Critical Thinking Framework For Any Discipline

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This paper identifies a 5-step framework that can be implemented in virtually any teaching or training setting to effectively move learners toward critical thinking. This interdisciplinary model, which is built upon existing theory and best practices in cognitive development, effective learning environments, and outcomes-based assessment, provides teachers with a useful framework. This framework can be used to move students toward a more active-learning environment which, ultimately, is more enjoyable and effective for teachers and students alike. An example of the model is applied in the context of accounting education, which represents a business discipline in which critical thinking has been consistently cited as both necessary and difficult to implement.

Thinking is a natural process, but left to itself, it is often biased, distorted, partial, uninformed, and potentially prejudiced; excellence in thought must be cultivated (Scriven and Paul, 2004). Critical thinking is, very simply stated, the ability to analyze and evaluate information. Critical thinkers raise vital questions and problems, formulate them clearly, gather and assess relevant information, use abstract ideas, think open-mindedly, and communicate effectively with others. Passive thinkers suffer a limited and ego-centric view of the world; they answer questions with yes or no and view their perspective as the only sensible one and their facts as the only ones relevant. Critical thinking is an important and necessary skill because it is required in the workplace, it can help you deal with mental and spiritual questions, and it can be used to evaluate people, policies, and institutions, thereby avoiding social problems (Hatcher and Spencer, 2005).

This paper identifies a 5-step framework that can be implemented in virtually any teaching or training setting to effectively move learners toward critical thinking. This interdisciplinary model, which is built upon existing theory and best practices in cognitive development, effective learning environments, and outcomes-based assessment, provides teachers with a useful framework in which to move students and lecture-based courses toward an active-learning environment.

Techniques That Encourage Critical Thinking

The lecture format of learning is a venerable and popular approach to content delivery in higher education; however, it frequently does not encourage active learning or critical thinking on the part of students. Those new to the teaching profession often adopt the lecture format because it is both teacher-centered and comes with a strong academic tradition. Unfortunately, it is very difficult to increase a student's critical thinking skills with the lecture format. Topics are discussed sequentially rather than critically, and students tend to memorize the material since the lecture method facilitates the delivery of large amounts of

information. The student is placed in a passive rather than an active role since the teacher does the talking, the questioning, and, thus, most of the thinking (Maiorana, 1991).

Active learning can make the course more enjoyable for both teachers and students, and, most importantly, it can cause students to think critically. For this to happen, educators must give up the belief that students cannot learn the subject at hand unless the teacher covers it. While it is useful for students to gain some exposure to the material through pre-class readings and overview lectures, students really do not understand it until they actively do something with it and reflect on the meaning of what they are doing.

There have been many definitions of critical thinking over the years. Norris (1985) posited that critical thinking is deciding rationally what to or what not to believe. Elder and Paul (1994) suggested that critical thinking is best understood as the ability of thinkers to take charge of their own thinking. Harris and Hodges (1995) declared critical evaluation as the process of arriving at a judgment about the value or impact of a text by examining its quality.

The taxonomy offered by Benjamin Bloom some 50 years ago offers a straightforward way to classify instructional activities as they advance in difficulty (Bloom, 1956). The lower levels require less thinking skills while the higher levels require more. The theory of critical thinking began primarily with the works of Bloom (1956), who identified six levels within the cognitive domain, each of which related to a different level of cognitive ability. *Knowledge* focused on remembering and reciting information. *Comprehension* focused on relating and organizing previously learned information. *Application* focused on applying information according to a rule or principle in a specific situation. *Analysis* was defined as critical thinking focused on parts and their functionality in the whole. *Synthesis* was defined as critical thinking focused on putting parts together to form a new and original whole. *Evaluation* was defined as critical thinking focused upon valuing and making judgments based upon information. In the context of this paper, critical thinking is deemed

to take place when students are required to perform in the *Analysis, Synthesis,* and *Evaluation* levels of Bloom's taxonomy.

