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Critical thinking: An elementary perspective

Abstract

There is currently a great deal of research being done to determine the meaning of critical thinking. Researchers are also trying to learn more about the transferability of critical thinking skills to various subject areas. Different methods of teaching critical thinking are also being sought (Norris, 1985). The major research question to be addressed in this paper is: how can critical thinking skills be fostered in children? Specifically, what are the instructional methods for teaching critical thinking skills in the elementary (K-6) curriculum? Secondly, does critical thinking become a separately taught discipline or can it be integrated into the pre-existing elementary school curriculum? A synthesis of current research findings and opinions of experts reported in the literature on the teaching of critical thinking skills in the elementary (K-6) curriculum will provide the information to answer these questions.

CRITICAL THINKING:

AN ELEMENTARY PERSPECTIVE

A Research Paper

Submitted to

The Department of Curriculum and Instruction

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts in Education

UNIVERSITY OF NORTHERN IOWA

by

Anthony K. Voss

April, 1986

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Entitled: CRITICAL THINKING: AN ELEMENTARY PERSPECTIVE

has been approved as meeting the research paper requirement

for the Degree of Master of Arts in Education.

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INTRODUCTION

Today, the development of critical thinking is recognized as a major goal of American education. By learning to think critically, children learn to utilize and incorporate their acquired knowledge in a cumulative and productive manner (Feldhouse, et. al. p.19).

"Critical thinking is thought of as the use of basic thinking processes to analyze arguments and generate insight into particular meanings and interpretations" (Costa & Presseisen, 1985, p.310). The roots of critical thinking extend back as far as Edward Glaser's experimental work with the development of critical thinking (1941) and his development with Watson of the Watson-Glaser Critical Thinking Test (1940). It is by no means a new concept or discovery. The "critical thinking" movement, however, has recently re-established its presence in today's education (Paul, 1984).

Much of the attention drawn to critical thinking was initiated by the decline of scores on the Scholastic Aptitude Tests of high school students.

According to Sternburg (1985) these low scores
suggested to some that there was an apparent decline
in critical thinking among students. Following the
reports of declining test scores came many of the
national reports on the state of education which
suggested that "higher order thinking skills" needed
to be taught in our schools (Sokoloff, 1984).

The challenge of helping elementary students
become effective critical thinkers is one that holds
promise for students and teachers. According to
McPeck (1981) and Siegel (1984), critical thinking is
not just another educational option but an
indispensable part of education. A necessary
condition for being educated is being able to think
critically. Hence, there is a need to determine a
means of fostering critical thinking in elementary
students.

Statement of the Problem

There is currently a great deal of research
being done to determine the meaning of critical
thinking. Researchers are also trying to learn more
about the transferability of critical thinking skills

to various subject areas. Different methods of teaching critical thinking are also being sought (Norris, 1985). The major research question to be addressed in this paper is: how can critical thinking skills be fostered in children? Specifically, what are the instructional methods for teaching critical thinking skills in the elementary (K-6) curriculum? Secondly, does critical thinking become a separately taught discipline or can it be integrated into the pre-existing elementary school curriculum? A synthesis of current research findings and opinions of experts reported in the literature on the teaching of critical thinking skills in the elementary (K-6) curriculum will provide the information to answer these questions.

REVIEW OF THE LITERATURE

Introduction

Probably never before in the history of
educational practice has there been a greater
push to teach children to think critically
(Sternberg, 1985, p. 194).

As a generic term "critical thinking" seems to
strike a common chord of understanding. A close
investigation, however, reveals that the general term
translates into a wide variety of classroom
activities calling upon diverse cognitive processes
and knowledge structures. These cognitive processes
and knowledge structures deal with relationships,
transformations and causations. Relationships
involve parts and wholes, patterns, analysis and
synthesis, sequences and order, and logical
deduction. Transformations include analogies,
metaphors and logical inductions. Causations are
comprised of predictions, inferences, judgments and
evaluations (Presseisen, 1985). Existing with this
diversity are a number of different means of

instruction (i.e. textbooks, in-service, staff development programs and curriculum programs) which attempt to foster these processes and structures (Quellmalz, 1984). The variety of classroom activities and numerous means of instruction illustrate well the complexity and difficulty that exists when dealing with critical thinking.

