflective thinking". Dewey used this term to refer to "the kind of thinking that consists in turning a subject over in the mind and giving it serious consecutive consideration" (p. 3). He also used such terms as "suspended judgment" and "healthy skepticism" when speaking of what we today call critical thinking.

Dissatisfied with the "looseness" of such viewpoints, Ennis (1962) developed what he believed to be a comprehensive, yet simplified approach to the concept. He defined critical thinking as "the correct assessing of statements" (p. 83), and outlined twelve aspects of critical thinking:

1. Grasping the meaning of a statement.
2. Judging whether there is ambiguity in a line of reasoning.
3. Judging whether certain statements contradict each other.
4. Judging whether a conclusion follows necessarily.
5. Judging whether a statement is specific enough.
6. Judging whether a statement is actually the application of a certain principle.
7.. Judging whether an observation statement is reliable.
8. Judging whether an inductive conclusion is warranted.
9. Judging whether the problem has been identified.
10. Judging whether something is an assumption.
11. Judging whether a definition is adequate.
12. Judging whether a statement made by an alleged authority is acceptable. (p. 84)

He further noted three distinguishable dimensions to his concept of critical thinking:

> The logical dimension...covers judging alleged relationships between meanings of words and statements. ...The critical dimension covers knowledge of the criteria for statements...[and] the pragmatic dimension covers the impression of the background purpose on the

judgment, and...the decision as to whether the statement is good enough for the purpose. (pp. 84-85)

Lists of critical thinking skills (also termed proficiencies or abilities) appeared over the next two decades with the following frequently appearing: "identifying assumptions, both stated and unstated, both one's own and others; clarifying, focusing, and staying relevant to the topic; understanding logic (including inference, deduction, and induction); and judging sources, their reliability and credibility" (Idol & Jones, 1991, p. 14). Snook (1974) took exception to this approach, stating, "To imagine that thinking can be broken down into its component parts which are then programmed is to misunderstand the nature of thinking" (p. 154).

The third quarter of the century brought about contributions from the disciplines of mathematics, science, and engineering, with "problem solving" receiving much attention. Polya (1971) outlined a four-stage approach: (1) understanding the problem, (2) devising a plan, (3) carrying out the plan, and (4) looking back. Woods and others (1975) described an adaptation of Polya's approach, adding a "Think About It" step before planning for their engineering students.

Continued research in the areas of reasoning and problem-solving by scientists, psychologists, and philosophers provided multiple facets to the evolving

concept of critical thinking. Guilford (1967) described "creative problem-solving", in an attempt to merge the two concepts. Similar to Woods, he incorporated a step on "incubation" into Polya's method to allow for "intuitive leaps." Several cookbook, linear approaches arose, including Bransford and Stein's (1984) I.D.E.A.L. problem-solving method: Identify the problem, Define the problem, Explore alternative approaches, Act on a plan, and Look at the effects.

Focusing on reasoning as a description of critical thinking, Glasman, Koff, and Spiers (1984) outlined four areas of activity:

(1) the ability to identify and formulate problems as well as the ability to propose and evaluate ways to solve them;

(2) the ability to recognize and use inductive and deductive reasoning and to recognize fallacies in reasoning;

(3) the ability to draw reasonable conclusions from information found in various sources (written, spoken, tables, graphs), and to defend one's conclusions rationally;

(4) the ability to distinguish between fact and opinion. (p. 467)

Beyer (1985) defined critical thinking as "the assessing of the authenticity, accuracy, and/or worth of

knowledge claims and arguments" (p. 271). Arons (1985) developed an operational definition of critical thinking, listing the following thinking and reasoning processes underlying analysis and inquiry:

1. Consciously raising the question, 'What do we know...?, How do we know...?, What is the evidence for...?,' when studying some body of material or approaching a problem.
2. Being clearly and explicitly aware of gaps in available information.
3. Discriminating between observation and inference, between established fact and subsequent conjecture.
4. Recognizing that words are symbols for ideas and not the ideas themselves.
5. Probing for assumptions (particularly the implicit, unarticulated assumptions) behind a line of reasoning.
6. Drawing inferences from data, observations, or other evidence and recognizing when firm inferences cannot be drawn.
7. Performing hypothetico-deductive reasoning, i.e. given a particular situation, applying relevant knowledge of principles and constraints and visualizing, in the abstract, the plausible

outcomes that might result from various changes one can imagine to be imposed on the system.

8. Discriminating between inductive and deductive reasoning, i.e. being aware when an argument is being made from the particular to the general or from the general to the particular.
9. Testing one's own line of reasoning and conclusions for internal consistency and, then, developing intellectual self reliance.
10. Developing self consciousness concerning one's own thinking and reasoning processes. (pp. 142-147)

Arons (1985) further explained, "The individual's conscious weaving together of these various modes results in the larger synthesis we might characterize as 'critical thought'" (p. 141).

Another aspect of critical thinking which received much attention in the 1980s was the importance of dispositions (or attitudes) of the thinker. Discussion centered around the fact that a person might possess or be <u>able</u> to demonstrate critical thinking skills, but may not be <u>inclined</u> to use them. Numerous authors emphasized the importance of dispositions (Ennis, 1987a; Marzano, 1991; Nickerson, 1987; Norris, 1985; Paul, 1984; Sternberg & Baron, 1985). Lists of dispositions began to emerge, including such items as "being open minded" and "being able to challenge one's own opinions."

Most notably, Ennis (1987b) enhanced his earlier work in the writing of A Taxonomy of Critical Thinking Dispositions and Abilities. He provided a broader definition of critical thinking to describe how it comprises both skills (or abilities), the cognitive aspect, and dispositions (or attitudes), the affective aspect. He wrote, "Critical thinking is reasonable reflective thinking that is focused on deciding what to believe or do" (p. 10). To his abilities list, he added the following thirteen dispositions of critical thinkers, as cited by Sternberg and Baron (1985).

The ability to:

1. Be open-minded.
2. Take a position (and change a position) when the evidence and reasons are sufficient to do so.
3. Take into account the total situation.
4. Try to be well informed.
5. Seek as much precision as the subject permits.
6. Deal in an orderly manner with the parts of a complex whole.
7. Look for alternatives.
8. Seek reasons.
9. Seek a clear statement of the issue.
10. Keep in mind the original and/or basic concern.
11. Use credible sources and mention them.
12. Remain relevant to the main point.

13. Be sensitive to the feelings, level of knowledge, and degree of sophistication of others (p. 42).

Marzano (1991) stressed, "At its core, critical thinking is dispositional in nature....It is the activation of such dispositions...that renders one's thinking critical, rather than using specific mental processes, such as classifying or inducing" (p. 426).

As the notion of dispositions, as an integral component of critical thinking, became widely accepted, attention was drawn to the judgment aspect of critical thinking. In his description of the "rational thinker," Ennis (1981) isolated as a third major component (in addition to proficiencies/abilities and dispositions/attitudes) the exercising of good judgment which, he claimed, "tends to increase with practice and experience" (p. 183).

Critical of his own prior work from 1975, Ruggiero (1984) said he was attempting to overcome the dominant intellectual focus of "feelings" of the sixties. He stated, "The result of that extremism was the neglect of thinking" (p. xiii). In his 1984 text, Ruggiero used a four-part design for critical thinking: (1) context: to understand such terms as individuality, thinking, truth, knowledge, and opinion, (2) problems: to recognize errors in the thinking process (i.e. logic), (3) strategy: to develop skills in addressing problems and issues, and (4) contemporary issues. He defined critical thinking, "To evaluate and judge the

accuracy of statements and the soundness of the reasoning that leads to conclusions" (p. 13).

Several authors cited limitations to both the informal logic and problem-solving approaches to critical thinking. Subject matter knowledge, the role played by background assumptions, and the need to take an active role in modifying beliefs were emerging as important elements of critical thinking. Meyers (1986) noted serious limitations to the general logic and problem-solving approaches, including concern that skills taught separate from subject matter have shown little carryover to the disciplines, and that these approaches do not support "a central element in critical thinking [which] is the ability to raise relevant questions and critique solutions without necessarily posing alternatives" (p. 5).

Responding to Ennis' earlier seminal work, McPeck (1981) described how some critical thinking doesn't involve statements and that some assessments of statements are not critical, but rather are arrived at by chance. He further criticized the use of logic for the assessment and justification of arguments in that such an approach does not allow for the generation of new hypotheses, theories, arguments, or resolutions.

McPeck (1981) additionally emphasized the controlled use of reflective skepticism, stating,

> Perhaps the most notable characteristic of critical thought is that it involves a certain sceptisism [sic], or suspension of assent, towards a given statement, established norm or mode of doing things. However, this sceptisism [sic] is not pervasive or unjustified; that is, it is not automatically applied to every statement, argument or mode of doing things that one encounters. Rather, critical thinking requires the judicious use of sceptisism [sic], tempered by experience, such that it is productive of a more satisfactory solution to, or insight into, the problem at hand. It is the appropriate use of 'reflective sceptisism' [sic] within the problem area under consideration. (p. 7)

Consistent with McPeck, Brookfield (1987) wrote that thinking critically is "reflecting on the assumptions underlying our and others' ideas and actions, and contemplating alternative ways of thinking and living" (p. x). He further stated that critical thinking "involves calling into question the assumptions underlying our customary, habitual ways of thinking and acting and then being ready to think and act differently on the basis of this critical questioning" (p. 1).

Brookfield (1987) also noted nine important critical thinking themes. Five of these dealt with "recognizing critical thinking":

1. Critical thinking is a productive and positive activity.
2. Critical thinking is a process, not an outcome.
3. Manifestations of critical thinking vary according to the contexts in which it occurs.
4. Critical thinking is triggered by positive as well as negative events.
5. Critical thinking is emotive as well as rational. (p. 5)

Four he identified as "components of critical thinking":

1. Identifying and challenging assumptions is central to critical thinking.
2. Challenging the importance of context is crucial to critical thinking.
3. Critical thinkers try to imagine and explore alternatives.
4. Imagining and exploring alternatives leads to reflective skepticism. (p. 5)

The role played by background assumptions in impeding critical thinking, and the necessity for the critical thinker to modify these as needed was also addressed by experts in the 1980s. Bar-Levav (1988) wrote, "We hold on to our rationalizations tenaciously, since our view of ourselves as rational beings depends on their validity....Man still tends to hide even from himself the fact that many of his life's most important choices and

decisions are made on the basis of feelings, not rationally" (p. 343). He further noted,

> Feelings commonly camouflage themselves as thoughts....But much thinking is circular and ruminative and leads to conclusions already arrived at by our feelings....Learning to really think requires first that we make room for it by diminishing the domain of feelings....Notions from our infantile past in the form of feelings commonly persist as guideposts in adult living. (p. 34)

Meyers (1986), drawing on the work of psychologist Jean Piaget (1976), wrote, "If we view mental structures as components of larger disciplinary perspectives for problem solving and analysis, we can say that when we teach students to thinking critically, we are helping them alter or replace their mental structures" (p. 13). Dale (1972) pointed out that, "All education involves the development and refinement of choice - an awareness of alternatives and the need to study and mentally rehearse the possible consequences of these alternatives before choosing them" (p. 69).

Brookfield (1987) emphasized that although critical thinking involves identifying and challenging assumptions and exploring and imagining alternatives, it is not a passive process. Rather, it is a "praxis of alternating analysis and action" (p. 23) as one refutes new ideas or integrates them, modifying current beliefs. Argyris' (1982)

double-loop learning, where background assumptions are restructured, and Paul's (1992) strong sense definition of critical thinking, where one examines multilogical issues from a variety of perspectives, challenging ones own values and beliefs, are consistent with Brookfield's notion of "critical thinking praxis."

Descriptions of what a "critical thinker" is have recently emerged as authors attempt to define the concept. Many refer to the need for one to not only have the disposition or intent to think critically, but one must be disposed to act and moved to do so (Nickerson, 1987; Norris, 1985; Siegel, 1988; Smith, 1990). Norris (1985) describes such an individual as one who possesses and displays a "critical spirit."

Critical Thinking in Context

Much attention has been given in recent years to the question of whether or not critical thinking can be taught as a process separate from a particular context. Rubinstein and Firstenberg (1987) wrote, "While the knowledge base for problem solving is domain-specific, the thinking skills can be generalized across boundaries between disciplines. The acquisition and development of such general productive thinking skills provide an education for a world characterized by rapid change" (p. 24). They likened thinking skills to cooking skills, stating that one with outstanding cooking skills can produce an outstanding meal

with few ingredients, and one with outstanding thinking skills can produce novel solutions from limited information.

In opposition to this, many authors have stressed the necessity of context in teaching critical thinking, stating that critical thinking is domain-specific (e.g. Arons, 1985; Brookfield, 1987; McPeck, 1981). Hyde and Bizar (1989) advocated integrating critical thinking into each course across the elementary school curriculum. Grant (1988) stated that critical thinking is "process-specific and context dependent" (p. 34). She added that in order to teach critical thinking, the teacher needs both subject matter knowledge and pedagogical content knowledge. She described the latter as the teacher (a) knowing how to teach to foster critical thinking, and (b) understanding both self and students.

Brookfield (1987) also noted the importance of context, including context related to the thinker (e.g. background assumptions, culture, point in time, etc.). He stated that identifying and challenging assumptions is central to critical thinking and that thinking critically means using imagination, exploring alternatives, and engaging in reflective skepticism. He further described critical thinking as "reflecting on the assumptions underlying our and others' ideas and actions, and contemplating alternative ways of thinking and living" (p. x). "[Critical thinking] involves calling into question the assumptions underlying

our customary, habitual ways of thinking and acting and then being ready to think and act differently on the basis of this critical questioning" (p. 1).

Arons (1985) provided an attempt to operationally define critical thinking by delineating thinking and reasoning processes that underlie analysis and inquiry. He described the following ten underlying processes "common to many disciplines and that can be cultivated and exercised separately in limited contexts acceptable to the student" (p. 141).

1. Consciously raising the question, "What do we know...? How do we know...? Why do we know...? Why do we accept or believe...? What is the evidence for...? ," when studying some body of material or approaching a problem.
2. Being clearly and explicitly aware of gaps in available information.
3. Discriminating between observation and inference, between established fact and subsequent conjecture.
4. Recognizing that words are symbols for ideas and not the ideas themselves.
5. Probing for assumptions (particularly the implicit, unarticulated assumptions) behind a line of reasoning.

6. Drawing inferences from data, observations, or other evidence and recognizing when firm inferences cannot be drawn.
7. Performing hypothetico-deductive reasoning, i.e., given a particular situation, applying relevant knowledge of principles and constraints and visualizing, in the abstract, the plausible outcomes that might result from various changes one can imagine to be imposed on the system.
8. Discriminating between inductive and deductive reasoning, i.e., being aware when an argument is being made from the particular to the general or from the general to the particular.
9. Testing one's own line of reasoning and conclusions for internal consistency and, thus, developing intellectual self reliance.
10. Developing self consciousness concerning one's own thinking and reasoning processes. (pp. 142-147)

Arons (1985) wrote, "The individual's conscious weaving together of these [processes] results in the larger synthesis we might characterize as 'critical thought'" (p. 141). He then noted the importance of context, stating, "Developing these intellectual skills requires extensive, sustained practice. Such practice is not possible in a space devoid of subject matter. It is only through contact

with, and immersion in, rich areas of subject matter that interesting and significant experience can be generated" (p. 148).

Perhaps the most well-known and often-cited advocate for critical thinking in context is John McPeck. In his seminal text, Critical Thinking and Education, McPeck (1981) advanced two versions of the subject-specificity viewpoint. First, in the conceptual version, McPeck asserted that thinking, and especially critical thinking, is always about some particular thing or subject. Teaching to think more about something "must be adding something to it making finer discriminations with respect to it or otherwise changing one's perspective of it" (p. 4).

Second, in the epistemological version of the subject specificity viewpoint, McPeck (1981) argued that there is no reason to believe that one who thinks critically in one area will do so in another. Epistemology is more than just what the words in the discipline mean, it also includes concepts and peculiarities of the nature of evidence as understood by practitioners in that field [i.e. the context of that culture]. Furthermore, he criticized the Informal Logic Movement, stating "They believe that if you train students in certain logical skills..., the result will be a general improvement in each of the other disciplines....Whereas I contend that if we improve the quality of understanding through the disciplines..., you will then get a concomitant

improvement in critical thinking capacity" (McPeck, 1990, p. 21).

A number of authors (e.g. Brookfield, 1987; Clark, 1990; Grant, 1988; Hyde & Bizar, 1989; Meyers, 1986) reported the need for critical thinking skills in context, concurring with McPeck's versions of the subject-specificity viewpoint. In Patterns of Thinking: Integrating Learning Skills in Content Teaching, Clarke (1990) presented numerous examples of classroom activities within disciplines. Noting the "regionalism" of the examples (e.g. references to lumbering and Vermont maple syrup), he pointed out that this further emphasizes the need for faculty to develop their own class exercises based not only on subject matter, but also in the context of students' milieu (and to address both genders and their diverse cultural backgrounds, this author might add.)

Glaser(1984), and other cognitive psychologists, also believed general thinking skills could not be transferred from discipline to discipline, but held a third viewpoint - the empirical version of the subject-specificity view. This viewpoint was based on doubt that empirical studies could prove transfer of such skills. Ennis (1987a) countered the three versions of subject-specificity views, stating, "Although I am firmly convinced that a thorough knowledge of the subject about which one is thinking is essential for critical thinking, I also am convinced that there are

general principles that bridge subjects, that have application to many subjects (author's emphasis)" (p. 43).

Norris (1990) called for empirical research to answer questions related to (a) "the underlying nature of reasoning", (b) "whether there can be one set of reasoning skills which can produce competence in the large variety of areas in which human beings reason", and (c) "whether people can be taught to reason only within the contexts of specific types of problems" (pp. 71-72). He argued that until these are answered, the question of generalizability and transfer cannot be answered.