To provide the greatest benefit to students, teachers should provide many opportunities for students to engage in the upper levels of Bloom's taxonomy where critical thinking takes place. While most teachers believe that developing critical thinking in their students is of primary importance (Albrecht & Sack, 2000), few have an idea exactly what it is, how it should be taught, or how it should be assessed (Paul, Elder, & Batell, 1997). The following model (Figure 1) is a 5-step framework that can be implemented in any classroom or training setting to help students gain critical thinking skills.

5-Step Model to Move Students Toward Critical Thinking

Step 1. Determine learning objectives. Considering the importance of a course, its placement in a program of study, and its role in providing a base of knowledge to be built upon by other courses, a teacher should first identify the key learning objectives that define what behaviors students should exhibit w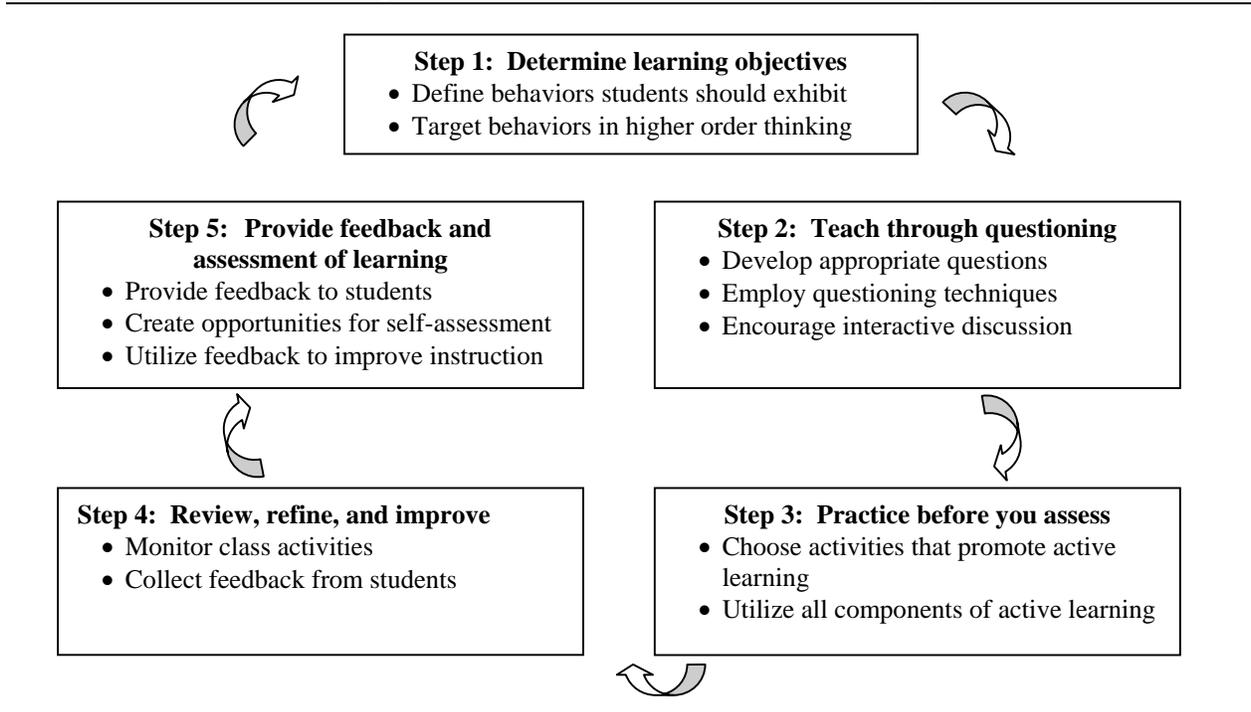hen they exit the class. To make critical thinking happen, these learning objectives, as well as the activities and assessments, must include those tied to the higher levels of Bloom's (1956) taxonomy.