Since information on critical thinking is so diverse, this review of the related literature was completed to obtain a clearer understanding of what has already been determined regarding critical thinking. This review is presented in sections which describe and examine different aspects of critical thinking. The sections included are: (a) the meaning of critical thinking, (b) components of critical thinking, and (c) methods for teaching critical thinking skills.

The Meaning of Critical Thinking

A clear and precise definition of critical thinking is imperative if effective methods of instruction are to be developed. The ability to design instructional material for critical thinking

skills is also dependent upon a clear understanding. However, to date, there is still indecision regarding the definition of critical thinking. Teachers often become confused about the meaning of critical thinking due to this indecision. In many cases, the lack of clarity regarding the meaning of critical thinking is what makes the task of teaching the skill difficult.

Numerous terms have been used interchangeably in the literature to describe critical thinking. These terms include: problem solving, decision making, creative thinking, evaluative thinking, divergent thinking, productive thinking, convergent thinking and logical thinking (Lucas, 1983). Each of these terms has its own uniqueness which makes it different from the others. Many of these terms are also associated with specific areas of content such as problem solving in mathematics and decision making in social studies. To further the confusion, not only has the concept of critical thinking had various individual meanings but it also has been regarded as an "umbrella" term which includes all of these types of thinking (Lucas, 1983).

It is quite possible that the present understanding of the term has evolved from Dewey's original term "reflective thinking" of which he stated:

> . . . reflective thinking, in distinction from other operations to which we apply the name of thought, involves (1) a state of doubt, hesitation perplexity, mental difficulty, in which thinking originates, and (2) an act of searching, hunting, inquiring, to find material that will resolve the doubt, settle and dispose of the perplexity (p.116).

A review of the literature reveals some additions and modifications have been made to Dewey's original definition. Glaser (1941) concluded that critical thinking calls for a " . . . persistent effort to examine any belief or supposed form of knowledge in the light of the evidence that supports it and the further conclusion to which it tends" (p. 6). Russell (1956) saw critical thinking as

. . .the process of examining materials in the

light of related objective evidence, comparing

the object or statement with some norm or

standard, and concluding or acting upon the

judgment then made (p. 285).

Moving from these more detailed definitions, Ennis

(1962) simply defined critical thinking as " . . .

the correct assessing of statements" (pp. 82-83).

This was followed by Feeley's (1976) reference to

critical thinking as " . . . the judging of

statements based on acceptable standards" (p. 3).

McPeck (1981) suggested that critical thinking is

" . . . the appropriate use of reflective skepticism,

and that this is necessarily linked with specific

areas of expertise and knowledge" (p. 19). Costa and

Presseisen (1985) have provided a current and

comprehensive definition of critical thinking which

will be used throughout this paper. Their definition

states that critical thinking is using basic thinking

processes to analyze arguments and generate insight

into particular meanings and interpretation.

A possible commonality which links all of the definitions is that critical thinking denotes a particular type of thinking. The "critical" of critical thinking implies an objective, analytical, and evaluative process that most would agree education should foster (Costa, et.al., 1985). The evaluative and analytical processes referred to are no doubt comprised of a collection of skills and operations. Hence, the fact that different people are focusing on different skills and operations explains the wide variance in meanings for critical thinking.

Today, specialists appear to agree that the meaning of critical thinking is the assessing of the authenticity, accuracy and/or worth of knowledge claims and arguments (Beyers, 1985, p. 271). Even though this agreement is said to exist, it has not become common knowledge to all those working with the concept. As a result, the ambiguity continues and there remains numerous definitions of critical thinking.

