

## Developing higher level thinking

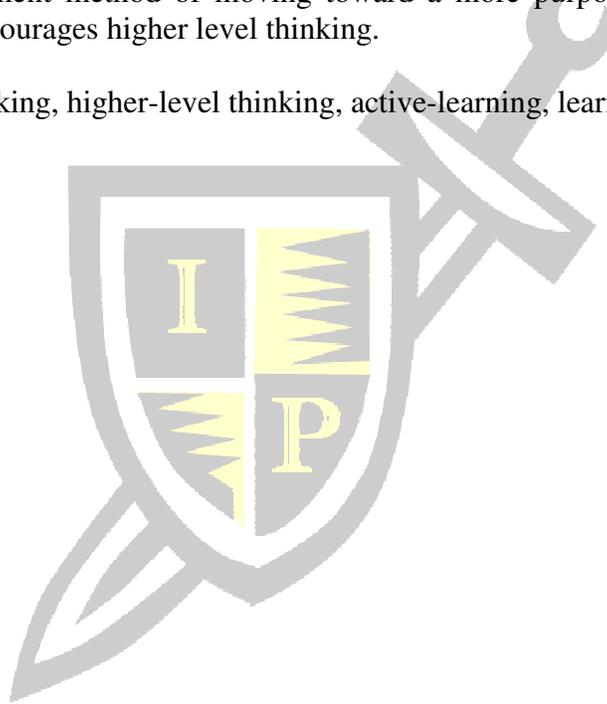
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### Abstract

This paper identifies an interdisciplinary, five-step process, built upon existing theory and best practices in cognitive development, effective learning environments, and outcomes-based assessment. The *Process for the Development of Higher Level Thinking Skills* provides teachers with an easy to implement method of moving toward a more purposeful and active-learning environment, which encourages higher level thinking.

Keywords: critical thinking, higher-level thinking, active-learning, learning environments, assessment



## Introduction

Pedagogy is a word that describes the art of teaching. Most teachers strive to become better and to perfect the art (Queensland Government, 2002). A strong pedagogy necessitates the study of teaching methods, which includes the study of specific ways in which teaching goals may be achieved. One of the most common goals of teaching is to develop critical thinking skills in students (Halpern, 1999). This higher level thinking is what allows students to excel and achieve intellectual freedom. Thinking is the cognitive process used to make sense of the world; questioning everyday assumptions will direct students to new solutions that can positively impact the quality of their lives. The purpose of this paper is to introduce those interested in the art of teaching to a pedagogical process that can be utilized to develop in students the higher level thinking skills deemed necessary for a quality life.

Active learning can make a course more enjoyable for both teachers and students, and most importantly, can cause students to think at a higher level. For this to happen, educators must give up the belief that students will be unable to learn the subject at hand unless the teacher "covers it". While students may gain some exposure to material through pre-class readings and overview lectures, true understanding of the material takes place when they are actively involved with and reflect on the meaning of what they are doing.

The authors propose the following five-step *Process for the Development of Higher Level Thinking Skills*, can be implemented in virtually any teaching or training setting to create a more active learning environment and to move learners toward higher level thinking.