A well-written objective should include a behavior that is appropriate for the chosen level of the taxonomy. Bloom's *Knowledge* level requires an answer that demonstrates simple recall of facts. Questions at this level could ask students to answer who and what and to describe, state, and list. *Comprehension* requires an answer that demonstrates an understanding of the information. Questions at this level might ask students to summarize, explain, paraphrase, compare, and contrast. *Application* requires an answer that demonstrates an ability to use information, concepts and theories in new situations. Questions at this level may ask students to apply, construct, solve, discover, and show. *Analysis* requires an answer that demonstrates an ability to see patterns and classify information, concepts, and theories into component parts. Questions at this level could ask students to examine, classify, categorize, differentiate, and analyze. *Synthesis* requires an answer that demonstrates an ability to relate knowledge from several areas to create new or original work. Questions at this level might ask students to combine, construct, create, role-play, and suppose. Finally, *Evaluation* requires an answer that demonstrates ability to judge evidence based on

FIGURE 1
5-Step Model to Move Students toward Critical Thinking

Step 1: Determine learning objectives
- Define behaviors students should exhibit
- Target behaviors in higher order thinking

Step 5: Provide feedback and assessment of learning
- Provide feedback to students
- Create opportunities for self-assessment
- Utilize feedback to improve instruction

Step 2: Teach through questioning
- Develop appropriate questions
- Employ questioning techniques
- Encourage interactive discussion

Step 4: Review, refine, and improve
- Monitor class activities
- Collect feedback from students

Step 3: Practice before you assess
- Choose activities that promote active learning
- Utilize all components of active learning

reasoned argument. Questions at this level may ask students to assess, criticize, recommend, predict, and evaluate.

Thus, a well-written lesson plan should target a specific behavior, introduce and allow for practice of the desired behavior, and end with the learner exhibition of the behavioral response. The development of well-written questions will greatly accelerate a learner's movement into critical thinking.

Consider computer security as an example. Say that the objective is: "Students will be able to classify common security threats by category." The verb *classify* is a behavior typically identified with the *Analysis* level of Bloom's taxonomy. The three categories (natural disasters, employee errors, crime) would be presented to the students using questions to enhance the students' understanding. These questions could include (a) "What natural disasters are common in the area in which you currently live?" (b) "Are employee errors intentional acts?" and (c) "What computer crimes or acts of fraud have you read about in the past two months?" Once an understanding of the basic categories has been established, the students are placed in groups and assigned a business. Students will then be asked to identify at least three security threats from each category for that business to be shared in discussion with the entire class. Finally, students are asked individually to classify security threats by category for a business on the exam.

Step 2: Teach through questioning. Questioning is a vital part of the teaching and learning process. It allows the teacher to establish what is already known and then to extend beyond that to develop new ideas and understandings. Questions can be used to stimulate interaction between teacher and learner and to challenge the learner to defend his or her position, (i.e., to think critically). Clasen and Bonk (1990) posited that although there are many strategies that can impact student thinking, it is teacher questions that have the greatest impact. He went on to indicate that the level of student thinking is directly proportional to the level of questions asked. When teachers plan, they must consider the purpose of each question and then develop the appropriate level and type of question to accomplish the purpose. All students need experience with higher level questioning once they become familiar with a concept. Thoughtful preparation on the part of the teacher is essential in providing that experience.

Questioning techniques can be used to foster the thinking ability of students. Questions can be categorized in a number of different ways. One simple method is to use the general categories of convergent and divergent questions. Convergent questions seek one or more very specific correct answers, while divergent questions seek a wide variety of correct answers. Convergent questions apply to Bloom's lower levels of *Knowledge, Comprehension*, and *Application* and may include questions like "Define nutrition,"

"Explain the concept of investing," and "Solve for the value of X." Divergent questions apply to Bloom's higher levels of *Analysis, Synthesis*, and *Evaluation*; are generally open-ended; and foster student-centered discussion, thereby encouraging critical thinking. For example, "Describe the qualities that make a person successful," "Create an office design to facilitate group interaction," and "Describe how sun spots might affect tree growth" are all divergent questions.

To most effectively encourage student participation, teachers must become highly skilled questioners. This is understandably difficult and takes commitment. According to Teaching Strategies (2003), the crucial elements of a skilled questioner are that they: pose brief and concise questions, are prepared to rephrase questions, are prepared to draw further responses from participants, use a variety of techniques, redirect questions/responses, provide feedback and reinforcement without repeating answers, and spread questions around the class.