The ability to determine if critical thinking is teachable and how to teach it may be dependent upon

the discovery and acceptance of a clear definition
for the term (McPeck, 1981). Presently, teachers are
free to choose one of many existing definitions of
critical thinking that fit their instructional needs.
(Lucas, 1983). However, when they do, more confusion
is generated and the inconsistencies and lack of
uniformity between teachers and schools is
compounded.

Components of Critical Thinking

With each definition of critical thinking there
is an accompanying set of component skills. The
abundance of meanings explains the equally exceeding
abundance of component skills purported to make-up
critical thinking. Robert Ennis is credited with
forming the general framework of critical thinking
skills upon which subsequent efforts have tended to
be built (Beyers, 1985). Three additional approaches
have further influenced his original efforts. In one
approach, individuals set out to define critical
thinking and, through insight, deduce the skills
assumed to comprise critical thinking:
comprehending, remembering and analyzing. A second

approach proposes taxonomies or hierarchies of
learning. In the taxonomies or hierarchies, skills
are included that relate to critical thinking as part
of a more general analyses of complex cognitive
processes. A third approach involves the development
of inquiry and problem solving skills such as single
units, groups and relations.

Beyer's study of the research work of Ennis
(1962), Feeley (1976), and Russell (1956), suggests
that a concensus exists regarding the nature of
critical thinking and its key cognitive operations.
The core of these skills are:

(a) distinguishing between verifiable facts and
value claims, (b) determining the reliability of
a source, (c) determining the factual accuracy
of a statement, (e) distinguishing relevant from
irrelevant information, claims or reasons, (d)
detecting bias, (e) identifying unstated
assumptions, (f) identifying ambiguous or
equivocal claims or arguments, (g) recognizing
logical inconsistencies or fallacies in a line
of reasoning, (h) distinguishing between

warranted or unwarranted claims and (i)

determining the strength of an argument (1985,

p. 272).

This list of skills does not suggest the only

operations that might be labeled as critical

thinking; it does, however, seem to include the most

commonly used of all critical thinking skills.

Methods of Instruction

The need to improve student ability to think

across the curriculum has been highlighted in the

survey of American education made by the National

Commission on Excellence in Education (Ashby-Davis,

1984). Furthermore, the Commission on the Humanities

sponsored by the Rockefeller Foundation, issued an

important report urging that the improvement of

elementary and secondary education be the major

commitment of American society for the 1980's. As

one of their suggestions for the improvement of

education, they recommended that "thinking" be added

to "reading, writing, and arithmetic" as one of the

basic skills (Oxman, 1984). In response to this,

many educators are beginning to consider teaching

thinking as a subject in schools (de Bono, 1984).

However, most school systems and most teachers are

not well prepared for this task.

Critical thinking is a particular type of

thinking, and it has become evident that teachers

need to begin to give some serious thought to

critical thinking programs (Paul, 1984). This must

be done if educators are to gain an understanding of

what makes sense in regard to the selection of

methods and materials for critical thinking

instruction.

Hesitation on the part of educators may be

explained by the fact that teachers, themselves, are

fearful of their own lack of critical thinking

skills. As a means of overcoming this deficiency,

some short term goals have been recommended by Paul

(1984). These goals are:

(a) encourage teachers to take at least one

university level course in critical thinking,

(b) facilitate the understanding and teaching of

micro-logical, analytic thinking skills within

established subject areas (e.g. a working

knowledge of such terms as premise, reason, conclusion, inference, assumption, evidence, fact, interpretation and so on), (c) train master teachers in a few of the best programs available, (d) encourage teachers and curriculum specialists to attend the growing number of critical thinking conferences, (e) work to develop a schoolwide attitude in which reasoning within unorthodox and conflicting points of view and respectful reasoned disagreement is considered essential and healthy (a difficult goal to achieve), (f) encourage special attention to what Bloom (1981) has called "latent" curricula and "unspoken" values that may undermine the critical spirit (again, very difficult) and (g) establish a working relationship with at least one university critical thinking instructor (pp. 6-7).