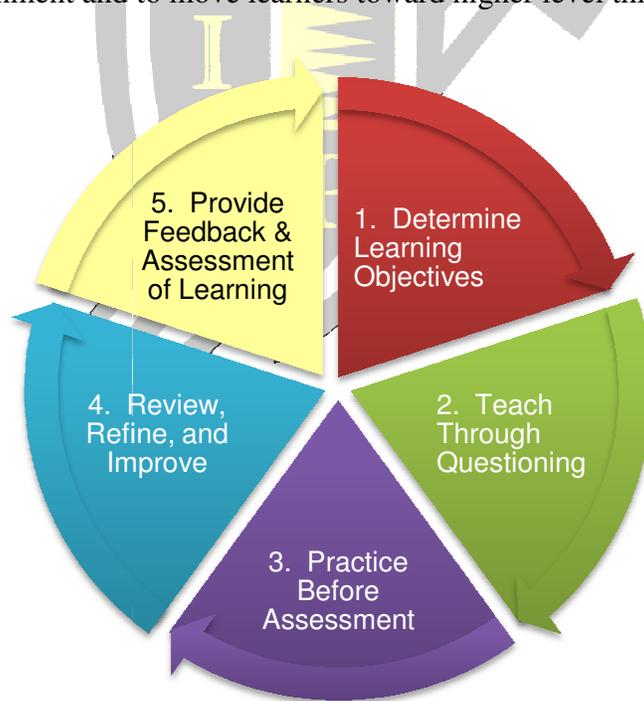


Figure 1: Process for the Development of Higher Level Thinking Skills

## Step One: Determine Learning Objectives

Considering the importance of a course, its placement in a program, and its role in providing a base of knowledge, a teacher should carefully identify key learning objectives that recognize what students should know when they exit the class. To make higher level thinking happen, these learning objectives, as well as the activities and assessments, must require students to perform and demonstrate higher level thinking. Thus, a well-written lesson plan should target a specific behavior, introduce and practice the desired behavior, and end with the learner exhibition of the behavioral response. The development of well-written objectives will greatly accelerate a learner's movement into higher level thinking (Ball & Garton, 2005).

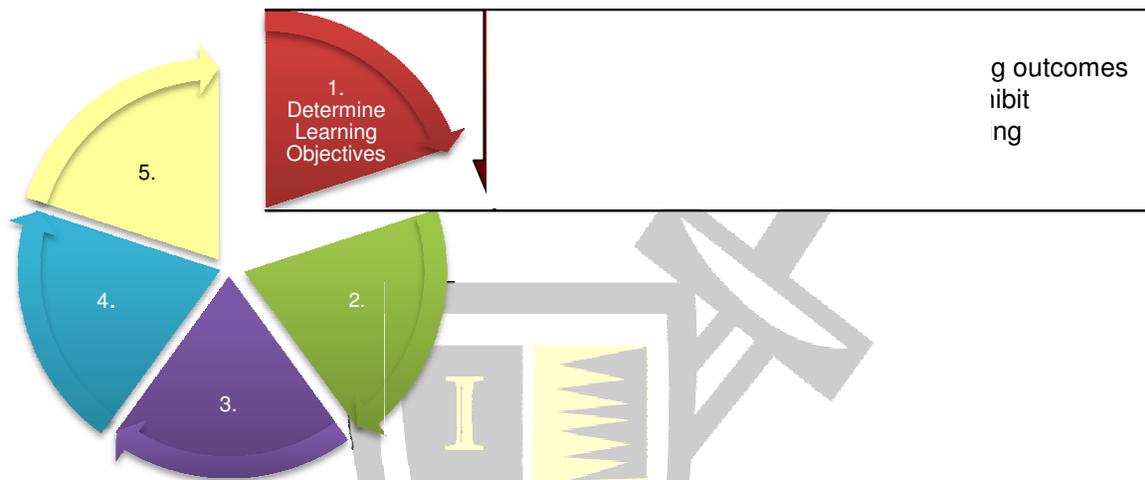


Figure 2: Step One: Determine Learning Objectives

A well-written objective should include a behavior that is appropriate for the chosen level of the thinking. Bloom's Revised Taxonomy of cognitive objectives is useful in planning curriculum that incorporates low to high level thinking activities. The successful accomplishment of low level thinking allows teachers to lead students to the higher levels. With the use of Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001) teachers can plan for student thinking at all levels.

“With the dramatic changes in society over the last five decades, the Revised Bloom's Taxonomy provides an even more powerful tool to fit today's teachers' needs” (Forehand, n.d., para. 16). The structure of the Revised Taxonomy provides a clear, concise visual representation of the alignment between standards and educational goals, objectives, products, and activities (Krathwohl, 2002). Teachers must make difficult decisions about how to use their allotted instructional time; Bloom's Revised Taxonomy ensures a fit between a lesson's purpose and learning objective.

