Education's Quest for the Golden Answer: The Need Continues for Critical Thinking

Dr. Bruce Rothwell

Abstract

This paper addressed the need for critical thinking as an appropriate learning outcome for the majority of higher education classes. The paper reviewed critical thinking from a multi-disciplined perspective. A brief review of the history of critical thinking preceded a short discussion of the need. The main body of the paper addressed the reasons for a lack of critical thinking in today's classroom and centered blame on a failure of educators to take the time needed for adequate implementation and a long-standing false belief that there is one best answer to any given question. Finally, the paper addressed numerous approaches identified as effective by recent authors on the subject of critical thinking.

Background/History of Critical Thinking

Instances of critical thinking date back thousands of years to the time of Socrates and before. However, critical thinking did not come of age in America until the writings of Edward Glaser in 1941. There were very few scholars who saw a need for or wrote about critical thinking before Glaser (Paul, 1990). Critical thinking was first introduced into general education programs in the 1950s (Ignatavicius, 2001). Although introduced decades ago, critical thinking skills have not been fully embraced by everyone involved in education. Today, Richard Paul may be the most quoted if not the most well know scholarly advocate concerning the need for critical thinking. Paul's works have been cited in many different disciplines from health education (see Broadbear & Keyser, 2000), to social work, (see Huff, 2000), management (see Mingers, 2000) and others.

Critical thinking represents a major shift from traditional education practices in the United States. Although there are differences in the way critical thinking can be taught, several different academic disciplines now advocate the concept of critical thinking as a significant tool in preparing students for future challenges (Broadbear & Keyser, 2000).

In today's technology advanced society, there still are times when lower order thought processes are satisfactory for the task at hand. However, those instances where lower order thinking may be sufficient are quickly disappearing (Paul, 1990). In earlier times, simply being able to follow instructions was sufficient for most employees. Then came the need for employees to read, write, and solve math. School systems of that era were adequate to prepare workers with these lower level skills. However, in today's society, businesses need workers who can do more than just follow orders, they need individuals who can use judgement to make decisions (Celuch & Slama, 1999). In a global economy, critical thinking is a skill that is quickly becoming essential to obtaining an advanced job (McBride & Carrillo, 2000). Critical decision making skills are one of only two core competencies found in the most successful leaders in

business. Business leaders recognize the need for improved critical thinking. Critical thinking skills were cited as a core competency needed in their companies by all but a few senior executives surveyed in an earlier study (Helliwell, 2000).

There are an almost limitless number of definitions of critical thinking. Further, education has not found a single best methodology for teaching critical thinking. Even though educators may disagree on definitions or approaches to critical thinking, few would argue what the end results should be. "[W]hen one goes to a physician, one prefers to have a specialist who can observe, interpret, judge and evaluate rather than one whose educational career had been characterized by..." memorization of endless facts and regurgitating those facts back on tests (Taylor & Patterson, 2000, p. 3).

Few educators would argue that an objective of most higher education classes should be for the graduate to have mastered some ability to think critically about the subject they have studied. Some researchers believe the level of critical thinking should go far beyond this rudimentary mastery of a specific topic. These authors believe it may be equally important that the student who has mastered a subject should possess the ability to think critically beyond the one class completed and demonstrate the ability to think critically across an entire field of study (Jones, Merritt, & Palmer, 1999).

Since teachers first stood in front of a classroom, many educational trends have come and gone. Although minor changes in techniques have been seen, teachers still use the same basic methodology they have used for generations. There are numerous reasons for a lack of significant change. In education today, one thing remains constant. It is still the teacher who is ultimately responsible for seeing a need for change and then implementing it (Ward, 2001). Therefore, unless educators see a need for the change and are willing to take the time to implement changes, the necessary changes will not happen and there will continue to be limited critical thinking in the future.

Critical Thinking Defined

"Critical thinking is a complex phenomenon and is not easily defined" (Huff, 2000, p. 2). Although not easily defined, there are probably as many different definitions of critical thinking as there are authors who have written about critical thinking. Huff (2000) provides several different definitions crafted by earlier authors before settling on one for use within her paper. The definition she uses comes from the California Critical Thinking Skills Test and defines critical thinking as "the process of purposeful, self-regulatory judgement. Critical thinking so defined, is the cognitive engine which drives problem solving-solving and decision-making" (Huff, 2000, p. 2). Barnet and Bedau define critical thinking as "...searching for hidden assumptions, noticing various facets, unraveling different strands, and evaluating what is most significant" (1996, p. 3). Stated differently, critical thinking requires a willingness for individuals to examine their own assumptions and beliefs, to think about new ideas, adeptly evaluate arguments, and to coherently present one's ideas on a specific subject (Barnet & Bedau, 1996).