In addition, Ashby-Davis (1981) suggests that staff development in critical thinking probably will be most successful if it follows two important steps. These steps being:

(a) to review the thinking/learning process,
strategies conditions, and hierarchies presented
by people such as Bloom, Gagne, Piaget,
Feuerstein and others and (b) to arrive at
methods of instruction geared to the needs of
students at various levels of age, social
background, intellectual potential and academic
expertise (p. 3).

Based on suggestions by Paul and Ashley-Davis,
teachers should also familiarize themselves with the
meaning and general ideal of the concept of critical
thinking prior to any implementation of instruction.
Also, they must evaluate their particular situation
and establish goals, objectives and methods for such
instruction.

As might be expected, the broad spectrum of
definitions for critical thinking has fostered a
variety of attempts to teach these skills. The
variety of methods for teaching critical thinking
parallels the diversity of definitions given to this
concept. The numerous approaches currently being
tried are additional testimony to the fact that

people hold different opinions regarding how best to proceed (Nickerson, 1984).

To the extent that critical thinking is a skill, it is teachable in much the same way that other skills are teachable, namely, through drills, exercises or problem solving activities (McPeck, 1981). In the broad sense, three types of approaches for the instruction of critical thinking exist. The first may be referred to as the generic approach. In this approach, a general method of teaching all aspects of thinking is adopted; critical thinking is just one of its aspects. As a result critical thinking is an instructional by-product of a broad-based general thinking curriculum. The second approach is specific. In this approach the concept of critical thinking is separated from the general concept of thinking and taught as a distinct, independent aspect. The final approach combines the generic approach with the specific. With this approach both general thinking skills as well as specific critical thinking skills are taught (Smith, 1984).

Critical thinking can be taught directly or indirectly. Although a complete report of their findings was not available Robertson and Strange (1985) have indicated that direct instruction with an opportunity to apply them in a variety of situations is the best method for students to develop specific thinking skills. When using the direct method, it is not necessary for regularly planned lessons to be interrupted in order to teach these skills. These specific skills can precede, coincide with, or follow the other skills already being learned. Time periods may be included within the current curriculum to focus on critical thinking. Success in any of these methods of instructing children to think is more likely when direct instruction is given.

A student cannot be expected to learn thinking skills by incidental learning or coincidental instruction (Robertson & Strange, 1985). This indirect teaching differs from direct teaching in that it is incorporated into and throughout the regularly taught lessons in a particular subject. The indirect method is intentional but unrecognized. The direct method adds a separate feature, drawing

the student's attention to the critical thinking that is being expected.

McPeck (1981) suggests that critical thinking should be taught as an integral part of other subjects. It is important that critical thinking be integrated into all the content areas in which students are working. Therefore, teaching of critical thinking across the curriculum is also necessary (Robertson & Strange, 1985).

Resources developed to teach critical thinking skills in the elementary classroom vary. Some textbooks present guidelines for teaching critical thinking. Some review critical thinking concepts and studies of critical thinking and describe sample techniques. Others present one particular program. Yet other resources present strategies for questioning (Quellmalz, 1984).

Another way that schools have attempted to bring critical thinking into the classroom is through staff development programs. These inservice efforts either focus on a variety of techniques for teaching critical thinking skills or limit themselves to

helping teachers learn to make better use of
questioning/inquiry techniques.

The third method of fostering critical thinking
is questioning. Questioning refers to both the
questioning done by the teacher and that done by the
students. Learning when to question something and
what sorts of questions to ask is an important part
of learning to think critically (McPeck, 1981).
Questioning and discussions are seen as crucial to
developing critical thinking skills. The types of
questions asked by teachers should be varied and
appropriate to the subject matter and to the
students' interests; it should not be rigidly
determined by any one hierarchy (Christenbury, 1983).
It is important that students be given time to think
about the answers, and not be overwhelmed by endless
inquiry. Questions should be intended to help
students discover their own ideas; this gives them
the opportunity to explore, argue and sharpen their
critical thinking skills. Good questioning
techniques can be practiced in all subject areas and
at all age levels without any additional materials
(Imel & Kang, 1983).