Elder and Paul (1997) proposed that the art of questioning is essential to the art of learning and that, to the extent that if they fail to ask genuine questions and seek answers to those questions, students are not likely taking the content seriously. Students learn math by asking questions about math, students learn history by asking questions about history, and students learn business by asking questions about business. Teachers can and should use questioning techniques to inspire critical thinking in the classroom.

Step 3: Practice before you assess. In the past decade, a major shift has taken place in education; that shift is toward active learning. Teachers that have used this approach generally find that the students learn more and that the courses are more enjoyable. Bonwell and Eison (1991) described active learning as involving the students in activities that cause them to think about what they are doing. Fink (2003) indicated that the concept of active learning supports research which shows that students learn more and retain knowledge longer if they acquire it in an active rather than passive manner. To make learning more active, we need to learn how to enhance the overall learning experience by adding some kind of experiential learning and opportunities for reflective dialog.

According to Fink (2003), there are two guiding principles that should be considered when choosing learning activities. First, activities should be chosen from each of the following three components of active learning: *Information and Ideas, Experience,* and *Reflective Dialog*. *Information and Ideas* include primary and secondary sources accessed in class, outside class, or online; *Experienc*e includes doing, observing, and simulations; *Reflective dialog* includes papers, portfolios, and journaling. Second, whenever possible, direct kinds of learning activities should be used. Examples of direct activities include doing in an

authentic setting, direct observation of a phenomenon, reflective thinking, service learning, journaling, and dialog in or outside of class.

One very important ingredient of active learning is in-depth reflective dialog. This provides students with the opportunity to reflect on the meaning of their learning experience. One can reflect with oneself, as in a journal, or with others, as in a class discussion. According to Fink (2003), in reflective writing, students should address the following questions: What am I learning? What is the value of what I am learning? How am I learning? What else do I need to learn?

When teachers think about what should happen in a course, it is important to consider the kinds of active learning that can encourage critical thinking. To enhance the overall learning experience and to create a complete set of learning activities, it is necessary to enlarge the view of active learning to include getting information and ideas, experience, reflection, and, when possible, direct experience.

Step 4: Review, refine, and improve. Teachers should strive to continually refine their courses to ensure that their instructional techniques are in fact helping students develop critical thinking skills. To accomplish this, teachers should monitor the classroom activities very closely. To track student participation, a teaching diary can be kept that identifies the students that participated, describes the main class activities, and provides an assessment of their success. Other reflective comments can also be tracked in this journal and can be very useful when revising or updating instructional activities.

Student feedback is also an important tool to be used in the improvement of a course. Angelo and Cross (1993) suggested numerous methods for collecting key information related to student learning and response to instructional techniques. One such method, the 2-minute paper, asks students to identify the most important point learned. Teachers can review the comments and use them in future classes to emphasize issues identified. Chain notes can be implemented with an envelope bearing a key question on it that students respond to by placing their answers in the envelope. Discussing the patterns of responses with the students can lead to better teaching and learning. Memory matrixes are also useful in the collection of student feedback; students are asked to fill in two-dimensional cells with labels related to a concept. For example, labels may correspond to different periods of history and students would be asked to classify events. The teacher can look for patterns among the incorrect responses and decide what might be the cause(s). These types of activities can also have positive benefits for the students. Students will become better monitors of their own learning. Students may find they need to alter study skills to improve their success in the course. Students will witness, firsthand, that the teacher cares about their learning.

Step 5: Provide feedback and assessment of learning. Teacher feedback, like assessment, compares criteria and standards to student performance in an effort to evaluate the quality of work. However, the purpose of feedback is to enhance the quality of student learning and performance, rather than to grade the performance, and, importantly, it has the potential to help students learn how to assess their own performance in the future. Feedback allows the teacher and student(s) to engage in dialogue about what distinguishes successful performance from unsuccessful performance as they discuss criteria and standards (Fink, 2003).

Teachers should provide good feedback to their students through frequent opportunities to practice whatever they are expected to do at assessment time. Teachers should spend ample time helping students to understand what the criteria and standards are and what they mean. Student peers may also provide feedback and evaluation. Each of these techniques help students learn to distinguish between satisfactory and unsatisfactory performance.