"Critical thinking is disciplined, self-directed thinking which exemplifies the perfections of thinking appropriate to a particular mode or domain of thinking" (Paul, 1990, p. 33). Paul later breaks this definition into two separate types of critical thinking, sophistic (weak sense) and fairminded (strong sense). The sophistic definition does not take all points of view into consideration and is centered on specific individuals or groups. The strong sense form of critical thought is designed to take all different interests into consideration no matter how much they differ from the individual doing the thinking (Paul, 1990). Although definable, Paul (1990) explains that no society has yet achieved, embraced, or sufficiently encouraged fairminded critical thought. Even though society has not reached the fairminded level, the sophistic critical thinker is still far advanced beyond the levels of the uncritical thinker.

Other authors have different views of what critical thinking is. "Critical thinking requires us to use our imagination..." (Barnet & Bedau, 1996,

p. 4). A vital part of critical thinking is that the one doing the critical thinking must be willing to investigate views that are different than their own. Each individual needs to look at all sides of a debate exploring the possible good and bad points from each possible position (Barnet & Bedau, 1996). Instead of providing a definition, some authors prefer to explain how to identify and recognize critical thought. For example, Lundquist states that it is essentially "...the ability to track inconsistencies in ones own or others reasoning" (1999, p. 3).

Some definitions are much more concise than others are. Some definitions used in many academic disciplines differ only marginally and seem to be tailored to the discipline under review. For example, McBride and Carrillo define critical thinking used for a wellness course of study as "...thinking that is used to make reasonable and defensible decisions about movement" (2000, p. 1). Yet, their paper is strongly reminiscent of other authors describing the need for critical thought in education, business, or management disciplines. Many instructors and institutions define critical thought too narrowly, which does not allow the freedom to explore the many varied possibilities. This lack of freedom in the defining process results in these institutions relying on a more formal definition of knowledge that stymies critical thinking (Walker & Finney, 1999).

Dialectical thinking is "...the ability to reflect critically on one's own thinking and to reason sympathetically within the frames of reference distinct from, and even opposed to, one's own" (Paul, 1990, p. 299). This ability to look critically at one's own beliefs is furthered by several authors. For example, Celuch and Slama assert that critical thinking means "...the ability to self-assess and continually improve one's thinking" (1999, p. 2). Critical thinking involves "...a scepticism or suspension of belief towards particular statements, information, or norms" (Mingers, 2000, p. 6). Critical thinking requires an individual to evaluate the thought process they use to arrive at the decisions they make and the opinions they have formed concerning the world around them (Walker & Finney, 1999).

In order to become a critical thinker, one must first learn how to learn. Individuals that have attained the ability to think critically can be identified by three specific traits that are dependent on each of the other two. First, critical thought has to be clear, accurate, relevant and logical. Next, these individuals need to be self-correcting in that they have the ability to modify their perceptions and beliefs based on the first criteria. Lastly, the critical thinker must internalize the process of critical thinking so that it becomes a part of them (Broadbear & Keyser, 2000).

Critical thinking is not a linear process that gets the thinker from point "A" to point "B" in the most direct route. Critical thinking is more of an interactive and circular process that requires the investigation of several possible competing possibilities (Huff, 2000). Critical thinking, by its very nature, implies that it involves finding more than one solution to a problem (Ignatavicius, 2001).

Reasons Why Critical Thinking is Not Taught

According to Paul (1990), in the very early years of education in America, catechism was the reason for any education. With God leading us, there was no need for self-reflective questioning. Into the mid 1800s schools basically taught those who attended what they needed to know to survive in early society. Students were taught the three R's, catechism, and the obligatory patriotic American history (Paul, 1990).