There is no evidence which suggests that any of the three programs mentioned above are effective in fostering critical thinking. Therefore, additional research needs to be conducted to determine if there are any programs which are effective.

The final way in which schools have attempted to foster critical thinking is through a curriculum program which suggests that teachers use specific strategies and activities to achieve a set of specified outcomes. Some of these programs incorporate critical thinking within a school subject like social studies or science, others teach generalized critical thinking skills. For many students, particularly those of average or below average learning abilites, direct teaching is necessary to bring about desired learning (Ashby-Davis, 1984).

A number of curriculum projects have attempted to foster critical thinking. The review which follows describes only the most recent elementary attempt to teach critical thinking skills.

The first program is the Structure of the Intellect (SOI). SOI materials are based on

Guilford's (1967) theory of intelligence. The goal
of SOI is to equip students with the necessary
intellectual skills to learn subject matter and think
critically (Meeker, 1985). The program's philosophy
is that differences exist not only between critical
thinking abilities but also between the kinds of
critical thinking required in a verbal curriculum
(i.e. Reading or Languge Arts) and a quantitative
curriculum (i.e. Mathematics or Science). The
program operates under the assumption that
intelligence consists of 120 thinking abilities that
are a combination of operations (i.e., comprehending,
remembering and analyzing); contents (i.e., words,
forms, and symbols) and products (i.e., single
units, groups, relationships). Of these, 26 are
directly related to success in school. These
abilities are assessed with the Structure of the
Intellect-Learning Abilities (SOI-LA) tests. An
initial test is administered indicating which
abilities require improvement. Specifically designed
materials are then prescribed. The amount of
instructional time needed for improvement varies but
can be one 30-minute lesson twice a week. Use of the

SOI tests and materials does require training. This training is necessary for both the diagnostic procedures and for the methodology required by the materials. Standardized test scores of students instructed with SOI showed an increase in academic achievement (Meeker, 1985). No further specific empirical data on its effectiveness were given by the researchers.

Philosophy for Children is another program which deals with critical thinking. The developer, Matthew Lipman (1985), assumes children have a natural interest in philosophy. He also believes that children should learn to think for themselves, to explore alternative points of view, to consider evidence, to make careful distinctions, and to become aware of the objectives of the educational process. This program seeks to improve children's reasoning abilities by having them think about thinking while they discuss concepts which are important to them. For three 40-minute periods a week students read special novels. After reading the novels, there is discussion using structured discussion plans, exercises, and games led by the teacher. This

program, like the previous program, requires lengthy teacher training. It also requires the school to purchase the novels needed for instruction. The following studies provide data regarding the effectiveness of the Philosophy for Children program. An experiment done by the Educational Testing Service (ETS) in 1980-81 found that after a one-year intervention with Philosophy for Children, the reasoning deficiency of a group of students was reduced by one third. A 1984 ETS experiment with third graders reported that the students in the experimental group showed gains of 46 percent and 63 percent on two test instruments which measured reasoning skills. The control group's level of appropriate response diminished over a year's time (Lipman, 1985). Empirical evidence suggests that the Philosophy for Children program significantly enhances the thinking skills of children (Johnson, 1984).

The UCI (University of California, Irvine) Thinking/Writing project integrates basic principles of learning theory, current research on the composing process and practical strategies in a developmental

approach to fostering critical thinking skills through writing (Olson, 1985). The program presumes writing to be a complex, critical thinking activity and that by becoming better thinkers students in turn become better writers. The inverse of this statement is also believed to be true.

Curriculum development, teacher training and evaluation are the three main activities involved in the Thinking/Writing Project. There are 30 demonstration lessons which provide strategies for composititition based on a thinking/writing taxonomy. This taxonomy correlates the composing process---prewriting, precomposing, writing, sharing, revising, editing and evaluation---with Bloom's Taxonomy---knowledge, comprehension, application, analysis, synthesis, and evaluation (Olson, 1985). Several instruments have been developed to evaluate the project's impact on students. No empirical evidence of its effectiveness was reported although both the evaluation data and the evaluation design can be obtained from the project.