The progressive levels of Bloom's Revised Taxonomy include Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating. Students who interact in the upper three levels are practicing higher level thinking. *Remembering* requires an answer that demonstrates a simple recall of information. *Understanding* requires the explanation of ideas or concepts. *Applying* requires the use of information in another familiar situation. *Analyzing* requires an answer that demonstrates an ability to see patterns and to classify information, concepts, and theories into component parts. *Evaluating* requires the justification of a decision

or course of action. Finally, *Creating* requires the generation of new ideas, products, or ways of viewing things (Krathwohl, 2002).

### Step Two: Teach Through Questioning

Questioning is a vital part of the teaching and learning process. The art of questioning begins with establishing what is known and allows the teacher to extend beyond to develop new ideas and understandings. Clasen and Bonk (1990) posited that although many strategies exist that can impact student thinking, teacher questions have the greatest impact. They 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.

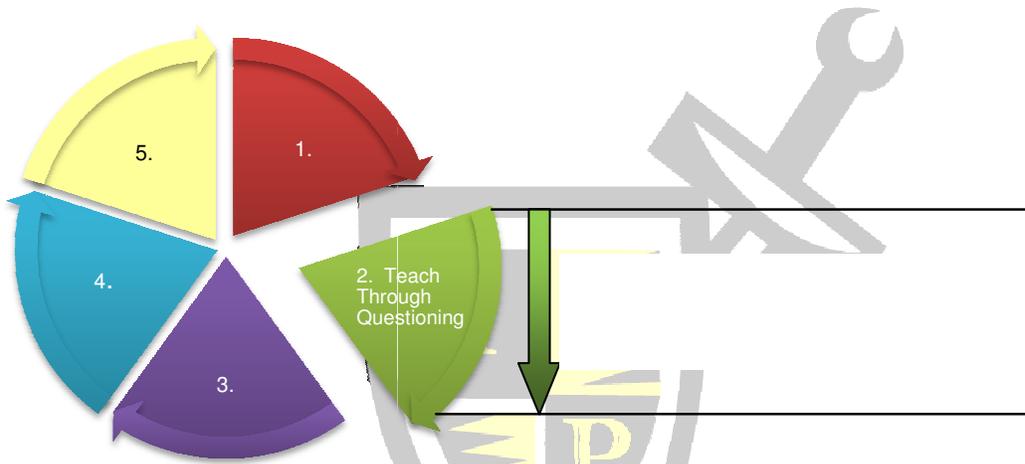


Figure 3: Step Two: Teach Through Questioning

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 *Remembering*, *Understanding*, and *Applying*. Divergent questions apply to Bloom's higher levels of *Analyzing*, *Evaluating*, and *Creating*; and are generally open-ended to foster student-centered discussion, thereby encouraging higher level thinking (Theijsmeijer, 2009).

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 they fail to ask genuine questions and seek answers to those questions, students are not likely taking the content seriously. Teachers can and should use questioning techniques to inspire higher level thinking in the classroom.

### Step Three: Practice Before Assessment

To make learning more active, teachers need to add experiential learning and opportunities for reflective dialog. For students to participate in higher level thinking, they must pose arguments, state opinions, and critique evidence using primary and secondary sources. Practice is necessary to master any skill; students must have the opportunity to practice the knowledge, skills, attitudes, and behaviors that will be evaluated. Therefore, choosing learning activities that allow them to practice, while causing them to critically think, is important (Schafersman, 1991).