When providing feedback, teachers should be both thoughtful and purposeful. According to Wlodkowski and Ginsberg (1995), teachers should provide feedback that is informational rather than controlling, based on agreed-upon standards, specific and constructive, quantitative, prompt, frequent, positive, personal, and differential (i.e., indicating personal improvement since the last performance).

Finally, it is important to note the importance of assessment to the 5-step model itself. Information gleaned from student feedback and assessment provides an immediate and significant source of information to the teacher with respect to which objectives were met, the effectiveness of specific learning activities, things to start or stop doing, effectiveness of feedback on standards, etc. This information should be used to continually improve courses and can in turn become a valuable part of a department or discipline's outcomes-based assessment efforts.

Illustrative Example

In an effort to illustrate the application of this framework, the topic of financial statement analysis in an introductory financial accounting course will be utilized. The need for fundamental change in accounting education has been well documented for most of the past two decades (Accounting Education Change Commission, 1990; Albrecht & Sack, 2000; Doney & Lephardt, 1993). In particular, the ability to think critically, reason in a variety of ways, and solve unstructured problems has been cited consistently as a necessary quality in business graduates in general and accounting students in particular (Springer & Borthick, 2004). Accounting education has been criticized for spending too much time solving well-structured,

deterministic problems, placing excessive emphasis on memorization, being reluctant to develop creative types of learning experiences, and focusing excessively on content at the expense of skills development (Albrecht & Sack, 2000; Doney & Lephardt, 1993). The model presented in this paper seems to provide an appropriate and useful framework from which to address many, if not all, of these concerns.

Basic financial statement analysis is a skill taught in most introductory financial accounting courses. It represents a good example of a skill that is built upon in other business courses (i.e., finance, business strategy) and is also likely to be utilized by most business professionals. The first step in the model (Determine Learning Objectives) involves the determination of behaviors students should exhibit appropriate to the various levels of Bloom's taxonomy as shown in Table 1.

Note that the development of these objectives not only provides for increasingly higher levels of learning (those which demonstrate critical thinking), but also provides a basis for developing appropriate questions, designing specific learning activities, and giving feedback on and assessing student learning outcomes.

The next critical step in the model (Teach through Questioning) is to develop questions (based upon the learning objectives identified above) and prepare to employ appropriate questioning techniques that help foster an active learning environment. In this context, the use of both focused and open discussion formats is recommended. Convergent questions are utilized to assist students in mastering the basic financial analysis concepts (i.e., knowledge, comprehension, and analysis), while divergent questions are proposed for the learning outcomes identified above which may include a variety of correct responses (i.e., analysis, synthesis, and evaluation). In accounting in particular, it may be necessary occasionally for the instructor to digress to the lecture format to explain difficult concepts or computational nuances. Nonetheless, a concerted effort should be made to keep the students actively and equally engaged.

In implementing Step 3 of the model (Practice before You Assess), working through the objectives and questions can be accomplished using a variety of activities. For this particular topic, students might be given a reading assignment and then administered a short reading quiz at the beginning of class to provide both practice and feedback on the knowledge and comprehension aspects of the topic. Once the teacher is reasonably sure that the students are able to perform the analysis and compute the ratios correctly, students may be placed in teams to perform the actual analysis of the statements. For higher levels of learning, the guidelines of Fink (2003) can and should be followed. For example, students might be asked to utilize information from real companies by accessing financial statements online and then using the data to compute ratios either in groups or individually in a real world application. Students may be asked to critique the analysis, synthesis, or evaluation of others. At the conclusion of class or the learning unit, a useful exercise in this setting is that of a reflective journaling activity. For example, students might be asked to reflect in writing upon "how what I learned will be of use to me in my chosen profession." In addition to encouraging students to reflect upon what they have actually learned, this type of activity also helps make the material personally and/or professionally relevant.