Another program approach to teaching critical thinking is Edward de Bono's CoRT program (Cognitive

Research Trust). In the program, Brandt (1985) sees de Bono portraying critical thinking as "reactive," calling it the " . . .bane of society and education" (p. 245). The program is a 60-lesson set of materials. Each lesson introduces a "tool" designed to "direct attention on creating a broader perceptual map" (deBono, 1985, p. 207). The PMI (Plus, Minus, Interesting) is the first CoRT lesson. The PMI is a simple scanning tool designed to avoid point-to-point thinking (i.e. following a pattern from one point to the next---and then following the dominant pattern from that next point onward). First, the thinker looks for good points (plus direction), then for bad points (minus direction), and finally for interesting things that might arise or are worth noting, even if they are indifferent (interesting points). Formal scanning in each direction is done one after the other. This produces a map which is better and broader. Thinking is not used to merely back up a snap judgment but to explore. Judgment is then applied by the thinker to the better map (de Bono, 1985). In each lesson, teachers present and monitor the exercises. The CoRT tools are designed

specifically as operating tools which are easy to use
and have a useful effect (de Bono, 1985). The
program elapses over a three year period with
individual lessons running a minimum of 35 minutes
per week. CoRT is not recommended for primary
grades. Individuals using the CoRT program with
delinquent and violent children observed a notable
change in behavior (de Bono, 1985). Also, an
instructor using the program in a science class found
students to perform significantly better at thinking
and science than those students not trained with CoRT
(de Bono, 1985). However, no conclusion can be drawn
since data regarding the specific types of behavior
or the aspect of science being measured were not
provided. Currently, data are being analyzed from
two additional experiments.

Selection of any one of these programs is
dependent on a variety of factors. Foremost, it
needs to be determined whether or not an intervention
program is what is ideally being sought.

The existence of these programs raises the
question of whether thinking skills should be
incorporated into regular classes or taught

separately. Merely providing exercises is not enough
(McPeck, 1981). Providing students with the
opportunity to think a certain way does not guarantee
that they will. Students who have internalized the
strategies for critical thinking will be much more
likely to apply them (Ashby-Davis, 1984). In
addition to applying strategies for critical
thinking, the inclination to use critical thinking
must also be developed. "The ability to think
critically is a matter of degree. No one is without
any critical skills, and no one has them so fully
that there are no areas of their life and thought in
which uncritical thinking is dominant"(Paul, 1984, p.
7).

SUMMARY OF THE RESEARCH

The elementary curriculum is just beginning to focus on the teaching of critical thinking. The need for such instruction is viewed, by many, with skepticism. Critical thinking as an educational ideal has yet to prove itself. It appears that much more must be accomplished for this to happen.

Presently, a major problem exists concerning the definition of critical thinking. Many people have attempted to determine a precise definition for critical thinking but have been unable to reach that goal. The meaning of critical thinking remains unclear.

The task of defining the term critical thinking as well as making decisions in regard to methods for teaching the skill and deciding where it fits in the elementary curriculum, pose a formidable challenge. Clearly, a better job of helping students learn critical thinking skills can be done. A wide variety of instructional methods do exist. If the improvement of the critical thinking skills of students is to occur, changes in instruction must be

made. Doing this requires an honest appraisal of what is presently taught in regard to critical thinking. School systems must decide what they want to teach as well as how they intend to teach it. The curriculum must specify when to begin teaching various critical thinking skills as well as when and how to review, reinforce and enrich these skills.

There are no easy answers to the questions of how critical thinking can be best fostered in students. The decisions that must be made require careful consideration of all the aspects that have been mentioned in this paper.