Paul (1990, p. 6) calls the lack of critical thinking in America the results of 400 years of "mis-education". Teachers and institutions are grounded in a didactic theory of knowledge and learning when they should strive for critical theory. In the didactic form, each course has a specific set of criteria that has to be remembered. Therefore, teachers talk and students listen, teachers test and students regurgitate. In such a didactic setting, interdisciplinary discussion is out of the question within the classroom and the students are not required to use or apply what they are taught. In the didactic setting, all course work is mired in details and the students

who do not ask questions are seen by their teachers as the ones who best understand (Paul, 1990). In the didactic setting, teachers incorrectly perceive they are totally responsible for student learning and their roles are very different than those of their students. Teachers also incorrectly believe that memorized information is retained and used. In actuality, such information is quickly forgotten and seldom applied in real life situations (Paul, 1990). When talking about the nature of knowledge and how students learn in a didactic setting, Paul states "Questions at the end of the chapter are framed in identical language and can be answered by repeating the texts. 'The correct answer' is in bold type or otherwise emphasized" (Paul, 1990, p. 22).

In today's classrooms, there is more talk about critical thinking that there is the actual achievement of critical thought. Many course outlines have been prepared contending that critical thinking will be enhanced, some with actual good intent. However, when met with an activity that is not welcomed by the student, most faculty fall back to what has worked in the past (Browne & Freeman, 2000). To be successful, the modern student simply does what they have found to be successful in the past. Primarily, they memorize what their teachers tell them is important so they can pass the test and continue to succeed (Paul, 1990).

When the teacher prepares a test that goes beyond simple memorization, they may be confronted with a chorus of "These are the most ambiguous tests I have ever taken!" (McKeachie, 1986, p. 86) Although teachers might tell themselves that the learning is the most important part of the course, to the student the most important part of the course may well be the final grade. In most classes, the final grade is very dependant on final answers on examinations (McKeachie, 1986). Teachers are faced with an interesting dilemma, the student does not like to have to think while taking a test and, those tests that do make the student think generally take an excessive amount of time for the teacher to create and grade (McKeachie, 1986). Therefore, developing and grading tests that measure critical thought is a time

consuming process that few educators attempt or maintain for very long.

There are several things taught in schools that restrict students to lower order thinking as opposed to higher order thought. For example, there is no specific set of steps, or even a direct approach that leads to higher order thought. Higher order thought leads to multiple possible solutions rather than a single correct answer. Higher order thought requires time and effort and involves uncertainty and interpretations. All of the preceding requirements are generally foreign to the current educational system (Paul, 1990).

Many times perpetuation of what has come before is easier than initiating change. Most teachers and professors teach the way they were taught. Since most were taught in a didactic format, they are comfortable teaching in this same format (Paul, 1990). The perpetuation of this type of teaching style can be the result of self-preservation and leaves the student totally unprepared for the future in a rapidly changing society (Broadbear & Keyser, 2000).

There are numerous reasons why there is not more critical thinkers coming out of education. First and foremost would be the apparent denial of the need on the part of the education system and the educators themselves. A second major consideration would be a failure to correctly view problems. There is a significant difference between technical and dialectical problems. Most people try to cast all problems into the technical arena because technical problems are easier to solve. Since the problems are placed in a technical realm that is how society naturally attempts to solve them. The big problem with this logic is that many problems are dialectical in nature. Another significant reason is the childhood ego-identification with adult beliefs, which creates a foundation for closed mindedness. Children learn to exhibit traits that earn them love and affection. First they learn to please their parents and then their teachers. Over time, these traits become ingrained within the child and are not easily changed. Therefore, individuals learn much of their closed mindedness from family and early teachers (Paul, 1990).

Although all humans think, it is not a natural process for the human mind to think critically. Humans want to believe in what makes them feel comfortable, what is simple, and what is rewarded by the society that they live in. Therefore, it is unnatural for the human mind to think critically (Paul, 1990). Thinking critically may cause them to arrive at conclusions that are different and not completely accepted. To truly attain the level of a critical thinker, an individual has to be capable of self-assessment. Self-assessment is possibly one of the most difficult and important skills needed to become a critical thinker. Self-assessment is described by Broadbear and Keyser (2000, p. 4) as an "unnatural act". The only way to get students to become critical thinkers is for teachers to require their students to think critically. Once the students have grasped the process of critical thinking, the teacher can then introduce them to "[m]odeling, numerous practice opportunities, and recognition of real achievement in self-assessment of thinking..." (Broadbear & Keyser, 2000, p. 5). Huff (2000) furthers the idea of modeling critical thinking skills and indicates that the proper environment needs to be created for the student. In this environment, positive critical thought should be nurtured through rewards and poor critical thinking ability should be challenged.