Kennedy, Fisher, and Ennis (1990) triangulated the controversy over a general skills versus domain-specific approach to teaching critical thinking skills, proposing a "combination of using a set of general dispositions and abilities, along with specific experience and knowledge within a particular area of concern - in school, often the subject-matter area" (p. 15). They posited that "this view might lead to the teaching of general critical thinking principles...both as a separate course...and as infused into the existing subject-matter instruction, where general dispositions and abilities would be applied" (pp. 15-16).

Several authors (e.g. Ennis, 1989; Sternberg, 1987) have argued for a "mixed model." Ennis (1989) has suggested two teaching approaches to develop critical thinking skills in context: infusion and immersion.

Infusion as a technique involves thinking in the subject matter with specific attention to general principles of critical thinking that apply in that subject. Immersion involves only thinking in the subject matter.

Though the value of teaching critical thinking skills in context is apparent there is still much debate as to whether critical thinking skills will transfer from one context to another, with little empirical evidence on the subject. There is much agreement, however, that teaching strategies should encourage the use of critical thinking skills and emphasize transfer from one context to another (Michenbaum, 1985; Nickerson, 1987; Sternberg, 1987). To promote transfer, Sternberg (1987) suggested students practice in a variety of educational and home situations, while Michenbaum (1985) stressed the need for instruction that emphasizes executive or metacognitive skills. Nickerson (1987) listed characteristics of a "Good Thinker", which included the ability to transfer what is learned to a new situation and to recognize that problems in the real world are complex with more than one simple solution.

Creative Thinking, Metacognition and Thinking Models

In reviewing literature on critical thinking, one is hard-pressed to define the concept without embracing the concepts of creative thinking and metacognition. Some authors have separated these as three distinct forms of

thinking and others have viewed them as overlapping concepts within the larger concept of rational, functional or effective thinking. Experts agree, however, that the concepts of creative thinking and metacognition, and their relation to critical thinking are important considerations in fostering critical thinking in students.

Creative Thinking

Dale (1972) noted the need for creativity in society, that imitating the past yields death. Only a creative society can survive. He stated, "To be creative is to be thoughtfully involved, to be a concerned and active participant, not a disengaged spectator" (p. 76). Perkins (1984) pointed out that the ultimate criterion of creativity is output. He described creative thinking as "thinking patterned in a way that tends to lead to creative results....We call a person creative when that person consistently gets creative results, meaning, roughly speaking, original and otherwise appropriate results by the criteria of the domain in question" (pp. 18-19). Halpern (1984) stated, "Creativity can be thought of as the ability to form new combinations of items to fulfill a need" (p. 324).

As in descriptions of critical thinking, a common theme among authors writing about creative thinking is the emphasis on attitudes or dispositions of the thinker. Ruggiero (1988b) suggested, "Creative ideas often come from

associating things not commonly associated or from actively bringing together antithetical elements" (pp. 24-25). He also attributed the "disposition to be curious, to wonder, to inquire" as the "trigger mechanism for creative thinking" and noted that the "production of ideas is stimulated by deferring judgments" (pp. 25-26). This process of "deferring judgment" is consistent with McPeck's (1981) "suspension of assent," Dewey's (1933) "suspended judgment," and others' definitions of critical thinking.

The interrelatedness of critical thinking and creative thinking is readily apparent. As Marzano (1991) pointed out, "Creative thinking is closely related to critical thinking, however, the emphasis is more on the generation of new and unique ways of conceiving information than on the thoughtful analysis of information" (p. 427). He considered the following dispositions, from his list of thinking dispositions, to form the basics for creative thought:

1. Engaging intensely in tasks even when answers or solutions are not immediately apparent.
2. Pushing the limits of one's knowledge and abilities to keep improving on one's knowledge and skills.
3. Generating, trusting, and maintaining one's own standards of evaluation.
4. Generating new ways of viewing a situation outside the boundaries of standard conventions. (p. 426)

Egan (1986) and Brookfield (1987) also noted the presence of risk-taking as a characteristic of creative thinkers, along with such characteristics as "optimism, confidence, acceptance of ambiguity and uncertainty, a wide range of interests, flexibility, tolerance of complexity, curiosity, persistence, and independence" (Brookfield, 1987, p. 115). Brookfield (1987) further noted commonalities among creative thinkers, such as:

1. Creative thinkers reject standardized formats for problem solving.
2. They have interests in a wide range of related and divergent fields.
3. They can take multiple perspectives on a problem.
4. They view the world as relative and contextual rather than universal and absolute.
5. They frequently use trial-and-error methods in their experimentation with alternative approaches.
6. They have a future orientation, change is embraced optimistically as a valuable developmental possibility.
7. They have self-confidence and trust in their own judgment (pp. 115-116).

He summarized, stating, "Developing these capacities is a major task of those helping adults to think critically" (p. 116).

In addition to creative thinking definitions and dispositions the following six general principles of creative thinking were explicated by Perkins (1984), whereby components that contribute to creative outcomes could be categorized.

1. "Creative thinking involves aesthetic as much as practical standards." Perkins notes that creative thinkers desire and actively pursue originality.
2. "Creative thinking depends on attention to purpose as much as to results." Creative thinkers revisit and redefine the problem in critiquing alternatives.
3. "Creative thinking depends on mobility more than fluency." Creative thinkers view problems through a variety of lenses, reformulate problems and use analogies when difficulties arise.
4. "Creative thinking depends on working at the edge more than at the center of one's competence." Creative thinkers are risk takers and comfortable with failure.
5. "Creative thinking depends as much on being objective as on being subjective." Creative thinkers seek and welcome criticism and consider differing viewpoints.
6. "Creative thinking depends on intrinsic, more than extrinsic, motivation." (pp. 19-20)

In an interesting text entitled, To Think, Frank Smith (1990) provided a detailed account on the concept of creative thinking. He stated, "Most people who talk about creative thinking want something more than imaginativeness. There are usually three other requirements: the thinking (or, rather, its observable consequence) must reach high standards, it must be original, and it must be the result of intention rather than chance" [author's emphasis] (p. 13). He continued, making the points: (1) high standards are determined by people in that time, in that culture (he cited Van Gogh and Schubert as two not considered to have displayed high standards until a later point in time); (2) originality doesn't account for those who may not be the first to discover or create something but if they weren't aware of those who previously did it, why are they not just as creative?; and (3) intention (vs. chance) doesn't account for artists and composers who by trial-and-error "happen" upon certain brushstrokes, color combinations, musical note order, harmony etc. that are appealing. He also offered his preference for "thinking creatively" over the term "creative thinking" because it is not a special kind of thinking, or a distinctive process, but rather "a manner of thinking on particular occasions" (p. 77).

Several authors compared and contrasted the concepts of critical thinking and creative thinking. Beyer (1987) wrote,

> Whereas creative thinking is divergent, critical thinking is convergent; whereas creative thinking seeks to generate something new, critical thinking seeks to assess worth or validity in something that exists; whereas creative thinking is carried on often by violating accepted principles, critical thinking is carried on by applying accepted principles. (p. 35)

Ruggiero (1986) contrasted creative thinking - thinking that produces ideas - with critical thinking - thinking that evaluates those ideas, testing and refining them. He described how being creative, however, can help overcome obstacles to critical thinking: set aside biases, be curious, and ask questions such as, "How will it be when applied?" and "How will different people react to it?" (p. 133).

Perkins (1990) described the "inner and outer natures" of creative thinking and compared them to those of critical thinking. He asserted, "The outer nature of creative thinking is what we see that leads us to identify an episode of thinking as creative....(O)riginality and contextual appropriateness are our tacit criteria for considering an outcome creative" (pp. 416-417). Additionally, he noted, "(T)he inner nature of creative thinking [is] the patterns of thought, attitude, and skill that enable and encourage it" (p. 417). He explicated that the inner natures of both critical and creative thinking "infuse one another" in that

in both, the thinker is engaged in an assessment process. In contrast, the outer natures vary greatly, in that unlike creative thinking's aim to produce a creative outcome, critical thinking's aim is to produce an assessment of things, beliefs, and courses of action.

Smith (1990) characterized creative thinking in terms of "the generation and selection of alternatives" (p. 101). He equated the two, describing how each is deemed as such by virtue of their context. Cohen (1971) earlier differentiated the two concepts on the basis of how basic thinking processes are used. He made the distinction thusly:

> **Critical Thinking**-using basic thinking processes to analyze arguments and generate insight into particular meanings and interpretations; develop cohesive, logical reasoning patterns and understand assumptions and biases underlying particular positions; attain a credible, concise, and convincing style of presentation.
>
> **Creative Thinking**-using basic thinking processes to develop or invent novel, aesthetic, constructive ideas or products, related to percepts as well as concepts, and stressing the intuitive aspects of thinking as much as the rational. Emphasis is on using known information or material to generate the possible,

as well as to elaborate on the thinker's original perspective. (p. 26)

Ruggiero (1988a), on the other hand, compared the two concepts by examining the production and judgment phases of thinking. This comparison, and his description of good and poor thinkers in each phase is explicated in the following:

The Production Phase

In this phase, which is most closely associated with creative thinking, the mind produces various conceptions of the problem or issue, various ways of dealing with it, and possible solutions or responses to it. Good thinkers produce both more ideas and better ideas than poor thinkers. More specifically, good thinkers tend to see the problem from many perspectives before choosing any one, to consider many different investigative approaches, and to produce many ideas before turning to judgment. In addition, good thinkers are more willing to take intellectual risks, to be adventurous and consider outrageous or zany ideas, and to use their imaginations and aim for originality.

In contrast, poor thinkers tend to see the problem from a limited number of perspectives (often just a single narrow one), to take the first approach that occurs to them, to judge each idea immediately, and to settle for only a few ideas. Moreover, they are overly cautious in their thinking, unconsciously making their

ideas conform to the common, the familiar, and the expected.

The Judgment Phase

In this phase, which is most closely associated with critical thinking, the mind examines and evaluates what it has produced, makes its judgments, and, where appropriate, adds refinements. Good thinkers handle this phase with care. They test their first impressions, make important distinctions, and base their conclusions on evidence rather than their own feelings. Sensitive to their own limitations and predispositions, they double-check the logic of their thinking and the workability of their solutions, identifying imperfections and complications, anticipating negative responses, and generally refining their ideas.

In contrast, poor thinkers judge too quickly and uncritically, ignoring the need for evidence and letting their feelings shape their conclusions. Blind to their limitations and predispositions, poor thinkers trust their judgment implicitly, ignoring the possibility of imperfections, complications, or negative responses. (pp. 3-4)

Metacognition

Most authors writing in the area of critical thinking discussed the importance of "thinking about thinking", or

metacognition. Beyer (1987) and others have emphasized the synergy among critical thinking skills, dispositions, and metacognition. Beyer (1987) describes the importance of "helping students become independent thinkers, proficient at self-initiated and self-directed thinking....(T)he teaching of thinking consists of teaching students to think about their own thinking, consciously and deliberately, while engaged in thinking for functional purposes" (p. 191). Some authors included the concept of metacognition as part of the critical thinking process, while others clearly distinguished it as a discrete thinking process, but essential for one to truly be a critical thinker.

Dale (1972) described thinking about thinking, defining critical thinking as "thinking which has been systematically criticized" (p. 63). He advocated that the critical thinker "must define and confine the problem" and "be clear about the question" (p. 63). He or she must "read the lines (duplication)...read between the lines (implication)...and "read beyond the lines (application)" (pp. 65-66). What he was advocating was the metacognitive process.

Beyer (1987) concurred with the concept of self-regulation, delineating three major metacognitive operations: planning, monitoring, and assessing. He noted that "although these operations may appear to be sequential, in practice they are not strictly linear but recursive" (p. 192). He asserted that these metacognitive operations (in

addition to thinking skills and dispositions) are vital to effective thinking [or critical thinking].

Costa (1984) defined metacognition as the "ability to know what we know and what we don't know....to plan a strategy for producing what information is needed, to be conscious of our own steps and strategies during the act of problem solving, and to reflect on and evaluate the productivity of our own thinking" (p. 57). He differentiated this from mere "inner language" which begins in most children around age five, noting that metacognition, a formal thought operation, does not develop until about age eleven. Costa (1984) asserted, "Probably the major component of metacognition is developing a plan of action and then maintaining that plan in mind over time" (p. 58). He also noted evidence in the literature that "those who persevere in problem solving; who thinking [sic] critically, flexibly and insightfully; and who can consciously apply their intellectual skills are those who possess well-developed metacognitive abilities (Bloom & Broder, 1950; Brown, 1978; Whimbey, 1980)" (p. 58).

In the Dimensions of Thinking model introduced by Marzano et al. (1988), metacognition was identified as one of the five discrete dimensions in the framework. Marzano (1991) equated metacognition to self-regulation. He added that it, like both critical and creative thinking, is dispositionally based. In his list of seventeen

dispositions, delineated earlier in this chapter, he pointed out that he had included not only dispositions specific to critical thinking (items one through nine) and to creative thinking (items 10 through 13), but also four that were specific to metacognition (items 14 through 17). He noted that "an individual is behaving in a self-regulated, metacognitive manner when he or she plans, is sensitive to feedback, evaluates progress, and uses available resources" (p. 427).

Perkins (1990) commented on the relation of metacognition to creative thinking. He wrote,

> The very category, metacognition, seems at odds with...[the] perspective on creativity...we inherit from the Romantics, [which] presents a remarkably passive view of the inventive mind....[that] moments of invention...'bubble up' from some subterranean combustion....However, the general mode of creative thinking...demonstrates ample room for mindfulness and control in creative thinking; for metacognition, in short. The individual can be mindful of the factors that figure in creative thinking - such as attention to matters aesthetic, for instance - and can control this process of creative thinking to a significant extent by deploying various patterns of thinking that about creative results. (pp. 425-426)

Perkins concluded that not only does metacognition play a role in creative thinking, as well as in critical thinking, but that creative thinking is becoming even more (author's emphasis) metacognitive. He gave as an example how the field of art has changed:

> In most cultures and at most times, art has not been a radically creative activity but more a refined craft. However, since the impressionists, and perhaps since the Renaissance, Western artists have become self-conscious innovators. It is plain that nearly any mid-20th century artist of note did not just happen upon a new genre but strove to create one. Genuine creative thinking in art came to mean not merely devising new works but calculatedly inventing new idioms. (p. 439)

Appearing most recently in the literature is an emerging redefinition of the concept of metacognition to include aspects of motivation and initiative in the learner. Idol, Jones and Mayer (1991) asserted that metacognition refers to two dimensions of learning: self-appraisal and self-regulation. They commented on metacognition's newly-defined relation to motivation, stating, "In the past, metacognition was defined largely as an individual behavior and was not initially linked to motivation. Now, it is defined as shared behavior (thinking aloud), and it includes the learners' beliefs, judgments, attitudes, motivation, and self-concept" (p. 73).

This emerging definition of metacognition as including an aspect of motivation and initiative is apparent in O'Flahavan and Tierney's (1991, pp. 41-42) view of critical thinking which encompasses the following key points:

1. The goals of critical thinking are, as described by Ennis (1987b) that "Critical thinking is reasonable reflective thinking that is focused on deciding what to believe or do" (p. 10).
2. Examining ideas from multiple perspectives requires the learner to possess a variety of critical thinking dispositions as described by experts in the field.
3. Attaining a perspective on perspectives requires the thinking to be <u>productive</u> as described by Norris (1985), "in the sense of conceiving of alternative courses of action and candidates for belief, before critically appraising which alternative to choose. People must be able to produce reliable observations, make sound inferences, and offer reasonable hypotheses" (p. 40).
4. "Reasoning ability is best developed in conjunction with learning situations that nurture student initiative. [Without] empowering learners with the <u>inalienable right</u> [author's emphasis] to guide their own learning...the behaviors

> associated with independent learning may fail to emerge" (p. 42).

O'Flahavan and Tierney (1991) asserted further that, "Strategic control and regulation [i.e. metacognition] of one's own skill is allied to student initiative. All of the reading and writing strategies we address...depend on successful control and regulation by the learner" (p. 42).

Thinking Models

Several thinking models appear in the literature, depicting the relationship of critical thinking to creative thinking, and, in some cases the relation of these to metacognition.

Ennis' (1981, p. 145) "Components of the Rational Thinker" is depicted in Figure 1. He stated, "A rational thinker has a variety of proficiencies, a set of tendencies, and good judgment....This conception combines creative thinking, critical thinking, and problem solving - all skills that are thoroughly interdependent in practice" (p. 145). Ennis (as cited in Coles & Robinson, 1988, p.81) further depicted the relationship of these concepts, (see Figure 2.)