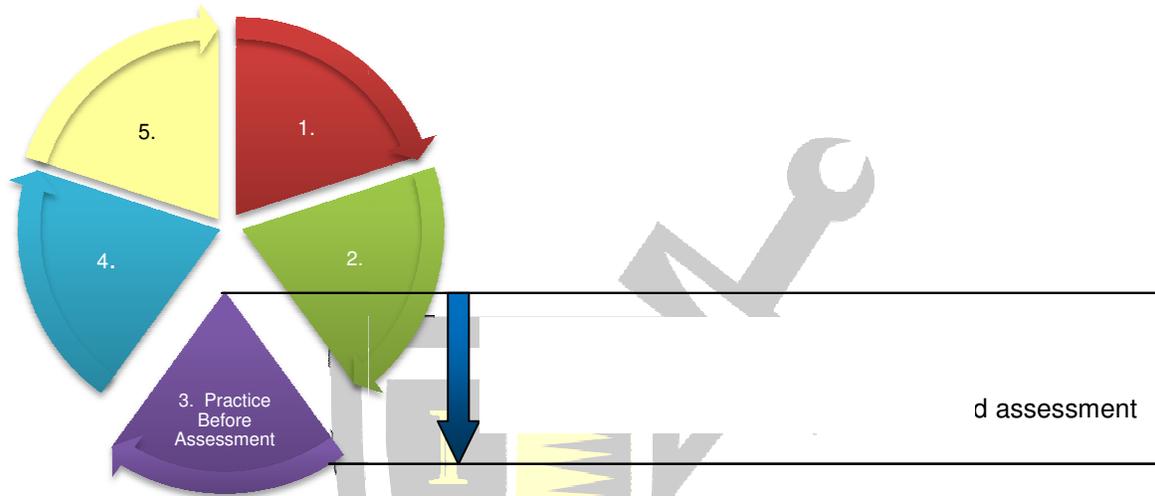


Figure 4: Step Three: Practice Before Assessment

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. For students to participate in higher level thinking, they must pose arguments, state opinions, look for evidence, critique the evidence, and think with fair-mindedness. 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 when they acquire that knowledge in an active rather than passive manner. To make learning more active, some kind of experiential learning and opportunities for reflective dialog should be included as part of the course.

When teachers think about what should happen in a course, the kinds of active learning that can encourage higher level thinking is important to consider. 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 (Fink, 2003). Information and ideas include primary and secondary sources accessed in class, outside class, or online; experience includes doing, observing, and simulations; reflective dialog includes papers, portfolios, and journaling. Direct experience activities include doing in an authentic setting, direct observation of a phenomenon, reflective thinking, service learning, journaling, and dialog in or outside of class.

### Step Four: Review, Refine, and Improve

Teachers should strive to continually refine their courses to ensure that their instructional techniques are in fact moving students toward critical thinking. Students become responsible for their own learning when teachers monitor class activities, create a supportive environment, and carefully track student participation. Collecting feedback from students about what they have, or have not learned, may present the need to offer opportunities for re-learning and expose areas in need of improvement.

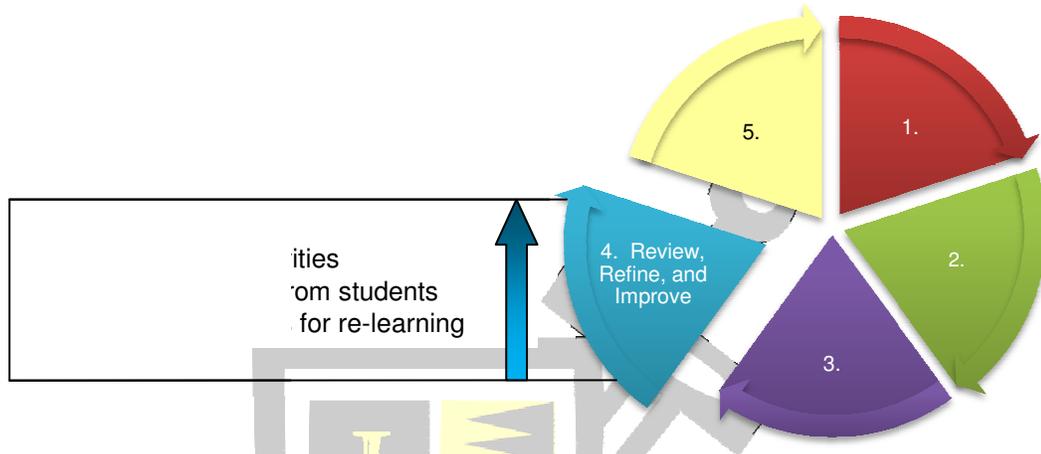


Figure 5: Step Four: Review, Refine, and Improve

Creating a classroom environment conducive to discussion in which all students feel good about participating is a very important step in higher level thinking. Teachers should strive to continually refine their courses to ensure that their instructional techniques are in fact helping students develop higher level 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.