Students who display the ability to think critically can be recognized as the ones who have had teachers that enabled them to differentiate between good ideas and bad ideas. If students are only shown one side of the argument or one means of thinking they will not develop the internal skills they need to think critically for themselves. Therefore, one of the best ways of challenging a student to achieve critical thought is through "...the clash of good and bad ideas" Luckowski & Lopach, 2000, p. 1). For the most part, teachers that used critical thinking techniques did not teach today's teachers. Robert Lundquist (1999) discusses the importance of conflict to critical thought but also indicates that it is not the only method. When conflict is not present, reflection can take its place to stimulate critical thought in the student.

Doubt causes the student to think and controversy can cause the doubts to

occur in the student's mind. Controversy causes the student to analyze a position that is different than his or her own. Many educators soon find that the problem with introducing controversy into the classroom is that it can get out of hand if not properly directed and managed. Further, being made aware of positions that are different can make the student feel uncomfortable with their own beliefs (Browne & Freeman, 2000). Sometimes, doubting one's beliefs can cause discomfort as the individual realizes they may have been wrong in their previous thought processes. Being able to control such situations requires practice. If the teacher does not succeed at first, they may be hesitant to attempt the same methodology again.

There are several problems created when a teacher decides to use critical thinking in the classroom. One of the first of these problems has to do with the amount of class time that must be dedicated to the process. Fostering critical thinking almost necessitates the need for in-class exercises. These exercises are time consuming and will take time away from the presentation of content. The measurement of content is an easier process than analyzing the attainment of critical thinking which will require the teacher to take more time to grade these higher order level assignments (Celuch & Slama, 1999). Although it takes a considerable amount of time to master, just about anyone can learn to be a critical thinker (Ignatavicius, 2001). It is precisely the increased amount of time required to effectively teach critical thinking that may prevent its wider use and ultimate acceptance.

One of the reasons that critical thinking is not found in the business world is that managers and executives have become bogged down in knowledge. In an age of instant information, technology constantly bombards management with knowledge. Before the information can be used, it needs to be absorbed, classified, and applied. Problem is, there is so much information vying for management's attention that the quantity of information has been placed ahead of substance, content, and critical thinking (Dilenschneider, 2001a). According to Dilenschneider (2001a) universities are

teaching people how to use hardware and software which simply adds to the amount of information produced but does not train people how to ask the right questions, to analyze, or even use the information created.

When students arrive in higher education classes, they arrive with an entire spectrum of preconceived ideas, values, and learning techniques (Jones, Merritt, & Palmer, 1999). Many of these students have learned their study habits through years of lower level education classes.

When educators provide in class responses to student questions, many view the question in the wrong way. Instead of seeing the question as an opportunity to foster creative thought they view the question as an interruption to their lecture. Viewing the question as an interruption instead of an opportunity, many instructors answer the question in the shortest means available. Instead, they should answer the question in a way that generates contrasting views instead of a quick-fix response (Lind, 2001).

Although educators generally agree that critical thinking needs to be encouraged critical thought is seldom stimulated within the classroom. Part of the reason critical thought is not achieved is because too many educators focus on the results instead of the methodology used in getting to the results. Lundquist (1999) classifies these educators as behaviourists. Although educators need to place emphasis on the outcome, they must understand that the learning process is complex and that not everyone learns in the same way. Many students have to be able to reflect on and draw conclusions from less successful attempts to obtain answers.

Educators are faced with rational students. Simply stated, the goal of every student is not to excel or increase his or her ability to think critically. Instead, the goal of many students is to pass each course and graduate. Such an attitude can be especially prevalent in courses taken as an elective. Therefore, these students will rationally do the as little as possible to get through the course even though they are capable of achieving much more (Lundquist, 1999).

Too many educators approach their subjects as isolated bodies of knowledge that their students should

internalize. They seem to feel that the accumulation of large quantities of facts by their students about their specific field of interest qualifies the student to pass through the course (Mingers, 2000). Even when new teachers are taught how to encourage critical thinking in school, most revert back to more traditional methods of teaching facts within a short time when in front of the classroom (Yost, Sentner & Forlenza-Bailey, 2000). Traditional modes of teaching take less time and effort. Therefore, the teacher's busy schedule and the daily grind take their toll on the best of intentions.

Different interpretations of the word critical can lead to problems with educators trying to implement critical thinking in their classrooms. Being critical is not critical thought. Being critical is more akin to being negative which can be destructive instead of facilitating critical thinking in the classroom (Mingers, 2000). Other authors agree that the word critical may be problematic because it brings to mind images of negativity (Walker & Finney, 1999).