Figure 1. Ennis' "Components of the Rational Thinker"

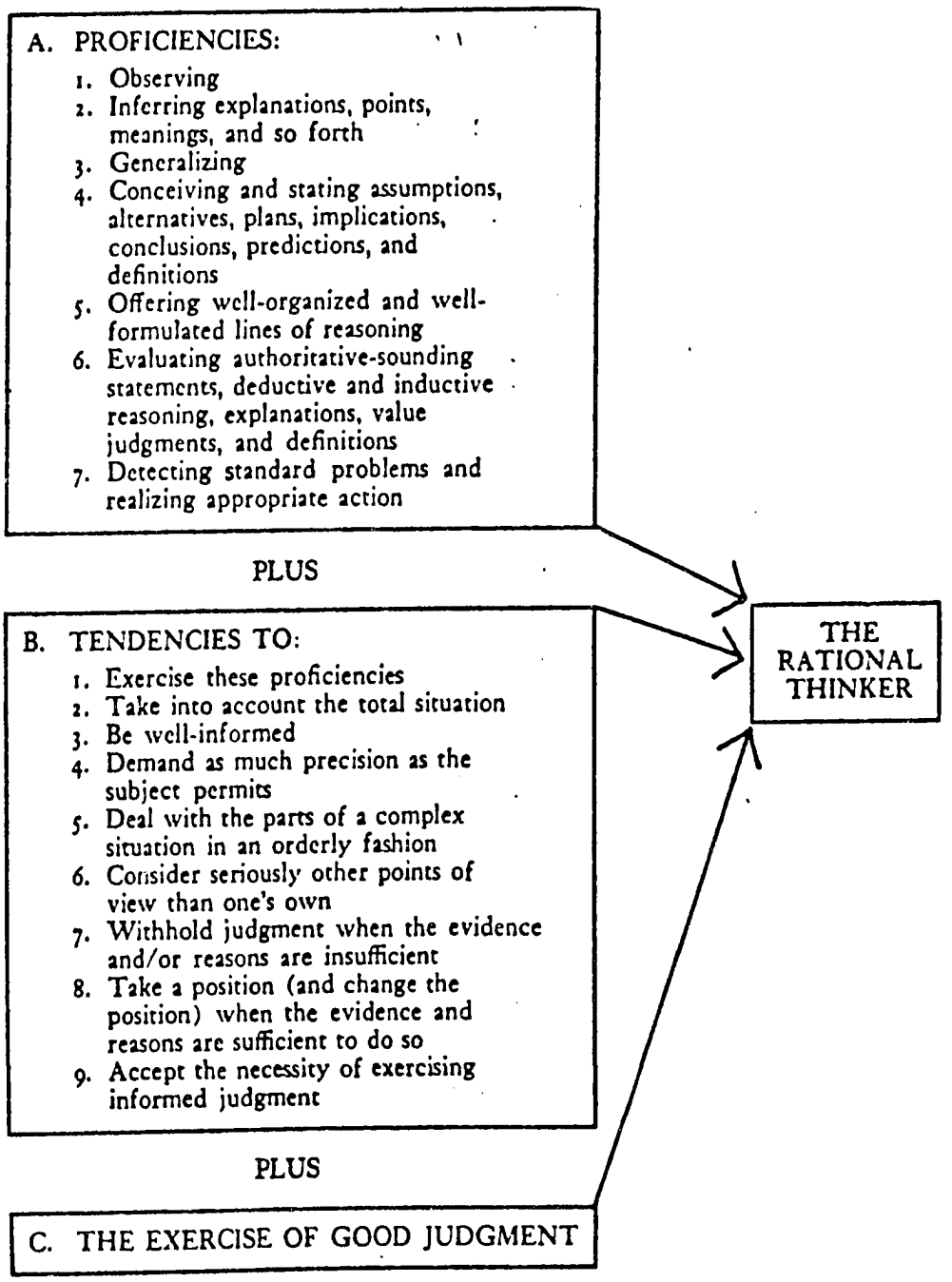
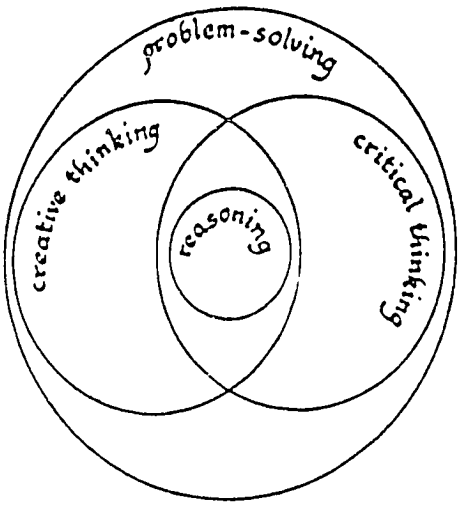
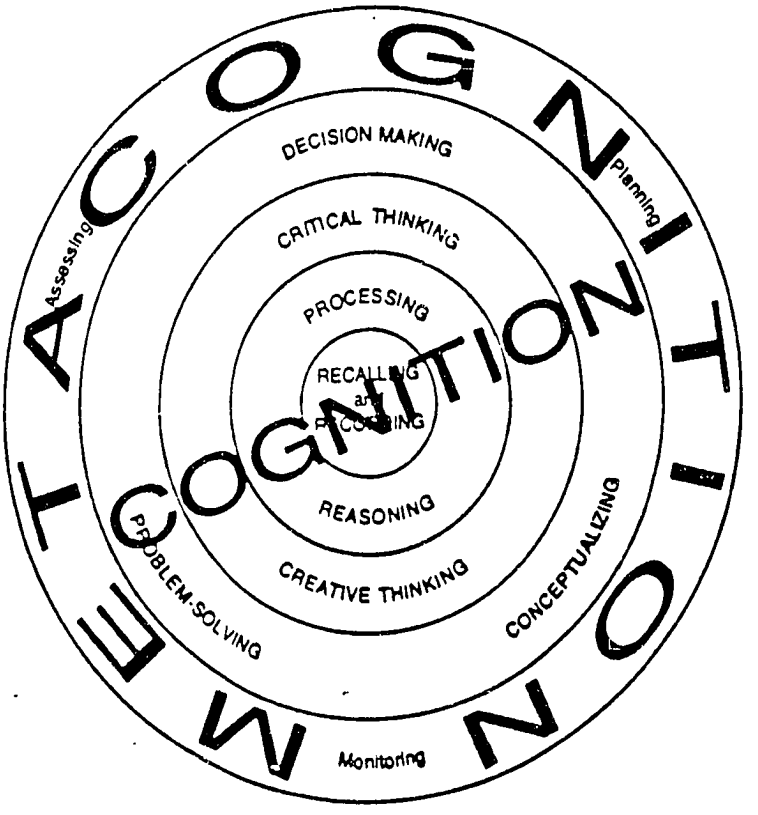


Figure 2. Ennis' Representation of the Thinking Field.



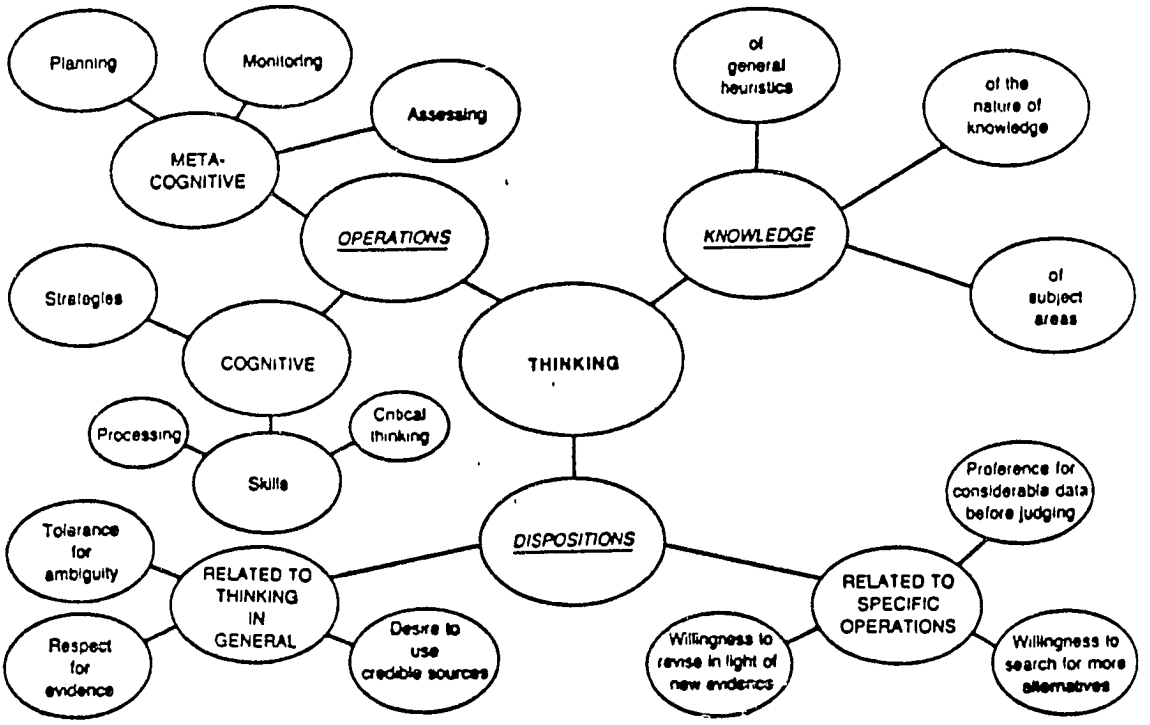
Beyer's (1987) "A Model of Functional Thinking" (p. 23), depicted as Figure 3, shows a series of concentric rings which gain in complexity as they move outward. "The cognitive or meaning-making operations that constitute thinking make up the outer ring that wraps around and is superordinate to the inner core of operations used to produce meaning" (Beyer, 1987, p. 22).

Figure 3. Beyer's "A Model of Functional Thinking."



Additionally, Beyer (1987) depicted three interrelated components of thinking - operations, knowledge, and dispositions (or attitudes) - and their subcomponents in the model depicted as Figure 4 (p. 18).

Figure 4. Beyer's "Key Components of Thinking."



He wrote,

> Thinking, in sum, consists of certain dispositions, knowledge, and operations. Giving it both character and substance, these elements are, in effect, the gears of thinking; as they mesh, thinking occurs. The proficiency of the individual doing the thinking, the environment(s) in which thinking occurs, the purposes for which it is engaged, and the

> modalities in which it is employed all shape how this process is executed. Yet, there is more to thinking than can be described by listing its components, those factors that shape it and its distinguishing features. Thinking is an action. It occurs at different levels and serves a multitude of functions. Examining the major kinds of thinking individuals engage in can help clarify even further exactly what constitutes thinking. (p. 21)

Critical Thinking Teaching Strategies at the Community College Level

Although the need for fostering critical thinking in our students today has been well-documented, actual teaching strategy exemplars, especially at the college level, are sparse. As Meyers (1986) stated, "Despite a growing body of literature on the subject, college teachers have found few suggestions for ways to improve the critical thinking of their students. Most of this literature has been highly theoretical, far removed from the practical concerns that constantly confront teachers and their students" (p. xi). He added that what makes this even more difficult is the fact that the methods for critical thinking vary from discipline to discipline.

Several authors have described techniques that, although discussed in the context of a particular discipline, could be utilized across disciplines. Raths and

others (1986) stated, "Thinking activities...are open-ended, in that no single, 'correct' answers are being sought....Many answers are acceptable and appropriate. Each activity calls for the exercise of one or more higher-order mental functions" (p. 47). Dale (1972) suggested that the role of the teacher is to give just enough help to avoid frustration in the student, but not too much, else the student becomes dependent and is robbed of the joys and risk of independent thinking. He described that the teacher's role is not to provide knowledge on which the student makes choices, but rather to stimulate the student to think independently about choices and their consequences and to develop values. "To be creative is to be thoughtfully involved, to be a concerned and active participant, not a disengaged spectator" (p.76).

Teaching strategies for critical thinking often involve reading and writing techniques. Dale (1972) described critical reading as an involved, participatory experience wherein the reader is sensitive to metaphor and engaged in dialogue with the author. Paul (1992) concurred, stating,

> Critical reading is an active, intellectually engaged process [author's emphasis] in which the reader participates in an inner dialogue with the writer. Most people read uncritically and so miss some part of what is expressed while distorting other parts. A critical reader realizes the way in which reading, by

> its very nature, means entering into a point of view other than our own, the point of view of the writer. A critical reader actively looks for assumptions, key concepts and ideas, reasons and justifications, key concepts and experiences, implications and consequences, and any other structural features of the written text, to interpret and assess it accurately and fairly. (p. 642)

He also provided a definition of critical writing:

> To express oneself in language requires that one arrange ideas in some relationships to each other. When accuracy and truth are at issue, then we must understand what our thesis is, how we can support it, how we can elaborate it to make it intelligible to others, what objections can be raised to it from other points of view, what the limitations are to point of view, and so forth. Disciplined writing requires disciplined thinking; disciplined thinking is achieved through disciplined writing [author's emphasis]. (pp. 643-644)

Manlove (1989) suggested ways of thinking about literature to make it come alive more for the reader, i.e. noting satire and irony, reading "deeper", and exploring meanings and linguistics.

Jones and others (1987) used the term "strategic teaching," meaning the utilization of teaching strategies to

decrease teacher direction so students take responsibility for their own learning. The teacher must assist the learner in constructing meaning so that the "learner is strategic, working actively to link the new information to prior knowledge and drawing on a repertoire of thinking strategies" (p. 10). They noted that learning is recursive and nonlinear, returning to earlier thoughts for revision as new information is understood and assimilated.

Teaching strategies whereby students assimilate and group information, note patterns, or build models are also prevalent in the literature. Jones and others (1987) suggested students use organizational patterns and graphic outlining or mapping. Dale (1972) recommended building outlines, models, and paradigms to classify ideas and to use mental scanning to bring dissimilar ideas together. In addition, he added that the student must think about thinking through systematic critique. This includes reading between the lines for implications and reading beyond the lines for application. Ruggiero (1988a) concurred with this, suggesting that faculty encourage students to be curious and ask questions such as "How will it be when applied?" and "How will different people react to it?"

There is increasing support in the literature for modeling and the use of exemplars. The notion here is that critical thinking is an abstract concept, difficult to describe and operationally define, and that the learner can

best learn its use through modeling and effective use of exemplars. Meyers (1986) stated that "by modeling reflective thought in lectures and discussion, teachers can do much to encourage this frame of mind in their students" (p. 47). Paul (1985) emphasized the need for teachers themselves to take a course in critical thinking in order to foster the same in students. While giving praise to Bloom and others (1974) for their seminal work in delineating educational objectives, including higher-order thinking skills, Paul (1985) was somewhat critical that the text maintained a "neutrality" and that the teacher must instead raise opposing views, explore background assumptions, and examine inconsistencies. In order to facilitate this process in students, the teacher must be able to model these behaviors.

Grant (1988) provided a qualitative study of four high school teachers nominated by the principal as exceptional teachers who challenged students' thinking. She advocated the use of models, metaphors, and images as modeling techniques. Sternglass (1988) gave an account of a class called Introspective Accounts of Reading and Writing where students maintained journals for the purpose of reflective thinking. In an interesting text entitled Uncommon Genius, Denise Shekerjian (1990) shared a study of interviews with Roderick MacArthur Fellowship recipients, chosen for the awards based solely on their creativity. Recipients are

from a wide spectrum of disciplines and their interviews provide an opportunity for the reader to see some of the process and product of critical and creative thinking.

Specific suggestions of strategies for teaching critical thinking at the community college level are cited in the literature. Adams and Hamm (1990) advocated the use of collaborative teaching strategies, citing debates, role play, composition of letters to newspapers and the media, and other collaborative processes as means for developing critical thinking skills. Interdisciplinary small group projects are also effective teaching strategies in the cooperative learning approach. Additionally, Adams advocated the use of computers to stimulate interaction, thinking, and collaboration. Long (1989) noted that cooperative learning, where students are grouped in teams working together toward a common goal, provides a forum for students to interact in such a way that critical thinking is enhanced.

Heyman and Daly (1992) suggested a number of teaching strategies in vocational-technical and occupational classes, including: (a) visualization techniques, (b) use of literature, (c) case studies and oral communications, and (d) problem solving and models. Marzano and Evy (1989) stressed the need for vocational programs to emphasize (1) self-management skills (setting goals, planning, adjusting, and evaluating); (2) knowledge extension skills (composing,

problem solving, decision making, and inquiry); and (3) enabling skills (comparing, classifying, deducing, analyzing, supporting, and abstracting).

Knight (1989) described teaching strategies in history and the social sciences to strengthen the student's reflective process and develop creativity. In particular, she emphasized the importance of students developing the skill of argumentation.

The need for developing critical thinking skills in students and the need for teaching strategies to implement the "learning to learn" concept across all college disciplines was noted as a priority at Miami-Dade Community College. In 1987, the college formed a "Learning to Learn" committee to study the issue. Following an extensive process of faculty surveys and interviews, the committee reported a series of recommendations which included a course for teachers, a self-assessment instrument for faculty, and a Teaching/Learning Resource Center (Miami-Dade Community College, 1987).

Teaching Strategies in Nursing

Discipline-specific literature on critical thinking in the vocational fields has been slow to develop. A number of vocational disciplines have integrated problem-solving exercises over the years. Most notably, Woods and others (1975) developed an adaptation to Polya's four step method for their engineering students. The American Nurses'

Association (ANA) (1973) adopted into their Standards of Nursing Practice a five step nursing process model of assessment, analysis, planning, implementation, and evaluation. These, and other efforts in the vocational disciplines, represent rational, linear, problem-solving approaches; usually there are one or more "correct answers" involved and only one world view. Although helpful in assisting students to analyze, synthesize, and evaluate within the narrowness of Bloom's 1974 taxonomy, as described by Paul (1985), these strategies do not provide for critical thinking and creative thinking in the broader sense as described by Brookfield (1987), McPeck (1981), and Paul (1992).

