

Thinking Critically about Critical Thinking: Integrating Online Tools to Promote Critical Thinking

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The value and importance of critical thinking is clearly established; the challenge for instructors lies in successfully promoting students' critical thinking skills within the confines of a traditional classroom experience. Since instructors are faced with limited student contact time to meet their instructional objectives and facilitate learning, they are often forced to make instructional decisions between content coverage, depth of understanding, and critical analysis of course material. To address this dilemma, it is essential to integrate instructional strategies and techniques that can efficiently and effectively maximize student learning and critical thinking. Modern advances in educational technology have produced a range of online tools to assist instructors in meeting this instructional goal. This review will examine the theoretical foundations of critical thinking in higher education, discuss empirically-based strategies for integrating online instructional supplements to enhance critical thinking, offer techniques for expanding instructional opportunities outside the limitations of traditional class time, and provide practical suggestions for the innovative use of critical thinking strategies via online resources.

As discussed by McKeachie, "everyone agrees that students *learn* in college, but whether they learn to *think* is more controversial" (Joscelyn, 1988). The discrepancy highlighted by McKeachie is at the center of ongoing debate between content coverage and critical thinking. Instructors try to cover more material, in more depth, with more critical analysis while simultaneously struggling with growing class sizes, limited funds, and restricted contact time. This instructional catch-22 creates an educational dilemma in which many instructors must make difficult decisions between focusing limited class time to the comprehensive coverage of course material or encouragement of critical thinking about a narrow range of course concepts.

This dilemma is compounded even more by the passive learning stance adopted by many postsecondary students and the vast amount of readily available information provided by the media. As described by MacKnight (2000, pg. 38), "we fall prey to modern communication media, which present a world where the prepackaging of intellectual positions and views is so ingenious that *thinking* seems unnecessary." Thus, as our society becomes more advanced with an endless supply of information readily available via television, radio and the Internet, it is essential that postsecondary institutions prepare students to be critical thinkers and cautious consumers of information.

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Defining Critical Thinking

Research (Paul, Elder & Bartell, 1997) indicates that an overwhelming majority (89%) of university faculty claim that the promotion of critical thinking is a primary objective of their instruction. Yet, only 19% could define critical thinking and 77% had little, limited or no conception of how to reconcile content coverage with the fostering of critical thinking. This ambiguity only adds to frustrating challenge of structuring classroom activities to clearly and effectively meet an undefined goal. Thus, the first step of ensuring the promotion of this abstract intellectual ability is to operationalize critical thinking:

Critical thinking is the intellectually disciplines process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action. (Center for Critical Thinking, 2004, ¶12)

This definition of critical thinking provides a framework, or a process goal, that leads to achievement of the specific course learning objectives. When balancing course coverage with critical thinking, it is important to clearly differentiate between the *content* of a course and the *process* by which the content is mastered. The course learning outcomes provide guidance on the content goals, while critical thinking guidelines provide instructional strategies for approaching and learning the specific course content. As such, "instruction in critical thinking is to be designed to achieve an understanding of the relationship of language to logic, which should lead to the ability to analyze, criticize, and advocate ideas, to reason inductively and deductively and to reach factual or judgmental conclusions based on sound inferences drawn from unambiguous statements of knowledge or belief" (Dumke, 1980, pg. 3).

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Barriers in Teaching Critical Thinking

Barriers in teaching critical thinking are often the result of practical constraints of a traditional classroom. Specifically, instructors have only a limited amount of contact time with students, and the face-to-face classroom environment mandates that instruction be somewhat generalized to be applicable, understandable, and paced to simultaneously meet the needs of a large number of diverse students. This type of time-limited, group setting often dictates a more didactic teaching strategy in which the instructor leads students through a pre-arranged set of content material with minimal time spent on individual interaction or critical analysis of the information presented.

The challenges of the traditional classroom are compounded further by the habitual nature of teaching and learning. Most teachers tend to teach the way they were taught with an emphasis on instructor-based strategies that value content acquisition over the learning process. This tendency is again reinforced by the standardized assessment movement and readily available assessment resources which emphasize knowledge over the thought process (i.e., most published assessment supplements provide questions designed primarily around ease of grading, factual textbook information, the time-constraints of testing, etc.). As a result, students tend to gear their time and attention on concrete, factual learning that is likely to be assessed to determine their overall course grade. This habitual cycle impedes the integration of critical thinking instructional techniques as instructors may be uncomfortable or unfamiliar with alternative classroom strategies, assessments may not be in place to measure students' mastery of critical thinking skills, and students may be resistant to altering their focus toward nonfactual learning (Paul & Elder, 2004).

Embracing Alternative Teaching Philosophies

In contrast to traditional didactic instructional strategies, constructivist learning philosophies tend to shift the emphasis from the instructor to the student. As described by Thanasoulas (n.d., ¶12),

It is the learner who interacts with his or her environment and thus gains an understanding of its features and characteristics. The learner constructs

his own conceptualisations and finds his own solutions to problems, mastering autonomy and independence. According to constructivism, learning is the result of individual mental construction, whereby the learner learns by dint of matching new against given information and establishing meaningful connections, rather than by internalising mere factoids to be regurgitated later on. In constructivist thinking, learning is inescapably affected by the context and the beliefs and attitudes of the learner. Here, learners are given more latitude in becoming effective problem solvers, identifying and evaluating problems, as well as deciphering ways in which to transfer their learning to these problems.