Not all discussions within the classroom are the same. Although some classes have discussions between and among students and teachers, the discussions never reach the level necessary to achieve critical thought. Many times this problem stems from the fact that the teacher is uncomfortable with dissent and challenges. Therefore, they insist on maintaining an atmosphere where no one can challenge another's ideas so that no one's feelings can be hurt (Yost, Sentner & Forlenza-Bailey, 2000).

Possibly the one thing that prevents critical thinking more than anything else within education is the concept of the golden answer. It is difficult for students to learn to be skeptical. It is even harder for them to learn it is all right to have a different view than that of those writing the texts or teaching the course. Part of this difficulty stems from the fact that they have spent years in educational settings learning from previous instructors that there is only one correct answer. In their past, they have probably been in a setting that discouraged rather than encouraged them to question their

teachers (Mingers, 2000). Too many teachers focus on the right answer (Yost, Sentner & Forlenza-Bailey, 2000). Students and educators alike have been searching for the single correct answer for too long.

> Much of our education system... is geared toward teaching people the *one right answer*. By the time the average person finishes college, he or she will have taken over 2,600 tests, quizzes, and exams... [t]hus, the 'right answer' approach becomes ingrained in our thinking (Oech, 1983, p. 21).

How to Develop Critical Thinkers

One of the biggest problems in teaching critical thinking is that no single method will work with all students or even with all teachers. Therefore, all educators can do is learn all they can about the subject and implement it in a way that works best for them and their students (Broadbear & Keyser, 2000).

Educators need to concentrate more on how students learn instead of simply concentrating on what the student has learned (Lundquist, 1999). To teach students how to become good problem solvers, teachers need to stop teaching what students should know and concentrate more on how they should think (Celuch & Slama, 1999). If teachers continue to teach what students should know, the student will never learn how to become a creative thinker. Therefore, the teacher needs to concentrate less on content and more on the process. Once the student masters the process, the content will come as a natural side effect (Celuch & Slama, 1999).

In a critical thinking environment, teachers encourage their students to ask questions. The more perceptive and probing the student's questions are, the better the indication that higher order learning has resulted. Student questions that start with "Is that why.....Does this mean that...." are all sound indications that critical thinking has taken place within the student (Paul, 1990, p. 23). It is vitally important for educators to ask critical questions. Posing a critical question causes the student to explore the validity of an author's main point. One needs to be careful not to criticize an author's writing or the student will

feel their reading was a waste of time. Therefore, posing an alternative point of view or conclusion may start the student questioning future readings for different opinions than their own (McKeachie, 1986). McKeachie also suggests that using comparative and connective questions can help student discussions and ultimately student thought. Comparative questions are those that cause the student to compare one author's thoughts to another. While connective questions require students to find relationships between dissimilar subjects (McKeachie, 1986). Classrooms that are comprised of critical thinkers are marked with numerous questions. Some of these questions come from the teacher while the students initiate many others. Reinforcing the appropriate types of questions by the teacher goes a long way in fostering critical thought. "Why" questions are more important in the search for stimulating critical thinking and help foster reasoning on the part of the students (Browne & Freeman, 2000). Many teachers ask and are asked questions, but few of these questions reach the level required of critical thought.

Students who actively participate in the classroom are the ones who retain the information and become the most independent learners (Ward, 2001). One of the keys to critical thought is getting the student to participate instead of simply being an observer. Active involvement is a critical element in any teacher's arsenal of tools (Browne & Freeman, 2000). Where it is sometimes difficult to get some students involved in a class discussion and even tougher to get some to think critically, games and simulations are an excellent means of getting everyone involved at a higher order level of learning. Games and simulations seem to evoke a sense of competition. Competing students one against another is good, but placing them on competing teams improves their level of involvement even further. "An educational game involves students in some sort of competition or achievement in relationship to a goal, a game that both teaches and is fun" achieves the best results (McKeachie, 1986, p. 170). The best thing about games and simulations is that they make the student

an active participant where they must "...make decisions, solve problems and react to the results of their decisions" (McKeachie, 1986, p. 170). Critical thinking has to be a participatory activity on the part of the student. Closely linked to games and simulations is the case method approach. This approach also helps involve the student and teaches them how to solve problems using what they have learned in the class (McKeachie, 1986). Being able to apply what they have learned is a dynamic means of introducing critical thinking skills in the classroom. Many researchers recommend the use of case studies to further class discussions and student involvement. Such discussion fosters an environment that results in reflective decision making and critical thinking (Lind, 2001). When selecting the correct case study the educator should look for one that allows their students several levels of understanding. By selecting such cases, the instructor allows multiple possible decision strategies to be discussed in the class which in turn furthers the amount of critical thinking that transpires (Lind, 2001).