Making a major contribution to the literature in the discipline of nursing, Bandman and Bandman (1988), in their book Critical Thinking in Nursing, provided an important bridge between current literature in critical thinking, and nursing as a science and practice. Although still somewhat narrow, their definition of critical thinking went beyond the simplistic, goal-oriented, problem-solving approach of previous nursing literature. They defined critical thinking as:

> the rational examination of ideas, inferences, assumptions, principles, arguments, conclusions, issues, statements, beliefs, and actions....Critical thinking is reasoning in which we analyze the use of

> language, formulate problems, clarify and explicate assumptions, weigh evidence, evaluate conclusions, discriminate between good and bad arguments, and seek to justify those facts and values that result in credible beliefs and actions. (p. 5)

Bandman and Bandman (1988) further particularized their definition by providing a checklist of critical thinking functions in nursing. They then proposed three models of teaching and learning in critical thinking in nursing (adapted from Scheffler 1973): the Feeling model, the Vision model, and the Examination model. They described the three models as follows:

> The Feeling model emphasizes feelings, impressions, and data, the given. Feelings call for observation, sensitivity, care, concern, alertness for vital signs, symptoms, and clues, and attention to a patient's state of mind....
>
> The Vision model is used to generate a pattern of thought, to organize and interpret feelings, to assemble a patient's data, and to formulate a hypothesis, an inference, a guess, an idea about the patient's health care problem....
>
> The Examination model is used to reflect on the ideas, insights, and visions...to search for appropriate rules of inference, investigation, testing,

inspecting, verification, confirmation, corroboration, and justification. (p. 6)

Miller and Malcolm (1990) also advocated critical thinking in nursing, stating, "Changes could be made whereby students could engage in more problem-solving activities, case study analysis, more discussion and reflection, and position papers rather than passively listening to lectures....Nursing educators can foster critical thinking in students by reinforcing the spirit of inquiry and independent critical thought" (p. 73). Both Miller and Malcolm (1990) and Klaassens (1988) stressed the need for nurse educators to consider not only the students' cognitive level, but also learning styles. Klaassens (1988) provided the following as teaching strategies that apply to higher educational settings and nursing education in particular: use of reflective responses, analysis, free writing, brainstorming, journal writing, case studies, and computer simulations.

Teaching strategies to foster critical thinking in clinical practice proposed by Persaud, Leedom, and Land (1986) included (a) the use of feedback lectures where students were broken into groups and given problems to solve, (b) clinical simulations using a decision-making model, (c) computer assisted video instruction, and (d) case studies integrating medical-surgical and maternal-child content areas. Gambrill (1990) advocated that clinical

practitioners strive to improve their accuracy of judgments and decisions about clients by learning more about sources of error. Such teaching strategies as role modeling and the critique of case studies would allow for such learning, especially among senior students who have experience, at a novice level, in clinical practice.

Summary

Literature reviewed for this study included not only writings in the area of critical thinking, but also literature on creative thinking, metacognition, and teaching strategies to foster critical thinking. These concepts have been discussed in the literature for nearly a century, with increasing emphasis in the past two decades in response to cries for educational reform and the teaching of thinking at all educational levels.

Although there has been extensive dialogue in the literature among philosophers, psychologists, and educators regarding the definition of critical thinking, a common definition is yet to emerge. The construct remains "slippery." Some authors maintain a narrower view of critical thinking (i.e. problem solving, analysis, judgment, logical reasoning), while others view the construct more broadly, encompassing reflective skepticism, exploration of alternatives, the generation of new ideas, thinking about thinking, and being moved to reflect on values and reframe beliefs.

Argument continues on the value of teaching critical thinking skills, dispositions, creativity, and metacognition as a pure instructional approach, versus the necessity of context, utilizing infusion and immersion techniques. Recent dialogue brings these viewpoints closer. Most "purests" encourage a parallel approach of teaching in subject matter context for "practice" with application; and, most "domain-specificity" advocates acknowledge the value of critical thinking skill instruction as an adjunct approach. Several mixed models have also begun to emerge.

Discussed heavily in the literature on critical thinking were the concepts of creative thinking and metacognition. Many authors differentiated these concepts; some viewed them as "infused" into one another. Several models have been constructed to depict their interrelatedness.

Teaching strategies for developing critical thinking skills in learners are becoming more abundant, though most focus on secondary and postsecondary instruction in the academic disciplines. Literature in the vocational areas, at the collegiate level, remains sparse. There is a paucity of literature on critical thinking strategies in nursing, with the few that do exist focusing primarily on the narrower concept of critical thinking as logical reasoning or problem solving. The need for this study, then, becomes even more apparent.

CHAPTER 3

Research Design and Methodology

Study Objective

The purpose of this study was to explicate postsecondary critical thinking instructional techniques being used by faculty in the discipline of nursing at the associate degree level to serve as a model for nursing faculties and faculties in other disciplines. Teaching strategies employed in Associate Degree Nursing (ADN) programs, in California Community Colleges, perceived by faculty as effective in fostering critical thinking in students were examined. Questions addressed by the study were the following:

1. Are there common threads among nursing educators in their definition of critical thinking?
2. Do nursing faculty utilize critical thinking teaching strategies in senior courses and, if so, were they used prior to AB 1725, or have they been added as a result of AB 1725?
3. What critical thinking strategies are being utilized by lead nursing faculty in senior courses and how do they perceive the effectiveness of such techniques?
4. What common themes emerge as lead nursing faculty in senior courses reflect on and describe teaching

strategies they feel have been "especially effective in fostering critical thinking in nursing students?"

The study's results, including exemplars, serve as a resource for college faculty in both nursing and other disciplines as they search for methods to foster critical thinking in their college level students.

Design

Following literature review and a pilot study, an instrument was developed and employed to conduct a survey of critical thinking teaching strategies utilized by faculty in senior nursing courses at the ADN level. The senior nursing course was defined as that course in the last term of the program, prior to graduation, where leadership content is included. All 70 California Community College ADN programs were surveyed. One of the 70 was used for pretesting the instrument and was thereafter eliminated from the sample.

Careful planning and sound methodology were employed, utilizing the seven major steps for questionnaire surveys as outlined by Borg and Gall (1983):

1. Defining objectives
2. Selecting a sample
3. Writing items
4. Constructing the questionnaire
5. Pretesting
6. Preparing a letter of transmittal

7. Sending out questionnaire and follow-ups (p. 415)

Instrument

The survey instrument was developed through a pilot study in one California community college, which was thereafter eliminated from the study sample. The pilot study consisted of a review of teaching strategies identified for the critical thinking component of each college level course at College of the Redwoods in Eureka, California. This college, in addressing the Title V mandate, created a course outline template delineating all new requirements, including the critical thinking component, for college level courses.

Following literature review and a review of all course outlines' critical thinking components at the pilot school, the survey instrument was designed (Appendix A). Teaching strategies used to foster critical thinking as they emerged from both the pilot study and literature review were grouped in constructing the instrument, resulting in the following twenty teaching strategies for the survey instrument.

1. Brainstorming
2. Case studies; patient or management situations
3. Class or small group discussion using facilitator(s); feedback lectures
4. Recording and/or critique of therapeutic communication dialogues (process recordings, taped report, interviews, etc.)

5. Deductive reasoning techniques (e.g. decision trees, etc.)
6. Inductive reasoning techniques (e.g. priority setting, triage, noting trends, etc.)
7. Interactive video
8. Computer simulations
9. Mock trial for legal issues (malpractice, negligence)
10. Scenarios; role play; clinical simulations
11. Panel discussion of multi-faceted issue
12. Formal debate
13. Abstract or critique of a book, article, or videotape
14. Written report on issues, trends, etc.
15. Constructing models (two or three dimensional)
16. Writing policy blueprint(s)
17. Writing letter to newspaper or media on controversial issue; position papers for identified problem(s)
18. Journal writing with reflection
19. Self-study exercises (values clarification, personal philosophy statements, development of resume)
20. Teacher role modeling of critical thinking; self-critique showing judgment errors of the instructor

The survey instrument contained four components: (1) cover letter explaining the purpose of the study; informing the respondents of benefits, risks, confidentiality, and voluntary nature of the study; and asking if they would like a copy of the results; (2) demographic data section including school data (i.e. college size, ADN program size, number of admissions, and geographic location), and personal data (i.e. gender, age, years of teaching experience in nursing, type and recency of degrees including those in progress, amount of professional development in the subject of critical thinking in the past five years, and their own definition of critical thinking); (3) survey questions asking respondents to identify critical thinking teaching strategies they currently use in the senior nursing course and to indicate their perceived effectiveness (by forced-choice Likert scale) of such strategies; and (4) a narrative description request, asking respondents to reflect on their use of critical thinking teaching strategies and describe one they feel has been especially effective in fostering critical thinking in nursing students (Appendix A).

As described in Chapter One, no definitions were provided by the researcher on the term "critical thinking" nor the twenty critical thinking teaching strategies. As described by Polit and Hungler (1989), "Researchers operating in a phenomenological framework generally do not define the concepts in which they are interested in

operational terms prior to gathering information. This is because of their desire to have the meaning of concepts defined by those being studied themselves" (p. 39).

The survey instrument was pretested by nursing faculty at the pilot study school. As stated by Borg and Gall (1983), "For the pretest [one] should select a sample of individuals...similar to [the] research subjects" (p. 425). Space was provided for pretest respondents to make comments on the questionnaire, citing areas of ambiguity, and making suggestions on the questionnaire format. The survey instrument was then revised and prepared for distribution to the 69 schools remaining in the sample.

Methodology: Sample and Data Collection

All California community college ADN programs, with the exception of the one in the pilot study, were surveyed (N = 69). ADN programs were chosen for the study based on two factors. First, nursing is one of the few community college programs with a blend of curriculum in both vocational education (nursing) and general education (biological sciences, behavioral sciences, communication skills, and computation), and both of these curricula are transferable to four year institutions. Therefore, nursing was seen as one of the most likely vocational programs to utilize critical thinking teaching strategies.

Second, since the California Nurse Practice Act requires all ADN programs to teach, and program graduates to

practice, leadership and nursing process (a problem-solving approach to care), the likelihood of critical thinking teaching strategies being utilized in nursing programs (particularly the senior courses) was great. Additionally, beginning research in critical thinking in the discipline of nursing can be found in the literature over the past decade, lending support to the development of the survey instrument.

Survey instruments were mailed to the lead instructor in the senior nursing course, as previously described. The senior course lead instructor was the individual so designated by the program director.

Respondents were given two weeks to respond to the survey. A thirty-nine percent return rate (N = 27) was obtained from the initial survey (i.e. first distribution). Follow-up letters and phone calls were then utilized resulting in a final return rate of seventy percent (N = 48).

Demographic data consisted of both school data and faculty personal data as follows:

School Data

1. College size
2. ADN program: numbers of students admitted each class
3. ADN program: number of classes admitted each year
4. Regional location of the college

Faculty Member's Personal Data

1. Gender
2. Age
3. Full-time equivalent (FTE) years teaching nursing
4. Formal education in progress
5. Formal education completed
6. Professional development completed in the area of critical thinking in the last five years (in days)

Figures 5 and 6 depict the distribution of responses on school data and faculty data, respectively from respondents in the study sample (N = 48).

Figure 5. Distribution of Respondents' School Data (N = 48).

1. College Size:	Number	Percent
1 - 3,500 FTE	4	8.33%
3,500 - 5,000 FTE	5	10.42%
5,000 - 10,000 FTE	17	35.42%
Over 10,000 FTE	22	45.83%
Not Reported	0	0.00%
Total	48	100.00%

2. ADN Program: Admitted Each Class	Number	Percent
Under 20	1	2.08%
21-30	10	20.83%
31-40	8	16.67%
41-50	15	31.25%
Over 50	14	29.17%
Not Reported	0	0.00%
Total	48	100.00%

3. ADN Program: Classes Admitted Each Year:	Number	Percent
One	23	47.92%
Two	22	45.83%
Three	2	4.17%
Four or More	1	2.08%
Not Reported	0	0.00%
Total	48	100.00%

4. Regional Location	Number	Percent
Northern	9	18.75%
Bay	7	14.58%
Central	10	20.83%
South Central	2	4.17%
Desert/San Diego	5	10.42%
Los Angeles/Orange	15	31.25%
Not reported	0	0.00%
Total	48	100.00%

As depicted in Figure 5, more than 80% of the faculty surveyed were located in colleges whose full-time equivalents (FTE) of students were greater than 5,000. The number admitted into each class ranged from under 20 to over 50. (One respondent reported as many as 125 occasionally being admitted in a given class.) More than 93% of the ADN programs admit one or two classes per year. Respondents were from all six regions of the state, with the largest number from the Los Angeles/Orange region.

Figure 6. Distribution of Respondents' Personal Data (N = 48).

1. Gender	Number	Percent
Male	1	2.08%
Female	47	97.92%
Not Reported	0	0.00%
Total	48	100.00%

2. Age	Number	Percent
21 - 30	0	0.00%
31 - 40	9	18.75%
41 - 50	21	43.75%
Over 50	18	37.50%
Not Reported	0	0.00%
Total	48	100.00%

3. FTE years teaching nursing	Number	Percent
0 - 5	3	6.25%
6 - 10	9	18.75%
11 - 15	14	29.17%
16 - 20	14	29.17%
21 - 25	6	12.50%
Over 25	2	4.17%
Not Reported	0	0.00%
Total	48	100.00%

4. Formal Education in Progress	Number	Percent
Masters	19	39.58%
Doctorate	3	6.25%
None indicated	21	43.75%
Not reported	5	10.42%
Total	48	100.00%

4.B. Degree Programs Indicated	Number	Percent
Education	2	4.17%
Nursing	15	31.25%
Public Health Admin.	1	2.08%
Theology	1	2.08%
None Indicated	29	60.42%
Total	48	100.00%

5. Formal Education Completed	Number	Percent
BSN	31	34.83%
Bachelors, Non-nursing	4	4.49%
MSN	41	46.07%
Masters, Non-nursing	8	8.99%
Doctorate, Nursing	2	2.25%
Doctorate, Non-nursing	3	3.37%
Total	89	100.00%

Note: Duplicate Count; some respondents had more than one degree, checked all applicable.

6. Professional Development in last five years (in critical thinking)	Number	Percent
None	2	4.17%
1 - 3 days	27	56.25%
4 - 6 days	12	25.00%
7 - 9 days	2	4.17%
10 or more days	4	8.33%
Not Reported	1	2.08%
Total	48	100.00%

As depicted in Figure 6, 47 of the 48 respondents were female; the mean age was in the 41 to 50 year range. There was a normal distribution among respondents of full-time equivalent (FTE) years experience teaching nursing with nearly 60% having taught between 11 and 20 years.

Over 46% of the respondents had completed a masters degree in nursing, with an additional two percent having completed doctoral degrees in nursing. Also, nearly 46% of all respondents had formal (graduate) education in progress. Of the 22 individuals currently in graduate programs, 19 were at the master's level, while the remaining three were

at the doctoral level. Most respondents' in-progress degree programs were in nursing. Interesting to note was data related to professional development in critical thinking, which revealed that more than 85% of all respondents had six or fewer days of such development activities over the past five years.

Examination of demographics data revealed the following school profiles:

1. Small schools (N = 9) of less than 5,000 full-time equivalents (FTEs) of students admitted one or two ADN classes annually; the size ranged from 21 to over 50 students per class (four schools reported 21 to 30 students, two reported 31 to 40, and three reported over 50 students per class).
2. Mid-sized schools (N = 17) of 5,000 to 10,000 FTEs also admitted one or two ADN classes annually; size ranged from 21 to over 50 students per class, although 65% reported over 40 students per class.
3. Large schools (N = 32) of over 10,000 FTEs generally admitted two classes per year, with 68% reporting sizes of over 40 students per class.
4. Class size trends were not found related to the geographic region in which they fell, but rather related to the size of the school, as noted above.

Also interesting to note was the fact that no trends were found comparing (a) the amount of attendance by faculty

at professional development activities, in the area of critical thinking, in the past five years; (b) the number of years of teaching experience; and (c) the recency, and completed versus in-progress status of graduate degree work.

Data Analysis

As identified by Borg and Gall (1983), "data collection tools are used in survey research to obtain 'standardized' information from all subjects in the sample [for data analysis]" (p. 406). Components two and three of the survey instrument were constructed in a "closed form" (Borg and Gall, 1983, p. 419), utilizing category checklists and Likert scales so that quantification and analysis of results could be carried out efficiently. Measures of central tendency were computed on quantitative data of teaching strategies in use and their perceived effectiveness.

Responses from the critical thinking definition question in component two and the narrative description in component four of the survey instrument, constructed in the "open form" (Borg and Gall, 1983, p. 419), were grouped to report trends. Narrative descriptions of teaching strategies respondents provided in component four were similarly grouped with representative descriptions reported in narrative form to serve as exemplars for faculties of nursing and other disciplines. In addition, faculty commentary was noted and included in representative exemplars.

Protection of Rights

Each lead instructor being surveyed received a cover letter with the survey instrument, explaining the purpose of the study, encouraging their participation, and asking them if they desired a copy of the results (see Appendix A). The fact that participation was voluntary was stressed, and participants were assured of both personal and institutional anonymity. The length of time projected to complete the survey (17 minutes) was included in the letter and minor risks and envisioned benefits were explained. The researcher's name and a contact number was provided to answer participants' questions and provide clarification as needed for responding to the survey instrument.

Summary

The purpose of the study was to explicate critical thinking teaching strategies being utilized by ADN faculty in California, and the perceived effectiveness of these strategies, to serve as a model for nursing faculties and faculties in other disciplines. Questions addressed by the study included not only teaching strategies in use and their perceived effectiveness, but also exploration of common threads among nursing educators in their definitions of critical thinking, and common themes of "especially effective" techniques.

The study involved a pretest of the survey questionnaire as a pilot, utilizing one sample school's

nursing faculty, with subsequent distribution to all 69 other ADN program senior nursing course lead faculty. The instrument included a cover letter; demographic school and personal data; closed form, Likert-scale questions related to critical thinking teaching strategies and their perceived effectiveness; and an open form question requesting a narrative description of an "especially effective" strategy that had been implemented. Respondents were also asked to articulate a definition for critical thinking. A 70% return rate was obtained, utilizing follow-up letters and phone calls.

CHAPTER 4

Research Findings

Introduction

The purpose of this study was to explicate postsecondary critical thinking instructional techniques being used by faculty in the discipline of nursing at the associate degree level to serve as a model for nursing faculties and faculties in other disciplines. Teaching strategies employed in Associate Degree Nursing (ADN) programs, in California Community Colleges, perceived by faculty as effective in fostering critical thinking in students were examined. Questions addressed by the study were the following:

1. Are there common threads among nursing educators in their definition of critical thinking?
2. Do nursing faculty utilize critical thinking teaching strategies in senior courses and, if so, were they used prior to AB 1725, or have they been added as a result of AB 1725?
3. What critical thinking teaching strategies are being utilized by lead nursing faculty in senior courses and how do they perceive the effectiveness of such techniques?
4. What common themes emerge as lead nursing faculty in senior courses reflect on and describe teaching strategies they feel have been "especially

effective in fostering critical thinking in nursing students?"