RECOMMENDATIONS

Recommendations for the Research

First and foremost a general agreement on the nature, shape and boundaries of what comprise critical thinking must be reached. Only then can progress be made in the development of critical thinking as a key ingredient of the curriculum. This curriculum must specify when to begin teaching various critical thinking skills as well as when and how to review, reinforce and enrich these skills.

The most effective methods for teaching critical thinking must be established. A distinction must be made between methods which demand that students use critical thinking and methods which teach students how to develop and use critical thinking. Both methods are necessary.

Educators must be made aware of the importance of critical thinking in the educational process. This awareness will encourage educators to gain personal knowledge regarding the concept of critical thinking and the skills that accompany critical thinking. Training in the methodology of the

instruction will also become important. Finally, an
effort must be made to determine the adequacy of the
tests which are used to evaluate critical thinking
skills. Validation of such instruments must be done.

Recommendations for Practical Implementation

What must take place in a classroom to foster
critical thinking among students? Based on personal
experience and the review of literature, critical
thinking does not require a specific curriculum of
its own. Critical thinking can be fostered at the
primary level and continue through all levels. It is
important that, at all levels, teachers keep in mind
the cognitive level of their students. A teacher
should not expect too much from a student or be
satisfied with too little. Student expectations must
be carefully based upon the student's level of
cognitive development.

To be effective, critical thinking should occur
in all subjects. The tools for developing critical
thinking across the curriculum already exist. It is
important that teachers in all subject areas be made

aware of these tools and how to use them in helping children develop critical thinking.

The starting point and catalyst for fostering critical thinking is the classroom teacher. A teacher must decide upon the nature of critical thinking as it is applied to his/her subject field. Progress in developing critical thinking cannot be made until the teacher is comfortable with the concept. A clear understanding of the the meaning of critical thinking is, however, not the only requirement of a teacher. A teacher must also be committed to the belief that critical thinking is a key ingredient of the subject field's curriculum.

A teacher's understanding of critical thinking and commitment to its importance establishes a firm foundation for the development of critical thinking in students. This development can best be achieved through appropriate questioning methods. First a teacher must become aware of and exhibit good questioning techniques. As the role model for students, the teacher must not rely solely on questions which request factual and literal response but must include questions which call for inferences

which go beyond mere recall of content. Questions
which concentrate on reading between the lines,
beyond the lines and creating new lines are
important.

Along with serving as a good role model, a
teacher must create a classroom atmosphere which is
conducive to questioning. The teacher must make each
student feel that questions are wanted and welcome.
Students must be assured that there is no such thing
as an inappropriate question. Teachers must make
questioning a non-threatening behavior. Teachers and
students must be conscious of their responses to the
questioner. Not only must they be accepting of the
questions asked but they must be accepting of all
attempts to answer.

After a natural, non-threatening atmosphere has
been established, a self-motivated desire to seek
information and resolve unanswered questions must be
developed in each student. This can best be
accomplished by tapping student interests. When
students have the opportunity to work in areas of
their individual interests, they develop a sense of
ownership. To meet these individual interests the

classroom must have a variety of inquiry centers and resources available to the students.

Secondly, teachers must refrain from providing students with all of the answers. Students must become independent thinkers capable of learning on their own. They must not expect to be given information. The teacher must be able to recognize when students have not been given enough information and when they have been given too much information. The teacher must encourage and foster a student's internal desire to question by helping them find information on their own. Once students have experienced success in obtaining information and the self-satisfaction that comes with success, their motivation to seek more answers independently will increase naturally.

Success is vital as a motivator for learning if learning is to be a life-long activity. The skills which are learned in school serve only as the base for the learning which must continue throughout life.

Once a classroom environment conducive to teacher and student inquiry is created, the attention can be focused on the application of the acquired

knowledge. It is not necessarily what you know that
is important; it is what you do with that knowledge.
This application of knowledge involves a combination
of general thinking skills and critical thinking
skills.

The use of critical thinking skill allows
students to make decisions and judgments, evaluate
sources, prioritize and reflect. These are the
elements which have been fostered in the the
classroom environment which has encouraged
questioning.

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