Motivation is essential to students doing well in their classes. Students learn what they want to learn and generally will not learn something they are not interested in (McKeachie, 1986). Implementing critical thinking into the curriculum is always going to be tougher than not trying. Therefore, educators need a motivating force to convince them of the need for the efforts. As a part of the motivation, educators should always remember "...that the work students do should have value beyond being an indicator of success in school" (Taylor & Patterson, 2000, p. 5).

Critical thinking is more than just knowledge and skills learned in the classroom. Critical thinking is also an attitude the student brings with them or learns to develop (Loo & Thorpe, 1999). Grades are important to students and they will do what they need in order to achieve good grades. Therefore, if a teacher is satisfied in grading on memorization, the student will memorize. If the teacher expects application of course materials and critical thinking, the student will rise to the requirement (McKeachie, 1986). It

is "...misleading to talk of developing a student's ability to think critically as something separate from the student's ability to think creatively" (Paul, 1990, p. 219).

Although not stated directly, it is obvious that Barnet and Bedau (1996) believe that a good means of teaching critical thinking is to first provide definitions and explanations. Then, present thought provoking essays on controversial issues such as gay marriage, legalization of drugs, or abortion then present thought provoking questions for each of the essays to allow the reader to practice their critical thinking skills. The essays they selected for their book were specifically chosen to evoke very strong opinions. The questions they present with each essay were designed to force the reader to explore the issue from many different points of view in order to adequately answer the questions (Barnet & Bedau, 1996). Paul (1990) seems to provide tacit support for this concept because he explains that teachers and professors must be willing to play devils advocate in their classes.

In a critical thinking environment, students learn more by explaining to others what they know or have learned. Further, students have to take the responsibility for their learning and they must be actively involved in the learning process either in the class or on their own. Teachers encourage students to bring their personal experiences into the classroom discussion and use these experiences as a form of application and assessment of the learning (Paul, 1990).

According to Paul (1990), there are seven intellectual and interdependent traits that must be present to allow critical thinking. They are humility, courage, empathy, integrity, perseverance, reason and a sense of justice. A short explanation of each highlights their importance to one another. Humility requires one to understand that they cannot know everything. Courage requires an openness to think about views that are very different than one's own. Empathy necessitates that the individual places themselves into another's position to see someone else's point of view. Integrity requires the critical thinker to be fair in the evaluation of his or her own

arguments in comparison to others. Perseverance simply reminds that the path to critical thinking is not an easy one and will require much effort. Reason means the critical thinker needs to truly believe that they will not be deceived by giving a fair appraisal of ideas that are very different than their own. Lastly, justice indicates that all viewpoints have to be evaluated fairly (Paul, 1990).

To improve critical thinking, Paul (1990) also suggests a four pronged approach that teachers and professors should learn to use. First, they need to know the difference between multilogical and monological problems and issues. Second, educators need to learn (or re-learn) the Socratic method of teaching. Third and fourth, they must not only use dialogical and dialectical teaching methods, they need to also learn how to correctly assess them (Paul, 1990). Quite simply, there are some questions that need not be analyzed from different angles to arrive at the answer. Such things as simple mathematical questions work well using the monological methodology. For the vast majority of other subjects however, the educator has to learn how to stimulate the desire to learn in their students through many different means. The use of Socratic questioning is simply one such important tool at their disposal. The dialogical and dialectical methods focus on the way students arrive at answers instead of the final results and requires practice on the part of the educator to facilitate and assess this method of problem solving (Paul, 1990).

In order to foster creative thinking in their classrooms, teachers should first introduce the fundamentals of creative thought. In other words, teach the students how to question, interpret, and draw conclusions among other things. Next, the teacher should evaluate student progress against standards such as depth, logic, and significance. Through this process, the teacher will create intellectual autonomy on the part of the student. Finally, the teacher has to hold the student accountable for accomplishing critical thought (Celuch & Slama, 1999).