A survey questionnaire was developed and administered to the senior nursing course lead faculty member of all California community college Associate Degree Nursing (ADN) programs (N = 70). One school was used for the pilot study, and was thereafter eliminated from the sample. A 39% (N = 27) return rate was obtained from the initial mailing, with a final return rate of 70% (N = 48) resulting after follow-up procedures by mail and telephone.

Sampling

Demographic school and personal data of the sample was presented in Chapter Three (see Figures 5 and 6). More than 80% of the faculty surveyed were located in colleges whose full-time equivalents (FTEs) of students were greater than 5,000; and, while the largest number of respondents were from the Los Angeles/Orange region, all six regions of the state were represented. Respondents were predominantly female (47 of the 48) with a mean age in the 41 to 50 year range. Nearly 60% had been teaching nursing for 11 to 20 years.

Over 46% of the respondents had completed a masters degree in nursing, with an additional two percent having completed doctoral degrees in nursing. Also, nearly 46% of all respondents had graduate education in progress (mostly at the master's level, with a few at the doctoral level).

Data on professional development in critical thinking, however, showed that more than 85% of all respondents had six or fewer days of such development activities over the past five years.

Instrument Administration

Administration of the survey instrument was conducted without incident. All questionnaires were completed correctly, although respondents did leave some questions unanswered. No returned surveys were eliminated from the sample. No written or verbal commentary was made by respondents regarding confusion or difficulty in understanding questionnaire items, nor were any untoward effects reported by study participants.

Following administration, quantitative survey data was tallied and qualitative survey responses were coded as described later in this chapter. Non-responses were included in quantitative data tables.

Critical Thinking Definition Threads

Participants in the study sample were asked on the survey instrument to "describe, in your own words, your definition of critical thinking." This question was placed at the end of the demographic data section, prior to questions related to critical thinking teaching strategies, for two reasons. First, this early placement of the question gave respondents an opportunity to reflect and "think critically" about the concept, then articulate their

definition in writing. The intent was to have the participant identify what a critical thinking teaching strategy was trying to accomplish before responding to his or her use and perception of effectiveness of such strategies (which appeared in the next section of the instrument). Second, the researcher was attempting to minimize any bias, as to the definition of the concept, which might be encountered once the participant began reading the detailed list of strategies that appeared later in the survey instrument.

Research Question One: Are there common threads among nursing educators in their definition of critical thinking?

In a phenomenological approach, key descriptors in all respondents' definitions were identified and compiled into a list, then grouped into common threads. Five threads emerged from the data, centered around an organizing theme of "visual lenses" through which, as respondents described, one might examine problems, issues, or new information. Table 1 delineates the five threads that emerged from respondents' definitions of the phenomenon of critical thinking.

Table 1. Critical Thinking Definition Threads.

1. Problem solving/nursing process
2. Analysis/synthesis/higher-level thinking/beyond knowledge and comprehension/some application, then analysis/evaluation (Bloom's taxonomy)
3. Formal logic/logic/identifying flaws in reasoning
4. Reflection/challenging current beliefs/imagining alternatives/creativity
5. Metacognition/thinking about thinking

Each descriptor on the compiled list was then categorized and assigned to it's respective critical thinking definition thread, and a coding system was constructed (see Appendix B). Each respondent's definition was read a second time and descriptors were coded. A tally of coded descriptors was maintained (see Appendix C). Lastly, respondents' definitions were read a third time and assigned a global definition from among the five major threads. In other words, although each definition may have contained descriptors in more than one major thread, the overall "visual lens" described by the respondent portrayed one main viewpoint, or thread.

For example, taking one respondent's definition of critical thinking through the coding process, the researcher conducted three steps as follows.

Step One: Descriptors in the definition were underlined and added to the compiled list:

> *"Critical thinking is the application of the scientific problem solving process in reaching goals - a process in which data are collected, analyzed, and weighed before finding a solution to a personal or professional problem."*

Descriptors: problem-solving
analyze
weighing
finding a solution

Step Two: Following grouping of descriptors on the compiled list, and emergence of the five threads, the definition's descriptors were coded (see Appendix B):

problem-solving FAC11 A1
analyze FAC11 B3
weighing FAC11 B3
finding a solution FAC11 A1

Step Three: The description was read again and assigned one of the five global definitions:

> *"Critical thinking is the application of the scientific problem-solving process in reaching goals - a process in which data are collected, analyzed, and weighed before finding a solution to a personal or professional problem."*
>
> Global definition: FAC11A Problem solving.

Although the definition includes two descriptors from the second thread (FAC11B), when taken in context the definition reflects the global concept of problem solving.

None of the respondents articulated a comprehensive definition which included descriptors from four or all five threads. Additionally, most respondents viewed critical thinking as problem solving, reasoning, or the utilization of Bloom's higher-order thinking skills. Given the nursing discipline's place as a novice in the maturational stage of active, formal use of critical thinking teaching strategies in the educational curriculum, respondents' definitions were as expected and consistent with earlier stages of evolution of the construct of critical thinking. Well documented in the literature in the last decade, however, is the narrowness of such approaches to the complex construct of critical thinking (McPeck, 1981; Paul, 1985; Siegel, 1988).

The results of the researchers' assignment of a global concept to each respondent's definition is shown in Table 2. The majority of the 48 respondents' definitions fell into the first two thread categories: (1) problem-solving and (2) analysis, synthesis, and evaluation. Declining numbers of respondents fell into the categories of (3) informal logic/reasoning and (4) reflection/challenging beliefs/creativity, with only one respondent viewing

critical thinking as involving the (5) metacognitive process.

Table 2. Distribution of Respondents' Global Concepts of Critical Thinking (N = 48).

Frequency	Global Concept
19	Problem solving/nursing process
12	Analysis/synthesis/higher-level thinking/beyond knowledge and comprehension/some application, then analysis/evaluation (Bloom's taxonomy)
7	Formal logic/logic/identifying flaws in reasoning
3	Reflection/challenging current beliefs/imagining alternatives/creativity
1	Metacognition/thinking about thinking
6	Non Respondents

Impact of Legislation: AB 1725

Faculty surveyed were asked to respond to the impact of AB 1725 on their use of critical thinking teaching strategies.

Research Question Two: Do nursing faculty utilize critical thinking teaching strategies in senior courses and, if so, were they used prior to AB 1725, or have they been added as a result of AB 1725?

The survey instrument (see Appendix A) asked faculty to indicate which one of the following most closely described critical thinking strategies they utilized in the last semester nursing course: (a) They are included on the written approved course outline as mandated by AB 1725, but I don't really do them in the course; (b) I use one or more techniques, but I was using them prior to implementation of AB 1725, or (c) I was not using any strategies prior to AB 1725, I am using them in the course.

Faculty respondents overwhelming indicated choice (b) on this survey question. All 48 participants responded that they currently use critical thinking teaching strategies. Only one of the 48 indicated that use was as a result of AB 1725; the other 47 responded they were using them prior to the implementation of AB 1725.

Several comments were made by respondents about this question on the survey. Most remarks related to the viewpoint that nursing has always used critical thinking; that planning patient care and utilizing nursing process requires critical thinking and, therefore, one cannot be a nurse without thinking critically. One respondent noted that although she had used critical thinking teaching strategies in the past she was using them more after having attended the Critical Thinking Institute at Sonoma State University.

Critical Thinking Strategies in Use and Their Perceived Effectiveness

As described in Chapter Three, the survey instrument delineated 20 critical thinking teaching strategies that emerged from extensive literature review and the pilot study. Participants were asked to (a) indicate for each teaching strategy whether or not they used the technique and (b) rate their perception of each strategy's effectiveness on a four point, forced-choice Likert scale, where one indicated they perceived it as very ineffective and four indicated they perceived it as very effective.

Question Three: What critical thinking teaching strategies are being utilized by lead nursing faculty in senior courses and how do they perceive the effectiveness of such techniques?

As shown in Table 3, there was a wide range of critical thinking teaching strategies in use. Eight strategies were used most heavily, i.e. by 75% (N = 36) or more of the respondents. These were:

Brainstorming

Case studies

Class or small group discussion

Inductive reasoning techniques

Scenarios; role play; simulations

Written reports

Self-study exercises

Teacher role modeling

Perceived effectiveness of these eight strategies was also high. Means ranged from 2.95 to 3.67 on a Likert scale of one to four (with four being very effective). Other teaching strategies not listed on the instrument, but cited by respondents under "other", included: critical thinking testing methods, games, verbal reports, and thinking about thinking exercises. One will note, in the next section, that strategies utilized most heavily were not only perceived as very effective, but also emerged as themes among faculty's narrative descriptions of "really good" techniques they had used.

Table 3. Frequency of Critical Thinking Teaching Strategies Used by Respondents and Their Mean Perceived Effectiveness (N = 48).

Teaching Strategy	Use	Don't Use	NR	Mean Effectiveness
Case Studies; patient or management situations	47	1	-	3.67
Inductive reasoning techniques	47	0	1	3.62
Class/small group discussion	46	2	-	3.59
Scenarios; role play; clinical simulations	40	8	-	3.48
Teacher role modeling	38	10	-	3.47
Deductive reasoning techniques	30	16	2	3.43
Brainstorming	38	10	-	3.40
Interactive video	13	33	2	3.36
Self-study exercises	36	12	-	3.36
Formal debate	9	38	1	3.33
Panel discussion of multi-faceted issue	23	24	1	3.25

Teaching Strategy	Use	Don't Use	NR	Mean Effectiveness
Writing letter to newspaper or media; position papers	12	35	1	3.21
Mock Trial	10	37	1	3.21
Computer simulations	22	26	-	3.17
Constructing models	5	42	1	3.13
Abstract or critique of a book, article, or videotape	22	26	-	3.00
Written report	38	10	-	2.95
Communication/process recordings	25	23	-	2.93
Journal writing with reflection	24	23	1	2.92
Writing policy blueprint(s)	6	41	1	2.64

Note: NR = No Response

Teaching Strategy Narrative Description Themes

The survey instrument asked participants to provide a narrative description of a teaching strategy they had used which they felt had been "especially effective in fostering critical thinking in nursing students." Even though the

survey instrument asked the respondent to describe the teaching strategy "in enough detail that a new teacher could try it," the researcher found some descriptions to be as brief as one sentence and others to be quite lengthy. For example, one faculty member simply wrote, "Presenting clinical situations; asking relevant questions and providing some answers that lead to discussion of predetermined areas." Other faculty wrote two or more pages, providing very detailed descriptions of patient cases or questions students must address in written reports, etc.

Narrative descriptions were handled in a similar manner as the critical thinking definitions, in that each description was coded to one or more of the 20 survey instrument's critical thinking teaching strategies that had emerged from literature review and the pilot study. A tally sheet was developed and completed for this purpose (see Appendix D.)

Of the 48 respondents, 40 provided narrative descriptions of teaching strategies, and eight did not provide narratives. Two of these eight provided written commentary that teaching their students to think was not feasible. One stated, "I find it very difficult to get students to think in a critical way. The first ingredient is to be able to read critically....They are not even at this point when they are in the last semester and this frustrates me." The other wrote, "I...do not believe one

can teach a process of thinking. After many years of encountering nursing students in the final semester of the program...I do not feel I can influence their thought processes. I believe this is either inherent in the brain structure and physical function or must be developed in early childhood."

Question Four: What common themes emerge as lead nursing faculty in senior courses reflect on and describe teaching strategies they feel have been "especially effective in fostering critical thinking in nursing students?"

Common themes which emerged from narrative descriptions are provided in Table 4, including the frequency of their appearance among respondents. The most commonly occurring themes were (1) case studies, (2) class and small group discussion, (3) scenarios and role play, and (4) written reports.

Table 4. Seven Emergent Themes of Especially Effective Critical Thinking Teaching Strategies and Their Frequency of Appearance Among Respondents (N = 48).

Emergent Themes	Frequency of Appearance
Case Studies: patient or management situations	14
Class and small group discussion	8
Scenarios and role play	6

Written report	5
Inductive reasoning techniques	4
Brainstorming	3
Panel discussion	3

Note: Some narratives included more than one theme.

Only one theme - the use of case studies - emerged as dominant among participants' responses. Of the 48 study participants, 43 provided narrative descriptions, with 33% of these (i.e. 14) falling into the case study category. In addition, those whose dominant theme was the use of small group discussion, scenarios, or role play, also frequently utilized patient cases in the process.

In addition, critical thinking teaching strategies which were cited once or twice among narrative descriptions as especially effective included: communication process recordings, deductive reasoning techniques, teacher role modeling, the formal debate, writing policy blueprints, journal writing with reflection, use of games, critical thinking essay exams, imagery, peer questioning, and peer critique.

Case Study Exemplars

The use of case studies, as an instructional approach for fostering critical thinking skills in students, far exceeded all other teaching strategies among respondents' narrative descriptions (see Table 4). Faculty utilized

individual patient case studies both in lecture and clinical laboratory settings of the class. Since the survey sample was from the senior nursing course, complex medical-surgical, ethics, and management case studies were prevalent. Extensive use of problem solving via the nursing process, priority setting, and patient care planning was found in the descriptions. Figure 7 provides three case study exemplars of critical thinking teaching strategies.

Figure 7. Critical Thinking Teaching Strategies: Case Study Exemplars.

CRITICAL THINKING TEACHING STRATEGY EXEMPLAR # 1

TOPIC: CASE STUDY - PATIENT SITUATION

The instructor prepares and provides to the student a written narrative of a patient, including biopsychosocial status, presenting symptomatology, laboratory results and other pertinent data, medical diagnoses, and physician's orders. The student must then identify nursing diagnoses and design a plan of care, including both long and short term goals and implementation activities. Rationale statements must be provided citing readings, media, classroom notes, periodicals, etc., to support goals and activities in the plan designed. *Faculty commentary: It is important to include as many curriculum threads as possible in the case to ensure the student must think critically about the plan, individualizing it to the specific patient. Each case study should vary such factors as age, weight, gender, culture, ethnicity, social and family structure, intellectual status, general health status, sensory deficit or other disabilities, level of mobility, etc.*

CRITICAL THINKING TEACHING STRATEGY EXEMPLAR # 2

TOPIC: CASE STUDY - PATIENT SITUATION GROUP WORK

This technique is effective in the clinical laboratory setting for a post conference. Each student presents his or her patient, critiquing the appropriateness and prioritization of nursing actions taken for the day. Rationale is provided verbally by the student to support what he or she would do differently if the experience could be repeated and new knowledge learned is shared. The other students provide feedback. The instructor facilitates the discussion, ensuring that feedback is constructive, eliciting input from quieter students, and adding comments from professional experience to enhance the groups's knowledge base. *Faculty commentary: In this strategy everyone participates and learning is fun and dynamic. Students are very supportive of one another; they gain confidence and are validated by both the instructor and peers, who provide positive feedback during the self-critiques.*

CRITICAL THINKING EXEMPLAR #3

TOPIC: CASE STUDY - MANAGEMENT SITUATION

Students are given a lengthy description of a hospital unit, describing staffing, patients, and the proceedings of a typical day on the unit. Students are asked to analyze the case study and answer a series of questions, which address (a) leadership styles, (b) management problems, (c) effective and ineffective communication taking place, (d) employee evaluation, and (e) policy needed. Students must cite references to support their answers.

Class and Small Group Discussion Exemplars

Frequently cited by respondents was the use of class or small group discussion as a strategy for fostering critical thinking skills in students. Narratives cited brainstorming, inductive reasoning, and exploring alternatives as techniques often involved in such discussion periods. Ethics and management were mentioned several times

by respondents as content areas for which they used small group discussions. Figure 8 portrays four exemplars utilizing class or small group discussion as a critical thinking teaching strategy. Although faculty respondents seldom included metacognition in their definition of critical thinking on the survey instrument, the metacognitive process is evident in Exemplars Four, Six, and Seven. Examination of descriptions and faculty commentaries reveals this "self-regulating" process in action, as both faculty and students monitor and systematically critique the thinking of the group.

Figure 8. Critical Thinking Teaching Strategies: Class or Small Group Discussion Exemplars.

CRITICAL THINKING EXEMPLAR #4

TOPIC: CLASS DISCUSSION - ETHICAL DILEMMAS

Each week an ethical dilemma is posed to the class followed by a series of questions. Students must formulate and verbalize their positions on the issue and the questions, using the literature as a basis to support their arguments. The instructor's role is to (a) facilitate the discussion, (b) identify when grounded arguments move to emotionalism, and (c) ensure that multiple world views are used as lenses for viewing these multi-faceted issues.
Faculty commentary: It is important when using this teaching technique to familiarize students with such concepts as pluralism, world view, grounded arguments vs. emotionalism, and opinion vs. fact. Some preliminary simple exercises working in pairs to give students practice at identifying and critiquing each other's "slips into emotionalism" are also helpful for ensuring that later large class discussions are fruitful. The instructor should also be prepared to deal with emotional outbursts from individual students who may have had personal experiences with abortion, abuse, etc.

CRITICAL THINKING EXEMPLAR #5

TOPIC: SMALL GROUP DISCUSSION - TEACHING-LEARNING EXERCISE

The class is divided in half. These A and B groups are then further subdivided into groups of four to five. (For example, in a class of 30, there will be six groups: 1A, 1B, 2A, 2B, 3A, and 3B.) The instructor provides a topic with objectives and a bibliography to each numbered group (i.e. one topic to 1A and B, one topic to group 2A and B, etc.). All the A groups research, prepare, and "teach" the class their topics. Their respective B counterparts preprepare questions on the topic and ask them during the presentation. The instructor facilitates the process and ensures that presentations and class discussion bring out information from references.