Obviously, the teacher will need to continually monitor, reflect upon, and refine the activities in an effort to adapt each topic and group of students using the techniques outlined in Step 4 (Review, Refine, and Improve) of the model. A particular problem frequently encountered in accounting classes is that of the free rider effect, in which one or more strong students tend to do the bulk of the quantitative analysis to the benefit of the other members of the group. This situation can be mitigated by making expectations clear

TABLE 1
A Sample of Learning Objectives for a Financial Statement Analysis

Level	Objectives
Knowledge	Identify two basic approaches to financial statement analysis
Comprehension	Compare and contrast horizontal and vertical financial analysis.
Application	Perform a ratio analysis of a company for the most recent fiscal year.
Analysis	Compare the financial ratios of a company to industry averages and give possible reasons for any significant variances.
Synthesis	Based upon financial analysis, identify several actions a company might take to improve its operating results.
Evaluation	In the role of a potential lender, prepare a memorandum to your supervisor assessing the overall liquidity and solvency of a prospective borrower, your recommendation to extend or deny credit, and any significant assumptions made or limitations of the data you utilized in formulating your recommendation.

and holding all group members accountable for the work. For example, the teacher may require all students to prepare a solution and then randomly select one solution for grading for the entire group and/or presentation by the entire group.

Feedback and assessment of learning are provided by the teacher in the final step of the model. In this setting, feedback is relatively straight-forward with respect to the learning objectives in the lower levels of the taxonomy since accounting, by its nature, often affords the student to come up with a right or wrong answer. As was previously discussed, however, this quality of accounting education also has a tendency to produce professionals who have little tolerance for ambiguity or unstructured problem solving. It is in this area, which represents the higher levels of the taxonomy (and, thus, critical thinking) where the model can make a substantial contribution to the quality of student learning. At the same time, teachers will have to make extra efforts to provide thoughtful and purposeful feedback. Examples of outstanding work from other students or groups represent one reasonably effective way to provide feedback on the learning outcomes and standards relating to the analysis, synthesis, and evaluation of information. Standards might also include ground rules for class or group participation and responsibility for assignments.

Assessment of this topic would logically measure student performance on the objectives stated at the onset of the lesson at a level consistent with the standards articulated above. Teachers should not be afraid to ask ambiguous questions or those which require the student to identify missing or limited information, defend his or her position and recommendations, or question assumptions underlying the financial statements being analyzed. In this manner, teachers will be in the best position to assess whether or not critical thinking is indeed taking place.

This illustration has shown the applicability of the 5-step model developed in this paper to the specific context of teaching financial statement analysis in an introductory accounting course. The framework can be applied to most any discipline with appropriate modification of learning outcomes, discussion models, and activities.

Conclusion

It is important that teachers give thoughtful consideration to current instructional methods and to the personal beliefs that drive them prior to contemplating this particular approach to teaching. Implementing critical thinking through this framework clearly requires a commitment to active, student-centered learning which, at least initially, may be somewhat unfamiliar and uncomfortable to both students and teachers.

Other potential roadblocks in the application of this framework can be overcome with some planning and creativity. Although there is little question that class size and time constraints may limit the frequency and duration of techniques that encourage critical thinking, it is still very possible to engage students in large groups.

Specific disciplines may also be construed as a limiting factor when considering techniques that encourage critical thinking. Despite the widely held belief that students need to do more than just listen to learn, a survey of professors in the United States found that lecturing is the mode of instruction for 89% of physical scientists and mathematicians (Chickering & Gamson, 1987). However, active/cooperative learning as a pedagogical approach to encouraging critical thinking can be very effectively used in conjunction with lectures. According to Bonwell and Eison (1991), "when using active learning students are engaged in more activities than just listening. They are involved in dialog, debate, writing, and problem solving," as well as higher-order thinking, such as analysis, synthesis, and evaluation. The encouragement of critical thinking can be accomplished in any content area by modification of lectures and the incorporation of simple active learning techniques.

While the use of the 5-step framework to help students learn critical thinking skills may necessitate a fundamental change in instructional technique from that of the traditional lecture-based format, such efforts will likely result in learning experiences which are both more enjoyable and valuable to students and teachers alike.

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