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. The 2-minute paper, asks students to identify the most important points 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 ask students 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 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 also witness, first hand, that the teacher cares about their learning.

### Step Five: Provide Feedback and Assessment of Learning

Feedback, like assessment, compares criteria and standards to student performance in an effort to evaluate the quality of work (Ko, 2004). Prior to providing opportunities to practice what is to be assessed; it is imperative that students first understand the standards by which they will be assessed. Next, students should be provided with constructive and relevant feedback by the teacher and peers, as well as assessing their own performance. Student feedback and assessment provides an immediate and significant source of information for the outcomes-based assessment process in evaluating instructional techniques, student achievement, specific learning activities, the course, departmental program, and/or the general studies curriculum.

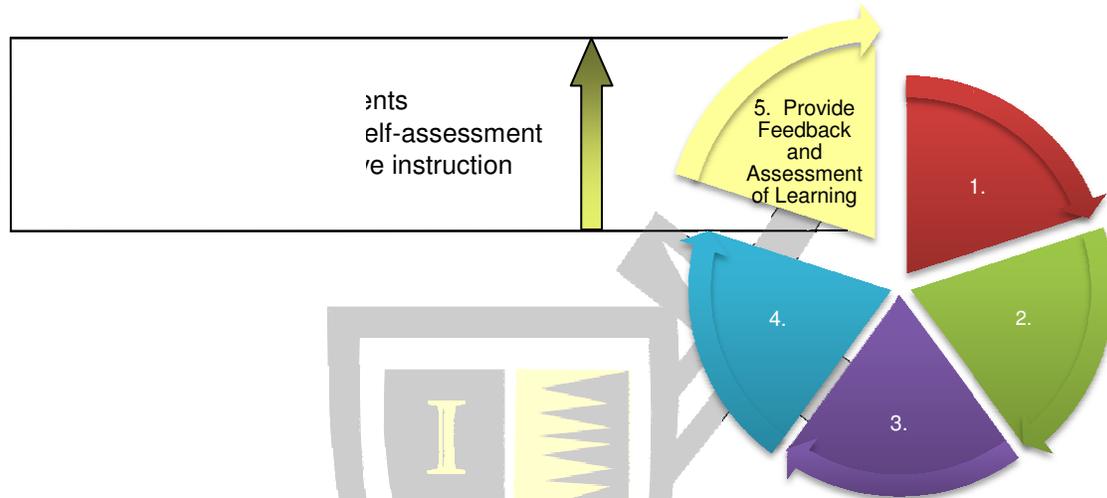


Figure 6: Step Five: Provide Feedback and Assessment of Learning

Comparing criteria and standards to student performance in feedback to students and assessment of course and departmental or discipline programs provides a significant source of information when determining effectiveness. Teacher feedback, like assessment, can be used to evaluate the student's 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.

### Conclusion

The successful implementation of the *Process for the Development of Higher Level Thinking Skills* requires the thoughtful consideration of current instructional techniques and the commitment to an active, student-centered learning environment. This may, at least initially, be

somewhat unfamiliar and uncomfortable to both students and teachers. Potential roadblocks in the application of this process 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 the techniques that encourage higher level thinking, it is still very possible to engage students in large groups. Although the use of the five-step process to move students toward higher level thinking may necessitate a change in instructional techniques, the efforts will prove beneficial to students, teachers, administrators, and accrediting bodies.

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## Biographies

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