Faculty commentary: Students have fun and learn a great deal. I also find they research more for this class than those taught in the traditional manner.

CRITICAL THINKING EXEMPLAR #6

TOPIC: SMALL GROUP DISCUSSION - MANAGEMENT SKILLS

The instructor provides students with a written description of a typical workload for an RN team leader, including intervention activities to be completed, problems to be resolved, and staffing for the day. The class is divided into small groups to discuss the situation. Each group prioritizes the workload, determines what to do and what to delegate to other staff, and determines how to resolve problems presented. Each group verbally reports their plan to the rest of the class, and class discussion follows. The instructor facilitates the discussion.

Faculty commentary: The small group work gets students to really think about the situation, discussing advantages and disadvantages of alternative approaches. The class discussion as groups report out provides an opportunity for students to see that there are multiple ways to satisfactorily manage the situation.

CRITICAL THINKING EXEMPLAR #7

TOPIC: SMALL GROUP DISCUSSION - EXAMINING AND DEVELOPING COMMUNICATION SKILLS

Each clinical laboratory group is utilized as a collaborative learning group to discuss patient situations and explore other topics. The instructor selects one student in each group to be the group facilitator and provides a special training session at the beginning of the course. Materials are provided for discussion in the clinical post conference or in class in the learning groups. In addition to content knowledge learned in the small groups, student facilitators observe communication processes and attempt to minimize ineffective techniques and foster effective ones in the learning groups.

Faculty commentary: The use of groups assisted students in learning the nursing process. It is also important for the instructor to meet with student facilitators several times throughout the course to discuss problems and successes encountered in the groups.

Scenario and Role Play Exemplars

Several respondents noted the value of scenarios or role play to "practice" transferring theory knowledge into clinical practice. Communication skills, interview techniques, and management techniques were all cited as content areas where scenarios and role play are effective techniques for developing critical thinking. Figure 9 provides two exemplars using these teaching strategies.

Figure 9. Critical Thinking Teaching Strategies: Scenario and Role Play Exemplars.

CRITICAL THINKING EXEMPLAR #8

TOPIC: ROLE PLAY - INTERVIEW TECHNIQUES

TO DETERMINE NURSING DIAGNOSES

Each student is given a NANDA nursing diagnosis in PES format (i.e. providing the problem, etiology(ies)), and symptomatology. The class is then divided into small groups of three to four students. Each student takes a turn role playing a patient with the given nursing diagnosis. The other group members use patient interviewing techniques to determine the nursing diagnosis and plan appropriate nursing interventions.

CRITICAL THINKING EXEMPLAR #9

TOPIC: SCENARIOS AND ROLE PLAY

FOR LEADERSHIP AND MANAGEMENT CONTENT

The instructor prepares a list of leadership and management topics including conflict resolution, being an effective change agent, how to conduct an effective team conference, developing policies through shared governance, minimizing burnout, etc. Students select their topics of choice and the class is then divided into groups of seven to eight persons. Each group must research their topic and prepare a written scenario or "play" with a list of character-actors (students in the group). The group must also provide all classmates with a bibliography in APA format. Each group is given a two hour class session in which to conduct a role play of the scenario followed by a question and answer session with the "audience" (classmates).

Faculty commentary: In contrast with the first year of the program, where the instructor provides a bibliography, at the senior level students conduct their own literature review. This fosters beginning research abilities, and students develop autonomy and a "comfort zone" in using library indexes that will assist them in the future as research needs arise in the practice setting.

Written Report Exemplars

Written reports were frequently cited by faculty as a vehicle for students to think critically about content material. Even those who wrote narrative descriptions involving case studies, small group discussion, or role play often included a writing assignment as part of the activity. Respondents cited ethics, issues, and trends most frequently as content areas where a written report was utilized.

Interesting to note was that although the use of research and the inductive process of preparing a report was a prevalent teaching strategy, the exercise of critiquing, judging, or refuting evidence found was not cited as a teaching strategy. Also noticeably absent was the complex task of writing an abstract of an article, video, etc. by another author.

Additionally, an important finding was that most faculty, when describing a written report or writing assignment that was effective in getting students to think critically, were quick to add remarks on how the students reacted to the exercises. Consistently, faculty commented that students did not like to write, and that their writing skills were poor. One faculty respondent wrote,

> The clinical issues paper of course asks the students (God forbid) to write! I get argument after argument regarding the 'fairness' of asking students to write (most commonly, 'we're in college of course we can

write.') Unfortunately, students have difficulties writing a sound problem statement, and carrying that theme throughout the paper.

Figure 10 displays four distinctly different written report exemplars used by faculty participants to strengthen critical thinking skills in students.

Figure 10. Critical Thinking Teaching Strategies: Written Report Exemplars.

CRITICAL THINKING EXEMPLAR #10

TOPIC: WRITTEN REPORT - NURSING CARE

PROBLEM RESOLUTION

In the last semester students have a six week gerontological nursing section that also emphasizes management skills. During this course the students are to identify a nursing care problem on the unit, research the literature for solutions, and write a paper that identifies the literature and how that content can be adapted to the particular situation. Students are graded on the identification of the problem, it's significance to nursing, it's impact on the patient population, literature review, and the implementation of the solution. Because this is a college course they are expected to use APA format appropriately when typing the paper. *Faculty commentary: Although the students really don't like writing the paper, they see the benefit of the process when the staff actually implements their solutions! I needed an alternative way of grading management skills in this course. A paper and pencil test did not encourage the problem-solving process as the written paper did.*

CRITICAL THINKING EXEMPLAR #11

TOPIC: WRITTEN REPORT - COMPARATIVE

REPORT ON THEORY VS. PRACTICE

Each student is assigned to a specialized acute or ambulatory care setting for a short-term rotation (e.g. cardiac catheterization laboratory, Senior Center, etc.). Specific objectives for the experience are provided by the teacher, as well as preparatory work to be completed. Text and periodical readings, videos, etc. are utilized to assist the student in learning content specified in the objectives. The student then completes the clinical rotation, making observations related to preparatory work. A written report is then completed, comparing what was learned from preparatory work with what they observed and experienced on the rotation.

Faculty commentary: Students are amazed at what is actually operating in reality compared to literature and videos. It allows them to actually see the significant role they can play upon graduation as a change agent.

CRITICAL THINKING EXEMPLAR #12

TOPIC: WRITTEN REPORT - CLINICAL ISSUES PAPER

The clinical issues paper involves a writing assignment three to five typed pages in length, plus references, completed in APA format. Students are asked to identify the health care issue they feel is the most important issue facing our nation as we enter the 21st century. Choice of issues selected have ranged from abortion (both sides), organ transplantation, fetal tissue research, national health care reform, AIDS, mandatory HIV testing for health care workers, and reforming nursing care delivery systems. Once the student has identified the issue they are asked, "What should we do about it?", and finally, "What is nursing's role in the solution identified?" The paper must be well referenced, and strongly argued. A stand must be taken by the student.

Faculty commentary: The assignment is not without its problems. Often students do not do preparatory work, have difficulty writing, and are unable to take a stand on an issue and stay with their arguments and provide supportive data.

CRITICAL THINKING EXEMPLAR #13

TOPIC: WRITTEN REPORT - ETHICAL ISSUES

In this writing assignment, multiple clinical ethical issues are explored. Some examples include: (a) charting that something ordered was done when it wasn't done, (b) "problem" patient who is being avoided, ignored, or even treated poorly, (c) getting patient consent for tests or surgery that is very high risk (e.g. if patient is older), and (d) refusing to care for AIDS patients. Students must use the problem solving process: What is the problem? What is behind different sides to the issue? What are some possible alternatives of action and their consequences? What is the writer's choice and reasons behind the choice? *Faculty commentary: This assignment's purpose is twofold. First, it provides an opportunity for students to think critically and explore alternative solutions to problems. Second, it shows students that in practice making choices in ethical dilemmas is an everyday occurrence.*

Inductive Reasoning Technique Exemplars

Several study participants provided narrative descriptions of inductive reasoning techniques for critical thinking skill development in students. Both individual and group inductive reasoning processes were cited. Some faculty members designed or used standardized data collection instruments to assist students in collecting comprehensive data for synthesis and analysis. Others used group activities and brainstorming techniques for inductive reasoning. One respondent wrote that such group activities were especially helpful to English as a Second Language (ESL) students. Figure 11 provides two exemplars of inductive reasoning techniques (one for individuals and one for groups) as critical thinking teaching strategies.

Figure 11. Critical Thinking Teaching Strategies: Inductive Reasoning Techniques Exemplars.

CRITICAL THINKING EXEMPLAR #14

TOPIC: INDUCTIVE REASONING TECHNIQUE

FOR INDIVIDUALS

In the pediatric rotation, a tool developed for the Roy Adaptation Model is used to assist students in researching the norms and adaptive behaviors for their pediatric patient's age. Additionally, students collect data from the chart, nurses' notes etc. All of this is accomplished prior to clinical. The second step in this process is completing areas with actual data collected during assessment of the child and family. The student is asked to prioritize areas of concern and diagnoses. For example, initial computations for fluids and calories change as the student works through the various needs and processes sections of the Physiologic Mode. Priorities change as students realize some areas are adaptive (e.g. if nutrition is managed by TPN then the priority may be high risk for alteration in growth and development, related to the child's inability to take foods orally.) Interrelationships between the modes begin to emerge and diagnoses and priorities are re-established. For example, the student may discern that the parent is stressed by the care demands and has high risk for ineffective coping related to lack of a stable support system. This may be the real priority for nursing care.

Faculty commentary: After years of experience of observing students I found they needed a structured system to help organize the overwhelming amount of information available on care of the child. The tool helps focus their efforts to determine priorities and what is essential.

CRITICAL THINKING EXEMPLAR #15

TOPIC: INDUCTIVE REASONING TECHNIQUE

FOR GROUP WORK

In this exercise, students are divided into groups for the purpose of generating nursing diagnoses and collaborative problems. As an example, in the content area of respiratory dysfunction, each group is given a written description of individuals experiencing such forms of respiratory dysfunction as (1) tuberculosis, (2) cystic fibrosis, (3) chronic obstructive pulmonary disease, and (4) adult respiratory distress syndrome. Each group generates nursing diagnoses and collaborative problems and writes them on large sheets of paper, which are then hung on the walls so that all students may view them. Each group verbally presents what they have generated. Then, through class discussion facilitated by the instructor, groups compare and contrast group reports, and commonalities and differences in caring for individuals with the different respiratory dysfunctions are identified.
Faculty commentary: Students complain this is too much work. As part of my course work, I spend time discussing with students what critical thinking is, why it's important, and what teaching strategies encourage what type of thinking patterns. Making explicit my goals has helped students be more open to using teaching strategies other than lecture.

Brainstorming Exemplars

This teaching strategy was perhaps the most difficult to identify as a discrete technique, since it came into play as other strategies were implemented (e.g. class and small group discussion and inductive and deductive reasoning techniques). The brainstorming technique was cited mostly in conjunction with the lecture class to generate as many ideas as possible on a particular subject.

It was noted that this strategy was especially effective for understanding phenomena, identifying belief systems, and learning in the affective domain where the instructor's goal was to have students embrace a pluralistic

approach (e.g. ethics, leadership qualities, and issues and trends content). Figure 12 displays two such approaches utilizing brainstorming as a critical thinking teaching strategy.

Figure 12. Critical Thinking Teaching Strategies: Brainstorming Exemplars.

CRITICAL THINKING EXEMPLAR #16

TOPIC: BRAINSTORMING FOR UNDERSTANDING A PHENOMENON

The brainstorming technique is effective in assisting students to think about the concept of leadership. Facilitative questions are written at the top of each section of whiteboard in front of the class. (Chalkboards, large sheets of paper hung on the walls, and flip charts work equally as well.) Questions used include: What is leadership? What are the characteristics of an effective leader? What are the characteristics of a positive role model? A student volunteer is solicited for each question to write ideas that are offered from the class. No ideas are discarded at this initial stage. The instructor then facilitates discussion following the brainstorming session, pointing out trends and how opposing viewpoints may both be important and correct, depending on differing belief systems.
Faculty commentary: A follow-up exercise where students bring in examples from the practice setting for critique has also been effective.

CRITICAL THINKING EXEMPLAR #17

TOPIC: BRAINSTORMING FOR VALUES CLARIFICATION

In an issues and trends class, a brainstorming session has helped students understand both sides of an issue. By generating multiple ideas and rational thinking processes on each side, students are enabled to clarify their own values and decide what they believe.
Faculty commentary: I have found this also helps them become more comfortable with ambiguity and gray areas.

Panel Discussion Exemplars

The use of panels among faculty respondents, for developing critical thinking in students, took two forms. First, some faculty bring in a panel of experts and students pose questions to the panel through the instructor as facilitator. In this approach, the student must research the topic well to pose thought-provoking questions and then must think critically about panel experts' answers in order to formulate an informed opinion.

Second, faculty described panels comprised of students themselves. In this approach the student must research the topic thoroughly in order to think critically about questions posed by classmates and provide responses.

Figure 13 portrays an exemplar for each approach, utilizing the panel discussion as a critical thinking teaching strategy.

Figure 13: Critical Thinking Teaching Strategies: Panel Discussion Exemplars.

CRITICAL THINKING EXEMPLAR #18

TOPIC: PANEL OF EXPERTS

Two different topics have been used for this teaching technique: (1) a panel of experts on AIDS and (2) a panel of senior citizens (active geriatric clients). In preparation for the panel discussion, the instructor provides written articles with opposing viewpoints on the area for students to read. Video on other media available are also utilized. The students then compose questions they want to address to the "panel" as a result of their preparatory work. The panel responds to the questions, and the following value statements are posted in four areas of the room: disagree, strongly disagree, agree, strongly agree. A series of statements are made, such as "The majority of senior citizens lead a lonely existence." The students physically move to their position in relation to the statement. They are then encouraged to share how they made their decision and reached a conclusion. If others are persuaded to change their viewpoints, they may move to a new position.
Faculty commentary: Students must complete a self-evaluation on their participation in this activity and their learning. The "voting with your feet" part of the activity was learned by the instructor at a colloquium and modified for this activity to meet leadership objectives.

CRITICAL THINKING EXEMPLAR #19

TOPIC: PANEL OF STUDENT EXPERTS

In this teaching strategy the class is divided into groups. Each group is assigned a bioethical issue (taken from the Hastings Center publications). The panel discusses the situation and must present the following:

1. the core issue
2. the ethical principles in conflict
3. possible options
4. ethical principles in each option
5. rationale for why one should agree or disagree with outcome of the situation
6. separation of: opinion and sentimentality from actual ethical principles and values

After the presentation, the panel must respond to questions and/or disagreements from the rest of the class.
Faculty commentary: This activity allows students to "wallow" in these dilemmas rather than only read or listen to lectures.

Additional Effective Critical Thinking Strategies

A number of other critical thinking teaching strategies were cited once or twice among respondents' narrative of especially effective techniques. These included: communication process recordings, deductive reasoning techniques, teacher role modeling, the formal debate, writing policy blueprints, journal writing with reflection, use of games, critical thinking essay exams, imagery, peer questioning, and peer critique. Figure 14 provides several exemplars of these additional critical thinking teaching strategies.

Figure 14. Additional Effective Critical Thinking Teaching Strategy Exemplars.

CRITICAL THINKING EXEMPLAR #20

TOPIC: COMMUNICATION PROCESS RECORDING

The communication process recording is a technique which the student can use to critique his or her communication skills. Although it can be used in any clinical setting, it is used most often in the psychiatric nursing setting. The instructor assists the student in distinguishing between statements made that are conversational versus therapeutic. We also use this technique in the leadership/management course. Students critique their interactions with peers and staff who are their team members to determine if they asked appropriate questions to stay "on top of" their team of patients.

CRITICAL THINKING EXEMPLAR #21

TOPIC: TEACHER ROLE MODELING

The instructor presents a patient situation and students are asked to plan a course of action and prioritize nursing interventions they will take. Following discussion in small groups, the instructor describes interventions taken by both her or himself and other members of the health care team and how the patient responded. Students compare and contrast approaches they planned to take with those of the instructor.
Faculty commentary: Frequently, students have chosen the same course of action as the instructor, and this validates their achievement of competency.

CRITICAL THINKING EXEMPLAR #22

TOPIC: WRITING POLICY BLUEPRINTS

Each student selects a management problem they have noted during the leadership rotation and identifies the specific cause or causes. They research the problem in the literature, in agency policy and procedure manuals, and through interviews of involved individuals. They devise a solution to the problem, writing a policy blueprint for instituting the change in the clinical setting.
Faculty commentary: Many of the students' plans have actually been implemented in the clinical area, which is exciting for both the student and the instructor.

In Exemplar #20, the instructor supports the student in utilizing a journal to record verbatim statements by both her or himself and patients or other health care team members. As a facilitator, the instructor assists the student in the critical thinking processes of reflection and metacognition, monitoring, assessing and critiquing her or his responses and exploring alternative approaches that might have been more therapeutic or effective.

The critical thinking teaching strategy of role modeling, including critique of one's own thinking, is described in Exemplar #21. In explaining alternatives considered and those chosen in caring for patients, the instructor role models the critical thinking process. Having already explored alternatives themselves, students can then compare and contrast their reasoning processes and creativity with those of experienced health care providers.

Exemplar #22 describes the critical thinking exercise of writing policy blueprints. Both creative and critical thinking is needed for this complex activity. The student must not only apply nursing theory knowledge, but must also synthesize this with change theory, communication skills, and leadership and management theory. She or he must then consider the unique attributes of each stakeholder and design and articulate in writing a policy blueprint to institute planned change.

Summary

The purpose of this study was to explicate critical thinking teaching strategies being used by California Community College Associate Degree Nursing (ADN) faculty. A survey questionnaire was developed and administered without incident to the 70 ADN program senior nursing course lead faculty.