Education needs to focus more on how to effectively communicate and less on how to use modern tools that allow us to communicate faster

(Dilenschneider, 2001b). The most important thing does not appear to be the type of venue where the critical thinking skills are learned. The important thing is that the skills are learned and reinforced. Huff (2000) found that there was no difference between the critical thinking skills learned by students in a traditional classroom setting and those receiving the same instruction through distance education. Huff (2000) indicates that since interactions between students and teachers are more difficult in the non-traditional classroom, educators must be more vigilant in such settings to provide interactions that improve the student's critical thinking abilities. One of the main things that make the non-traditional setting more difficult for the educator is the lack of visual communications on the part of the student. Designing non-traditional classes that will facilitate critical thinking take more preparation on the part of the teacher to ensure discussion, questions, and reflection occur than the amount of time required to prepare for a more traditional setting (Huff, 2000).

Beyond education and into application, Ignatavicius recommends that critical thinking must be a "...part of the organization's philosophy and core values with a definition that everyone understands...essential [critical thinking] skills should be part of the employees' job/role description and performance appraisal. Holding staff accountable for critical thinking is a minimum expectation" (2001, p. 3).

In addition to teaching critical thinking in an unstructured format, some researchers have advocated and developed standardized tests to determine the level of critical thought people possess. Loo and Thorpe credit Watson and Glaser as being "...pioneers in the development of the conceptualization and measurement of critical thinking" (1999, p. 1). The test developed by Watson and Glaser contain five areas that identify the test taker's ability to infer, recognize assumptions, deduce, interpret, and evaluate arguments. The composite of these five sub-tests provides the overall assessment of an individual's critical thinking abilities (Loo & Thorpe, 1999).

Several approaches to teaching how to think critically contain several steps or levels for the educator to work

though or observe in their students. One such approach advocated by Lundquist (1999) provides four levels the educator should look for and attempt to develop. In the first level, the student attempts to arrive at an appropriate solution. This level is common and can normally be found in most classroom settings. In the second step, the students should discuss their solutions among their peers. The third level requires the student to contrast the results they came up with against a recommended solution provided by the teacher. In the last level, a class discussion is held with all the students and the teacher discussing the various means the students and teacher individually used to arrive at their solutions (Lundquist, 1999). Obviously, the nature of the problem being worked in such a learning environment needs to be conducive to multiple correct solutions. Absolutely essential to using this approach is the need to change the student's mind-set. When a teacher first starts to use such an approach, the students "...are often disturbed by noting that there often is no single correct solution or that the teacher does not have the traditional role as the one who decides what is correct and what is not" (Lundquist, 1999).

Constructivism is a term Ward (2001) uses to explain a process where students move from knowledge about a topic to understanding the subject. Constructivism means that students must build on previously constructed knowledge. The building block approach of this methodology allows the student to look at new ideas from multiple directions to gain a higher level of understanding. Critical to this process is that solutions can be constructed from numerous different directions. The educator has to follow the student's constructed answer although it will often be different than his or her own. For a teacher to encourage such a constructivism approach, the teacher must willing to reward the construction of an answer as much or even more than simply rewarding the correct answer. Grading the steps leading up to an answer in addition to the answer is a foreign idea to most educators but is a critical component to the constuctivism methodology. Further, constructivism teaching methods means the teacher is required to understand the student's

thought process in deriving their answers. In addition to being the exception, using such an approach will be much more time consuming for the teacher implementing this approach especially initially (Ward, 2001). Constuctivism is an approach furthered by other authors as well. Some indicate that in addition to a system of building knowledge, constructivism should cause conflict in the student. The addition of conflict causes the student to question, which also means they learn new alternatives (Yost, Sentner & Forlenza-Bailey, 2000).

Reflection is an important element of critical thinking to many researchers. Knowledge by itself is not sufficient. In order to reach the desired level of critical thought there needs to be reflection of the knowledge attained (Lundquist, 1999). Reflection requires open-mindedness on the part of the student to accept that there are points of view different than their own. Reflection is a concept that must be learned and nurtured as it is not something that occurs naturally. Equally significant, because reflection does not come naturally, it has to be taught to the teacher before it can be used in teaching the student (Yost, Sentner & Forlenza-Bailey, 2000).

Although most authors indicate that critical thinking needs verbal communication, one group (Yost, Sentner & Forlenza-Bailey, 2000) indicate that writing assignments can also improve critical thought. Yost et al., provide four different levels of writing. The first, descriptive writing is not reflective and does nothing to further critical thought. Descriptive writing is commonly found in many classrooms. In the second level, descriptive reflection, the student's assignment should require them to interpret their readings. The third level, dialogic requires the student to write about possible reasons for the author's writings. In the last level, termed critical, the student is required to provide reasons for their position (Yost, Sentner & Forlenza-Bailey, 2000). Writing is an important component of enhancing critical thinking. Simply writing a list of reasons for and against an idea requires the writer to think about an issue from at least two differing points of view (Barnet & Bedau, 1996).