Definitions of the phenomenon of critical thinking were examined to determine ADN faculty's current understanding of

the construct. Five common threads were found among respondents' definitions. Critical thinking was viewed as (1) problem solving; (2) analysis, synthesis, and evaluation (Bloom's Taxonomy); (3) reflection, challenging beliefs, and creativity; and (5) metacognition, or thinking about thinking. Although some faculty noted more than one of these themes, none included more than three of these in their definition. Most respondents' definitions fell into the first two categories.

When queried as to the influence of AB 1725 on their use of critical thinking teaching strategies, only one of the 48 respondents noted any impact. The rest reported they had been using critical thinking teaching strategies prior to the implementation of the legislation.

Study participants were also asked to report whether or not they used certain strategies and to indicate their perceived effectiveness of each. Eight strategies were used most heavily (i.e. by 75% or more) by respondents. These included brainstorming, case studies, class or small group discussion, inductive reasoning techniques, scenarios or role play, written reports, self-study exercises, and teacher role modeling. Faculty's perceived effectiveness of these eight was high (2.95 to 3.67 on a four point Likert scale).

The survey asked participants to provide a narrative description of an "especially effective" technique they had

used. Seven themes emerged from the narrative descriptions. These were, in descending order of frequency, case studies, class and small group discussion, scenarios and role play, written reports, inductive reasoning techniques, brainstorming, and panel discussions. Critical thinking teaching strategy exemplars from the narrative descriptions were provided in this chapter.

CHAPTER 5

Discussion and Implications of Research Findings and Recommendations for Further Study

Introduction

The purpose of this study was to explicate postsecondary critical thinking instructional techniques being used by faculty in the discipline of nursing at the associate degree level to serve as a model for nursing faculties and faculties in other disciplines. Teaching strategies employed in Associate Degree Nursing (ADN) programs, in California Community Colleges, perceived by faculty as effective in fostering critical thinking in students were examined.

Following extensive literature review, a survey instrument was developed, piloted, and subsequently administered, without incident, to all senior course lead nursing faculty in California ADN programs. Although most respondents had completed or were in progress in masters and doctoral programs, less than 15% had more than six days of professional development activities in the area of critical thinking. The typical respondent was female, 41 to 50 years old, and had been teaching nursing for 11 to 20 years. All six geographic regions of the state were represented among study participants, although the Los Angeles/ Orange region had the greatest representation.

The following questions were addressed by the study:

1. Are there common threads among nursing educators in their definition of critical thinking?
2. Do nursing faculty utilize critical thinking teaching strategies in senior courses and, if so, were they used prior to AB 1725, or have they been added as a result of AB 1725?
3. What critical thinking teaching strategies are being utilized by lead nursing faculty in senior courses and how do they perceive the effectiveness of such techniques?
4. What common themes emerge as lead nursing faculty in senior courses reflect on and describe teaching strategies they feel have been "especially effective in fostering critical thinking in nursing students?"

Summary of Literature Review Findings

The literature review led to some interesting conclusions. As documented in Chapter Two, the following conclusions can be drawn regarding the construct of critical thinking:

1. A common definition of critical thinking is yet to emerge, although philosophers, psychologists, and educators are engaged in dialogue about the construct.

2. The dichotomous, "black and white," bipolar view of the teaching of critical thinking with a pure skills,

informal logic approach vs. only as embedded in the discipline by faculty from the discipline is being reshaped. Most "purests" have encouraged a parallel approach of teaching in subject matter context for "practice" with application; and, most "domain-specificity" advocates have acknowledged the value of critical thinking skill instruction as an adjunct approach. Several mixed models have also begun to emerge (Ennis, 1989; Kennedy, Fisher, & Ennis, 1990; Sternberg, 1987; Paul, 1992).

3. The role played not only by the context of the subject matter, but also the context of the thinker (i.e. his or her culture, gender, and background assumptions) greatly influences the critical thinking process (Bar-Levav, 1988; Clarke, 1990; Gilligan, 1982; Grant, 1988; Munnich, 1990).

4. Critical thinking is dispositional in nature. It is only when one has the disposition to think critically and is moved to do so, that critical thinking takes place (Ennis, 1987a; Marzano, 1991; Nickerson, 1987; Norris, 1985; Paul, 1984; Sternberg & Baron, 1985).

5. Critical thinking involves not only the ability to reason, problem solve, analyze, synthesize, and evaluate what is in existence, but also to imagine alternatives, reflect, and question current beliefs (Brookfield, 1987; McPeck, 1981; Meyers, 1986; Paul, 1985).

6. While there is controversy over the relationship of creative thinking to critical thinking - namely, whether or not one encompasses the other or if they are distinct, discrete forms of thinking - there is agreement that they work synergistically to produce "good thinkers" (Nickerson, 1987; Ruggiero, 1988a).

7. Proponents of both the thinking skills approach, and the critical thinking in context approach, emphasized the importance, and role played, by metacognition, or "thinking about thinking" via judgment, monitoring, and self - regulatory control processes (Beyer, 1987; Costa, 1984; Dale, 1972; Idol, Jones, & Mayer, 1991; Marzano, 1988; O'Flahavan & Tierney, 1991).

8. Experts agree on the need for educational reform and the inclusion of critical thinking skills, and learning-to-learn teaching strategies, throughout all educational levels (Marzano, 1991; Paul, 1992).

9. Educational reform also calls for a restructuring of the traditional didactic educational paradigm to a critical theory, wherein critical thinking teaching strategies and the concepts of teaching and learning can be reframed (Marzano, 1991; Paul, 1992).

10. Critical thinking teaching strategies in the literature generally focus on the secondary rather than the postsecondary level. Those that are discussed predominantly reside in the literature and arts category or in science and

mathematics, with analysis and reflective thinking prominent in the former, and logic and problem solving common in the latter.

The Need for Critical Thinking in Nursing

As a nurse and nursing educator for over seventeen years, and as an educational administrator for the past ten years, the researcher has noted an increasing need for critical thinking in nursing. Over the past three decades, nursing has evolved from an applied science based on a medical model to a nursing science, grounded in its own theory. The medical model is based on a rational, linear, scientific model of problem solving - i.e. identify the problem (disease, disorder, or dysfunction) and prescribe the (one, and only) appropriate treatment. Nursing science involves a nursing paradigm which is holistic in nature and comprised of four complex constructs: the client, environment, health, and nursing. Nursing diagnoses are made based on human response to illness and are therefore multi-faceted. The nurse must think critically in designing, implementing, and evaluating care which addresses the biopsychosocial and spiritual needs and the ethnocultural and ethical concerns of each unique, individual client, family, or social system.

The changing demographics of the health care delivery system demand increasing critical thinking among health care workers, and most notably among nurses. The length of stay

in hospitals has declined, with more care being delivered in outpatient, ambulatory care settings. Home care is also on the rise. The hospitalized patient is therefore in a much more acute state, with multi-system dysfunction. Greatly expanded pharmacotherapeutics and advanced technology have also enhanced the need for critical thinking in nurses.

Increased life expectancy and the advancing age of the "baby boomer bulge" in the population means an increasing number of elderly and of frail "old elders", whose health care needs are much more complex. Providing care for human responses in such individuals requires critical thinking and ethical decision making.

Lastly, frame-breaking of the world view of the nurse as "problem solver" to the nurse as "critical thinker" is vital in our changing demographics where representative ethnic minority groups are increasing. The need for critical thinking to individualize care based on diverse ethnocultural values, beliefs, and world views is readily apparent.

Discussion of Research Findings

As noted above, this study addressed four research questions. Several important findings resulted from the research study.

Critical Thinking as Defined by Nursing Educators

Perhaps the most revealing finding of the study was the difficulty experienced by nursing educators in attempting to

define critical thinking, and the narrowness of their resulting articulated definitions. A number of respondents (13%), in fact, left this survey question unanswered. As one respondent wrote, "An active, focused, careful consideration of a topic or belief or knowledge or...used to reach a conclusion, inquire about or resolve a problem - Aaugh! Tough question!" Even amidst the struggles of trying to define the construct, this respondent, as did others, made reference to resolving problems, reaching conclusions, and considering beliefs.

The majority of respondents (65%), however, provided much narrower definitions, viewing critical thinking as problem-solving or the utilization of higher-order thinking skills (Bloom's taxonomy). Since these two definitions were prevalent in the sixties and seventies, and since nearly half of the respondents already possessed masters degrees and had been teaching for 11 to 20 years, this finding was not surprising. It was, however, alarming to note the immaturity of the profession, in its view of critical thinking. The paucity of nursing literature on the subject until recent years was consistent with these study findings.

The notion of creativity, imagining alternatives, and challenging current beliefs was only minimally represented. The metacognitive process, or thinking about thinking, was only mentioned twice, among all subjects' responses to the survey instrument. Whether these concepts were simply not

included in the definition, or whether study participants were not familiar with them, is unknown at this time. These findings do, however, reemphasize the need for a common definition of critical thinking.

Impact of AB 1725

One aspect of AB 1725, in providing for educational reform, was the requiring of a critical thinking component in all college level courses. When study participants were asked if critical thinking teaching strategies they used were a result of AB 1725, 47 of the 48 respondents said "no."

This study finding raises several questions. Was the critical thinking aspect of AB 1725 needed? Did college educators in other disciplines already utilize critical thinking exercises, or was this unique to only a few disciplines, including nursing? Are what nursing educators claim to be critical thinking strategies really such? How can college educators incorporate a critical thinking component into their courses until they can define the concept, and define it in the context of their specific discipline? What is evident, is that AB 1725 had little, if any, impact on this study's population in their use of critical thinking teaching strategies.

The researcher's observation has been that what nursing educators are utilizing for critical thinking has been done for some time, but that most strategies in use only foster

the (1) problem solving and (2) analysis, synthesis, and evaluation critical thinking processes. Further confirming this was the study's findings that 65% of respondents' definitions of critical thinking fell into these two categories.

Additionally, more than 50 teaching strategies were provided by faculty in their narrative descriptions of "especially effective" techniques they had actually used. However, less than half of these 50 (those displayed as exemplars in Chapter Four) required the student to extend beyond the problem solving and analysis-synthesis-evaluation thinking processes, to reason, reflect, pose arguments, be creative, explore alternatives, and engage in self-regulatory thinking processes.

Critical Thinking Teaching Strategies in Use and Their Perceived Effectiveness

As described in Chapter Four, eight strategies were used by 75% or more of the respondents, and viewed by them as effective to very effective. These included: brainstorming; case studies; class or small group discussion; inductive reasoning techniques; scenarios, role play, or simulations; written reports, self-study exercises, and teacher role modeling.

A recurring characteristic among critical thinking teaching strategies was the active role played by the student. In the traditional lecture method, the instructor

presents factual information and the student is passive. In critical thinking teaching strategies, on the other hand, the student is an active participant, using some technique to immediately apply and individualize content learned.

Common Themes in Respondents' Narrative Descriptions of Especially Effective Strategies

Seven themes emerged from respondents' narrative descriptions of especially effective critical thinking strategies they had used, including:

Case studies of patient or management situations

Class and small group discussion

Scenarios and role play

Written report

Inductive reasoning techniques

Brainstorming

Panel discussion

It can be noted that these techniques (and most notably the narrative descriptions of these techniques) reflect use of problem solving, reasoning, and higher-order thinking skills (Bloom's Taxonomy). Critical thinking strategies involving creativity and metacognition were not cited. Whether faculty did not write about these because they were more complex and harder to write, or because they did not conduct them in their classes, is unknown and would require further study to determine.

In addition to the emergent critical thinking themes, several other conclusions can be drawn from subjects' narratives and remarks. A variety of resource materials were utilized for students which not only assisted them with thinking critically about the subject content, but also addressed a variety of learning styles. Several of the critical thinking teaching strategies cited could be developed further to provide independent study or honors options for exceptional students, to challenge them to delve deeper and explore content which extends beyond the course objectives.

Entry-level practitioners must have beginning research skills in order to perform badly-needed practice-based research. This expectation was a common theme that appeared in many of the narrative descriptions for critical thinking strategies (e.g. library research, interviewing techniques, and use of APA format for written papers.)

The frequent use of periodicals and case studies provided an opportunity for students to witness how theory content was applied in an individualized manner to the patient in the case being discussed. These exercises resulted in a role modeling of critical thinking to show how "the experts" "do" nursing.

As reported in Chapter Four, teaching strategies to develop students' abilities to refute, judge, critique, reason, be creative and explore alternatives were seldom

cited in narrative descriptions, although these critical thinking activities are a vital component of nursing practice. Students, in most exercises, through a variety of techniques, utilized a broad base of resources (periodicals, texts, media, peers, interviews of health professionals, etc.) to synthesize information. Such techniques as formal debates, mock trials, critiques of articles and media, writing position papers, and letters to the newspaper were not found in faculty narratives. These strategies enable the student to reason, pose arguments, refute evidence, and explore alternatives. Additionally, techniques such as constructing models and developing personal philosophy statements were also not identified by faculty. These techniques encourage students to examine and question their values and beliefs, be creative, and envision different social structures for the future.

Implications of Faculty Commentaries

Faculty commentaries were provided in the critical thinking teaching strategy exemplars in Chapter Four. Implications of these strategies for nursing are several:

1. Several faculty noted students' discomfort and inability to complete writing assignments. The inclusion of writing assignments in prior nursing courses (sample subjects were senior course faculty) and other college coursework is imperative to address this problem.

2. Student discomfort and complaints of "too much work" was noted as students were expected to be active participants in the learning process. Again, activities in prior courses are needed to "frame-break" the students' view of the learner as a passive recipient of information rather than as an active participant of learning.

3. Several narratives described activities whose goals included validation of self and/or competency in nursing practice. Faculty commented on the importance of this additional reinforcement for building self esteem and confidence. Inherent in this commentary is the implication for faculty. When developing critical thinking exercises, the faculty member would do well to include activities that foster self critique and validation of self. For example, peer critique of alternatives being considered, and role modeling by the instructor are invaluable.

4. Two respondents emphasized the importance of role modeling critical thinking, and discussing with students the purpose of using critical thinking teaching strategies rather than the traditional lecture method. As described in Chapter Two, the literature in recent years has emphasized the benefit of teacher role modeling in assisting students to thinking critically (Grant, 1988; Meyers, 1986; Paul, 1985; and Shekerjian, 1990). Study findings from these two respondents concur with evidence in the literature. Important for students to hear and reflect on, is why

critical thinking is important in nursing practice, and also that it is the basis for the National Council Licensing Examination for Registered Nursing (NCLEX-RN).

The Need For Pedagogical Content Knowledge

The need for pedagogical content knowledge in addition to subject knowledge has been emphasized in the literature (Grant, 1988). Research findings on demographics revealed that few faculty had attended professional development activities in the area of critical thinking. Faculty tend to attend inservice programs that provide an increased depth and breadth of their teaching discipline (i.e. nursing faculty attend seminars on nursing.) The need for acquiring, updating, and expanding pedagogical knowledge (i.e. "how to teach"), as a discipline itself, is not always recognized by faculty. Or, limited time available impacts their ability to accomplish this objective.

Demographic data showed that nearly half of all respondents were in progress in masters and doctoral level programs. (Some of these had previous graduate degrees in disciplines other than nursing). Since faculty's critical thinking definitions were weak, was this not a part of their graduate work? The implication for graduate programs to incorporate critical thinking is evident.

Also noteworthy, was the obvious lack of attention to addressing a variety of learning styles, cultural diversity,

needs of the English as a second language student, and male students (non-traditional discipline for this gender.)

Most Master of Science in Nursing (MSN) programs focus on the clinical practice role. Few offer a nurse educator role focus. Therefore, most nursing educators have had minimal pedagogical content knowledge (i.e. "how to teach") and are therefore not prepared to design teaching strategies to develop critical thinking skills or address a diversity of learning styles among students.

Impact of Critical Thinking Professional Development Activities

Review of the study data revealed that the 13% of respondents, who had attended more than six days of professional development activities in the area of critical thinking in the past five years, were better able to articulate a definition of the concept, and provided narrative descriptions of more refined teaching strategies. These study participants included three or four of the five critical thinking threads in their definitions of critical thinking, and in their narrative descriptions, whereas other respondents generally incorporated only problem solving and/or analysis and synthesis processes.

Increased knowledge and awareness of the breadth and depth of the concept of critical thinking was evidenced by respondents with more extensive professional development in this area. These respondents described the importance of

the "active participation of the learner," his or her "use of prior knowledge," and the need for the learner to be "self-directed." In addition to problem solving, and use of higher order thinking skills, these respondents included such descriptors as "use of multiple sources," "drawing conclusions and generating alternative approaches," "examining motives and ideas," "using judgment," and "evaluating success and nonsuccess [sic]."

Narrative descriptions of effective critical thinking teaching strategies used by these same respondents also extended beyond problem-solving exercises and analysis and synthesis activities. Strategies were utilized to assist students in imagining alternatives, being creative, reflecting on background assumptions, accepting multiple viewpoints, and thinking about their thinking processes. Strategies cited included (a) students recording interventions they took and critiquing the strengths and faults in each, (b) interviewing health care professionals to ascertain multiple viewpoints on ethical issues, (c) inductive reasoning exercises followed by comparative analysis of findings, (d) mock team leading scenarios with priority setting, and (e) several gaming techniques. A number of the exemplars noted in Chapter Four came from this group of respondents.

These study findings suggest that pedagogical content knowledge is strengthened by professional development

activities in the area of critical thinking. Educational administrators should not only support, but should encourage faculty attendance at professional seminars and conferences in the area of critical thinking. Additionally, directors of human resources, and others responsible for the design of professional development activities and inservice programs for faculty, should incorporate sessions for critical thinking teaching strategy development.

Implications For Educational Leadership

Implications for educational leadership based on research findings were several. First, educational leaders must nurture an environment where critical thinking among faculty and students can flourish. Teachers must be encouraged and supported in their efforts to develop and implement alternatives to the traditional lecture methods. Resource priorities should include such things as adequate equipment, supplies, media support, library services, and faculty resource centers.

Second, educational leaders must role model critical thinking, encouraging debate and questioning and being comfortable with conflict. Faculty must feel, "It's all right to disagree," and must carry this same message to their students.

Third, educational leaders must take a lead role in creating an environment where pluralism is encouraged. They must create and foster programs such as a speakers bureau,

faculty colloquia, debates, open campus forums on controversial topics, and host to a variety of diverse speakers with opposing viewpoints.

Fourth, educational leaders must seek funding for professional development, inservice education, classroom research, and release time to develop creative and innovative teaching strategies. They must also explore ways to encourage collegial dialogue and interdisciplinary exchange that stimulates critical thinking.

Lastly, educational leaders must embrace the concept of generativity. They must proactively seek educational reform not only through legislation such as AB 1725, but also within the culture itself. They must inspire among educators and educational administrators a shared vision of a new educational paradigm centered on learning (Marzano, 1991), where critical thinking replaces the didactic method (Paul, 1992), to prepare students for survival in a rapidly changing global community, where ethical decisions effect future generations. As Foster (1989) noted,

> Vision is another aspect of education. It is not enough to reflect on current social and organizational conditions; in addition, a vision of alternative possibilities must be addressed. Such a vision pertains to how traditions could be altered, if necessary, so that they meet human needs while still providing a sense of meaningfulness. This is perhaps

> the most crucial and critical role of leadership: to show new social arrangements, while demonstrating a continuity with the past; to show how new social structures continue, in a sense, the basic mission, goals and objectives of traditional human intercourse, while still maintaining a vision of the future and what it offers. (p. 54)

Recommendations For Further Study

This study provided descriptive data on the construct of critical thinking as documented in the literature, and explicated critical thinking teaching strategies in use among nursing educators, including their perceived effectiveness. Narrative descriptions by study participants, and their commentary, provided exemplars for other nursing faculty and those in other disciplines.

Study findings reveal the following recommendations for further study:

1. Replication of this study in other nursing educator populations (e.g. other geographic regions and at other educational levels - i.e. baccalaureate level).
2. Replication of this study in disciplines other than nursing.
3. Qualitative research to expand narrative descriptions of effective teaching strategies in use by nursing educators.

4. Qualitative research to define the concept of critical thinking within the context of each discipline, and to provide teaching strategy exemplars in each discipline.
5. Research to determine the impact of AB 1725 on various disciplines in California's community colleges.

In addition, further research is needed to address the following questions:

1. What critical thinking teaching strategies exist in other college curricula, and what is the perceived effectiveness of such techniques by educators in those disciplines?
2. What is the relationship between critical thinking and creativity?
3. What specific teaching strategies will enhance critical thinking in each of the five definition threads that emerged from this study?

In summary, critical thinking in nursing, and teaching strategies to foster critical thinking among students in nursing education programs continue to evolve. Results from this study contribute important descriptive data to the literature and provide exemplars for nursing faculty and faculties of other disciplines. Additionally, recommendations for further study and research questions to be addressed have been generated.

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Appendix A

Study Survey Instrument

Nicki Hoyt, M.A.Ed., M.S.N.
Associate Degree Nursing Program
College of the Redwoods
Eureka, CA 95501

April 20, 1992

Lead Instructor, Graduating Class
Associate Degree Nursing Program

Dear

The enclosed survey instrument concerned with critical thinking techniques is part of a statewide study for my doctoral dissertation at the University of San Diego. Lead nursing faculty of graduating nursing students in all California ADN programs are being surveyed. As nurse educators, we are all concerned with developing critical thinking skills in our program graduates. With the passage of AB 1725, a critical thinking component is now required in each college level class. Yet, many of us are struggling to identify teaching strategies and learning activities appropriate for our students and effective in enhancing their critical thinking abilities.

The purpose of this study is to identify and provide exemplars of critical thinking instructional strategies being used by associate degree nursing program faculty. Your nursing program director has designated you as the lead instructor for the graduating class, and the appropriate participant for this study. The enclosed instrument has been pretested by nursing faculty to make it possible to acquire only necessary information in a minimum amount of time. It is estimated to take only 17 minutes for you to complete the survey. Your participation is voluntary and you may withdraw at any time. Non-participation will in no way affect your job security. (I have enclosed a consent form for your signature.)

It would be greatly appreciated if you would complete the survey and return it, along with the consent form, in the stamped, addressed envelop enclosed by May 6, 1992. I would welcome any comments or materials you wish to include about the survey or the subject of critical thinking.

Please be assured that both personal and institutional anonymity will be maintained. A code number, available only to the researcher, appears on the survey for purposes of follow-up letters and phone calls. No anticipated risks are associated with this study and if you would like to benefit from the study by receiving a summary of its results, please so indicate at the bottom of the survey instrument.

Having completed many surveys myself as a nurse educator, I do sincerely appreciate your taking time from this busy Spring term to complete and return the enclosed survey. If you have any questions or need clarification, I can be reached at telephone (707) 445-6873.

Please return by May 6, 1992

Sincerely,

Nicki Hoyt
College of the Redwoods
Eureka, CA 95501

(Estimated time to complete this survey is 17 minutes)

RETURN BY MAY 6, 1992

SURVEY INSTRUMENT
CRITICAL THINKING TEACHING STRATEGIES

FACULTY MEMBER CODE # _____

DEMOGRAPHIC DATA

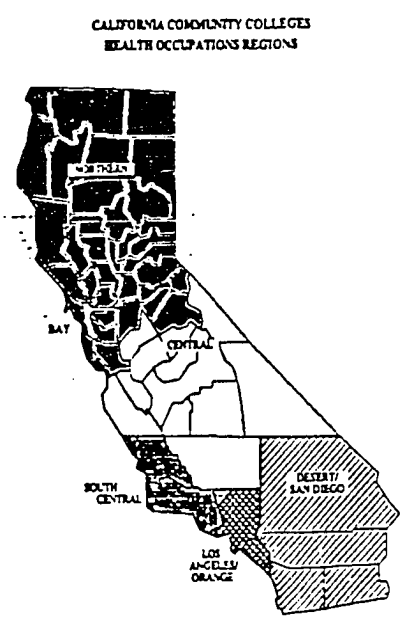
A. School Data

1. College size (Full time equivalents of students)
   _____1 - 3500
   _____3500 - 5000
   _____5000 - 10,000
   _____Over 10,000

2. ADN program - Number of students admitted each class:
   _____Under 20
   _____21 - 30
   _____31 - 40
   _____41 - 50
   _____Over 50

3. ADN program - Number of classes admitted each year:
   _____1
   _____2
   _____3
   _____4 or more

4. Regional location of college (see map):
   _____Northern
   _____Bay
   _____Central
   _____South Central
   _____Desert/San Diego
   _____Los Angeles/Orange



B. Faculty Member's Personal Data

5. Gender:
   _____Male
   _____Female

6. Age:
   _____21 - 30
   _____31 - 40
   _____41 - 50
   _____Over 50

7. FTE years teaching nursing:
_____0 - 5
_____6 - 10
_____11 - 15
_____16 - 20
_____21 - 25
_____Over 25

8. Formal education in progress:
_____Masters in _____
_____Doctorate in _____
_____None

9. Formal education completed:
(Please check all that apply and indicate year completed)
_____BSN (Year_____)
_____Bachelors, Non-nursing (Year_____)
_____MSN (Year_____)
_____Masters, Non-nursing (Year_____)
_____Doctorate in Nursing (Year_____)
_____Doctorate, Non-nursing (Year_____)

10. In the last five years, how many days of workshops, seminars, or professional development activities specifically in the area of critical thinking have you attended?

_____None
_____1 - 3
_____4 - 6
_____7 - 9
_____10 or more

11. Please describe, in your own words, your definition of critical thinking.

CRITICAL THINKING TEACHING STRATEGIES

12. Please check the one response which most closely describes critical thinking teaching strategies you utilize in the last semester nursing course:

_____ They are included on the written approval course outline as mandated by AB 1725 but I don't really do them in the course
_____ I use one or more techniques, but I was using them prior to implementation of AB 1725
_____ I was not using any strategies prior to the implementation of AB 1725, but now, as a result of AB 1725, I am using them in the course.

Comment(s):

CRITICAL THINKING TEACHING STRATEGIES (CONTINUED)

For each of the teaching strategies listed below please indicate whether or not you use the strategy in the last nursing course and if so, rate your perception of the effectiveness of the strategy on a scale of 1 to 4 as follows:

1 = I find it very ineffective in fostering critical thinking
2 = I find it somewhat ineffective in fostering critical thinking
3 = I find it somewhat effective in fostering critical thinking
4 = I find it very effective in fostering critical thinking

	Teaching Strategy	Use? (circle yes or no)		Perception of Effectiveness (circle one number only)
13.	Brainstorming	Yes	No	1 2 3 4
14.	Case studies: patient or management situations	Yes	No	1 2 3 4
15.	Class or small group discussion using facilitator(s); feedback lectures	Yes	No	1 2 3 4
16.	Recording and/or critique of therapeutic communication dialogues (process recordings, taped report, interviews, etc)	Yes	No	1 2 3 4
17.	Deductive reasoning techniques (e.g. decision trees, etc.)	Yes	No	1 2 3 4
18.	Inductive reasoning techniques (e.g. priority setting, triage, noting trends, etc.)	Yes	No	1 2 3 4
19.	Interactive video	Yes	No	1 2 3 4
20.	Computer simulations	Yes	No	1 2 3 4
21.	Mock trial for legal issues (malpractice, negligence)	Yes	No	1 2 3 4
22.	Scenarios/role play/clinical simulations	Yes	No	1 2 3 4
23.	Panel discussion of multi-faceted issue	Yes	No	1 2 3 4
24.	Formal debate	Yes	No	1 2 3 4

25.	Abstract or critique of a book, article, or videotape	Yes	No	1 2 3 4
26.	Written report on issues, trends, etc.	Yes	No	1 2 3 4
27.	Constructing models (two or three dimensional)	Yes	No	1 2 3 4
28.	Writing policy blueprint(s)	Yes	No	1 2 3 4
29.	Writing letter to newspaper or media on controversial issue; position papers for identified problem(s)	Yes	No	1 2 3 4
30.	Journal writing with reflection	Yes	No	1 2 3 4
31.	Self-study exercises (values clarification, personal philosophy statements, development of resume)	Yes	No	1 2 3 4
32.	Teacher role modeling of critical thinking; self-critique showing judgment errors of the instructor	Yes	No	1 2 3 4
33.	Other:_____ _____	Yes	No	1 2 3 4

Please make comments on any of the above you feel would be helpful to the study (refer to item by number, i.e. 13 to 33).

34. Narrative description. In the space below, please reflect on your use of critical thinking teaching strategies and describe in detail one you feel is "really good" (i.e. that has been especially effective in fostering critical thinking in nursing students). This is perhaps the most important question in the survey. Please describe teaching strategy in enough detail that a new teacher could try it.

Please indicate where you got the idea:

_____ From a colleague in nursing.

_____ From a teacher of another discipline (cite discipline)._____

_____ From a text or article. (Please cite source: _____

_____)

_____ Other (Describe)

I sincerely thank you for your time in assisting me in this important survey. If you would like a copy of the results of the survey, please indicate here_____.

RETURN BY MAY 6, 1992

IN THE ENCLOSED, STAMPED ADDRESSED ENVELOP TO

Nicki Hoyt
College of the Redwoods
7351 Tompkins Hill Road
Eureka, CA 95501
(707) 445-6873

UNIVERSITY OF SAN DIEGO
CONSENT TO ACT AS A RESEARCH SUBJECT

Nicki Hoyt of College of the Redwoods, and a doctoral student at the University of San Diego, is conducting a research study of teaching strategies used in California community colleges to foster critical thinking. As a selected participant in this study, I understand that I will be completing a survey of critical thinking teaching strategies I use including my perception of their effectiveness, along with demographics information.

I understand that my participation in this study will consist of approximately 17 minutes to complete the survey and that there are no risks anticipated in completing the survey. I am also aware that my participation is voluntary and I may withdraw at any time without jeopardy to my job security.

I understand my research record will be kept completely confidential and my identify will not be disclosed without consent as required by law. I understand the researcher, Nicki Hoyt, will be using code numbers on all forms for the purpose of follow up and to maintain my anonymity and that the key to the code numbers, raw data and consents will be stored and locked.

I further understand that all information I give on the questionnaire will remain confidential and will appear in summary or statistical form so that I may not be identified. Data will be grouped in any publication of the results of this study.

Nicki Hoyt has explained the study to me in a covering letter and supplied her phone number, (707) 445-6873, should I encounter any difficulties or have any questions.

I, the undersigned, understand the above explanations and, on that basis, I give consent to my voluntary participation in this research. There is no agreement, written or verbal, beyond that expressed on this consent form.

_____
Signature of Subject Date

_____
Location

_____
Signature of Witness Date

4-20-92
_____
Signature of Researcher Date

Appendix B

Critical Thinking Definition Coding System

FAC11A Problem solving/nursing process

- FAC11A1 Problem solving; identifying problems and finding solutions; nursing process
- FAC11A2 Decision making

FAC11B Analysis/synthesis/higher-level thinking/beyond knowledge and comprehension/some application, then analysis/evaluation (Bloom's taxonomy)

- FAC11B1 Comprehension; compare and contrast; comparative thinking
- FAC11B2 Application; beyond knowledge and comprehension; relating knowledge to thinking
- FAC11B3 Analyze; analysis; pattern recognition
- FAC11B4 Synthesize; synthesis
- FAC11B5 Evaluation; assessment; judgement; weighing; insight; independent thinking; self-directive

FAC11C Informal logic/logic/identifying flaws in reasoning

- FAC11C1 Reason; reasoning; inductive reasoning; deductive reasoning
- FAC11C2 Logic; logical; rational; linear
- FAC11C3 Conclude; draw conclusions
- FAC11C4 Inferring; making inferences
- FAC11C5 Relevancy; determining between opinion and fact

FAC11D Reflection/challenging current beliefs/imagining alternatives/creativity

- FAC11D1 Reflection; questioning
- FAC11D2 Creativity; creative thought
- FAC11D3 Identifying/exploring alternatives; alternative strategies
- FAC11D4 Non-emotional approach; unbiased; tolerance of ambiguity
- FAC11D5 Meaning; meaningful solutions/conclusions; meaningful whole; knowing

FAC11E Metacognition/thinking about thinking

- FAC11E1 Interpreting meaning
- FAC11E2 Thinking about thinking [process]; metacognition

Appendix C

Critical Thinking Definitions: Tally of Coded Descriptors

FAC11A Problem solving/nursing process

𝍸 𝍸 𝍸 𝍸	FAC11A1	Problem solving; identifying problems and finding solutions; nursing process
𝍸 𝍸 | | |	FAC11A2	Decision making

FAC11B Analysis/synthesis/higher-level thinking/beyond knowledge and comprehension/some application, then analysis/evaluation (Bloom's taxonomy)

| | |	FAC11B1	Comprehension; compare and contrast; comparative thinking
| | |	FAC11B2	Application; beyond knowledge and comprehension; relating knowledge to thinking
𝍸 𝍸 | | |	FAC11B3	Analyze; analysis; pattern recognition
𝍸 𝍸 | |	FAC11B4	Synthesize; synthesis
𝍸 𝍸 𝍸 𝍸	FAC11B5	Evaluation; assessment; judgement; weighing; insight; independent thinking; self-directive

FAC11C Informal logic/logic/identifying flaws in reasoning

𝍸 𝍸 𝍸 𝍸	FAC11C1	Reason; reasoning; inductive reasoning; deductive reasoning
𝍸 𝍸 𝍸 𝍸	FAC11C2	Logic; logical; rational; linear
𝍸 𝍸 𝍸 | | |	FAC11C3	Conclude; draw conclusions
|	FAC11C4	Inferring; making inferences
| |	FAC11C5	Relevancy; determining between opinion and fact

FAC11D Reflection/challenging current beliefs/imagining alternatives/creativity

| | | |	FAC11D1	Reflection; questioning
| |	FAC11D2	Creativity; creative thought
| | |	FAC11D3	Identifying/exploring alternatives; alternative strategies
| | | |	FAC11D4	Non-emotional approach; unbiased; tolerance of ambiguity
| | | |	FAC11D5	Meaning; meaningful solutions/conclusions; meaningful whole; knowing

FAC11E Metacognition/thinking about thinking

0	FAC11E1	Interpreting meaning
1	FAC11E2	Thinking about thinking [process]; metacognition

Appendix D

Narrative Teaching Strategy Themes: Tally of Coded Narratives by Faculty Member Number

Teaching Strategy	Faculty Member Nos.
1. Brainstrorming	29, 32, 40
2. Case studies: pt. or mgmt	3, 4, 5, 16, 17, 22, 24, 25, 26, 28, 30, 32, 42, 44
3. Class & sm. grp. discussion	10, 17, 18, 23, 29, 31, 36, 39
4. Communication process recdgs	25, 47
5. Deductive reasoning techs.	7, 33
6. Inductive reasoning techs.	21, 28, 29, 41
7. Interactive video	0
8. Computer simulations	0
9. Mock trial	0
10. Scenarios; role play	3, 8, 37, 39, 40, 48
11. Panel discussion	1, 12, 38
12. Formal debate	48
13. Abstract of book, article	0
14. Written report	13, 15, 25, 27, 34
15. Constructing models	0
16. Writing policy blueprints	43
17. Writing letter to media	0
18. Journal writing & reflection	47
19. Self-study exercises	0
20. Teacher role modeling	13, 33
Miscellaneous (other strategies):	
Games	35
Critical thinking tests	41
Imagery	47
Peer critique; questioning	48, 19
Non-respondents	2, 6, 9, 11, 45, 46
Negative responses	14, 20