In today's classrooms, the teacher is the knowledge expert. Therefore, what generally happens is that "...the one with the knowledge speaks; and the one seeking the knowledge listens" (Browne & Freeman, 2000, p. 3). Even if the teacher feels they need to do the speaking, there are ways to enhance the amount of critical thinking accomplished. The speaker must choose their words in a manner that requires the listener to reflect on and integrate what has been said. Through these active learning methods, the teacher can improve critical thinking when they feel they have to lecture (Browne & Freeman, 2000).

When drafting learning outcomes for higher education, educators should make critical thinking about the subject a top priority (Jones, Merritt, & Palmer, 1999). No matter the educator's preference for methodology used to teach critical thinking, educators need to make a commitment to their students to introduce critical thinking into their classes. Educators need to move away from their quest for the golden answer and come to grips with the fact there is no single right answer or best approach to solving most questions.

References

Barnet, S., & Bedau, H. (1996). Current issues and enduring questions: A guide to critical thinking and argument (4th ed.). Boston, MA: Bedford Books.

Broadbear, J. T., & Keyser, B. B. (2000). An approach to teaching for critical thinking in health education. The Journal of School Health, 70, 322-326.

Browne, M. N., & Freeman, K. (2000). Distinguishing features of critical thinking classrooms. Teaching in Higher Education, 5, 301-306.

Celuch, K., & Slama, M. (1999). Teaching critical thinking skills for the 21st century: An advertising principles case study. Journal of Education for Business, 74, 134-139.

Dilenschneider, R. L. (2001). Critical thinking. Executive Excellence, 18, 5-6.

Dilenschneider, R. L. (2001). The coming age of content and critical thinking. Executive Speeches, 15, 23-26.

Helliwell, R. (2000). Keys to critical thinking. New Zealand Management, 47, 44-45.

Huff, M. T. (2000). A comparison study of live instruction versus interactive television for teaching MSW students critical thinking skills. Research on Social Work Practice, 10, 400-416.

Ignatavicius, D. D. (2001). Six critical thinking skills for at-the-bedside success. Nursing Management, 32, 37-39.

Jones, P. C., Merritt, J. Q., Palmer, C. (1999). Critical thinking and interdisciplinarity in environmental higher education: The case for epistemological and values awareness. Journal of Geography in Higher Education, 23, 349-357.

Lind, V. R. (2001). Designing case studies for use in teacher education. Journal of Music Teacher Education, 10, 7-13.

Loo, R., & Thorpe, K. (1999). A psychometric investigation of scores on the Watson-Glaser critical thinking appraisal new form's. Educational and Psychological Measurement, 59, 995-1,003

Luckowski, J. A., & Lopach, J. J. (2000). Critical thinking about political commentary. Journal of Adolescent & Adult Literacy, 44, 254-258.

Lundquist, R. (1999). Critical thinking and the art of making good mistakes. Teaching in Higher Education, 4, 523-529.

McBride, R. E., Carrillo, D. (2000). Incorporating critical thinking into a secondary-school wellness unit. Journal of Physical Education, Recreation & Dance, 71, 20-24.

McKeachie, W. J. (1986). Teaching tips: A guidebook for the beginning college teacher (8th ed.). Lexington, MA: D. C. Heath and Company.

Mingers, J. (2000). What is it to be critical? Teaching a critical approach to management undergraduates. Management Learning, 31, 219-237.

Oech, R. V. (1983). A whack on the side of the head: How to unlock your mind for innovation. New York, NY: Warner Books Inc.

Paul, R. (1990). Critical thinking: What every person needs to survive in a rapidly changing world. Rohnert Park, CA: Center for Critical Thinking and Moral Critique Sonoma State University.

Taylor, R. H., & Patterson, L. (2000). Using information literacy to promote critical thinking. Teacher Librarian, 28, 9-14.

Walker, P., & Finney, N. (1999). Skill development and critical thinking in higher education. Teaching in Higher Education, 4, 39-49.

Ward, C. D. (2001). Under construction: On becoming a constructivist in view of the standards. The Mathematics Teacher, 94, 94-96.

Yost, D. S., Sentner, S. M., & Forlenza-Bailey, A. (2000). An examination of the construct of critical reflection: Implications for teacher education programming in the 21st Century. Journal of Teacher Education, 51, 39-49.