As such, instructional principles based on a constructivist framework require instructors to anchor learning activities within a larger context while supporting students in developing ownership of the task. To encourage active engagement with course material, the instructor must design authentic tasks that reflect the complexity of the environment students will face, then support and challenge students' thinking while encouraging them to test their ideas against alternative views and alternative contexts. Throughout this process, instruction not only facilitates content review, but provides the opportunity for reflection on the learning process (Savery & Duffy, 1995).

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While constructivist or student-centered instructional philosophies are not unique to any one teaching mode, there are several advantages to the use of online tools for promotion of critical thinking using this type of philosophical approach (Astleitner, 2002; Bruning, Zygeilbaum, Horn & Glider, n.d.). Central to student-centered learning and the development of critical thinking is allowing students the individualized time necessary for mastering the learning process; and, unlike the constraints of scheduled class period, online resources allow students to complete learning activities at their own pace. The increased time available also ensures that students have the time necessary to prepare for learning tasks (Pyle, 1997). Because learning is facilitated in an individualized environment, online resources remove peer-pressure and self-consciousness that can hinder classroom interactions (Hanna, Glowacki-Dudka & Conceicao-Runlee, 2000; Horton, 2000). The equal-opportunity environment of self-paced, online interaction encourages inclusion of all students and allows each student the prospect of learning by the means that best fit their preferred learning style (MacKnight, 2000; Muirhead, 2002; Murchu & Muirhead, 2005).

Integrating Online Instructional Strategies

The use of online instructional technology provides two distinct benefits for instructors wishing to enhance students' critical thinking about course material: 1) it provides a means of moving lower-level learning tasks out side of class time so that limited student contact time can be devoted to higher-order critical thinking activities; and 2) it fosters the use of constructivist teaching philosophies by supplementing traditional face-to-face activities with opportunities for individualized, in-depth interactions with course material.

Expanding Available Class Time

Educators generally agree that there is not enough classroom contact time available to cover all relevant course material effectively; as a result, class activities are often geared toward ensuring that students understand basic course concepts

with little time left to promote a more in-depth, critical analysis of course information (Kulik & Kulik, 1979). One of the most effective ways of meeting instructional goals concerning content coverage and critical thinking skills is to utilize online instructional strategies to actively engage students with instructional material outside of the classroom (Driscoll, 2005). By encouraging students' structured, targeted interaction with course material outside the scheduled class period via online instructional resources, instructors can enhance students' preparation for class and dedicate limited contact time to higher-order learning goals.

Research clearly supports the benefits of active learning strategies to promote enhanced understanding, retention and critical thinking over the shallow, passive learning that results from conventional lectures (Kulik & Kulik, 1979; McKeachie, Pintrich, Lin, Smith & Sharman, 1990). As such, interactive class discussions, projects and debates are often promoted for their ability to increase students' critical thinking abilities (i.e., ability to evaluate empirical positions, apply relevant principles, and formulate logical arguments). But, the educational benefits of interactive class activities rely on students' participation and preparation (Driscoll, 2005). The main reason that students cite for not participating in discussions or activities is a lack of knowledge or preparation; thus the essential problem facing instructors is ensuring that students have completed the prerequisite learning activities and are adequately prepared to interact with course material. While reading alone can be a very effective means of preparing students for class, instructors continuously struggle to ensure students complete readings *prior* to class time. As a consequence, instructors spend large amounts of valuable classroom time reviewing basic concepts and are not left with adequate time to conduct interactive discussions or activities. To maximize the educational impact of class activities, it is vital that students possess a basic understanding of key concepts prior to class time.

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Online tools provide an efficient means by which instructors can shift the instruction of basic concepts outside of class so that students are prepared to fully engage in class activities. The expansion of students' time-on-task with course material prior to scheduled class meetings ensures that students are more prepared to benefit from interactive instructional strategies (Driscoll, 2005). This shift in focus allows instructors to dedicate their face-to-face interactions to instructional strategies that foster critical thinking about the content of a given course. Key online tools that facilitate students' preparation for class include online preparation quizzes and online lectures or supplements.

Online Preparation Quizzes - Online preparation quizzes can be used prior to class to assess students' understanding of readings, provide feedback to correct basic conceptual errors, and, most importantly, provide an external motivation for students to complete assignments prior to class. The integration of online quizzes enables instructors to engage students with course material prior to class without spending valuable classroom time on quizzing and grading. In addition, online quizzes create an automated means of directing students' attention to key course concepts and correcting basic conceptual errors (Peirce, 2003).

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Online Lectures or Supplements - Many students lack the metacognitive ability to accurately judge the importance and significance of concepts embedded within written text. Thus, students become overloaded with the daunting task of "learning everything" and they fail to focus on key information. Online lectures

provide an efficient means by which instructors can guide students' focus and attention to ensure that students devote their preparation and study time to the key concepts within course material. Online lectures might include key term lists, examples, drill-and-practice activities and other basic components that allow students to obtain a basic level of knowledge outside of class time so that instructors can gear class activities to higher-order, critical thinking activities.

Embracing the principles of constructivist theory, self-paced online lectures allow a student-centered approach to individualize the learning experience. As such, the instructor provides the learning objectives and each student selects his or her own path of inquiry. The instructor facilitates the learning process by introducing necessary tools and resources in small increments as they are needed (Bruning, 2005). This hands-on engagement demands frequent student interaction and a high level cognitive involvement. As such, equal emphasis is given to the evaluation of the learning process as well as the knowledge gained (Jones, 1996). Because students are given the resources and support to master material according to their own schedule, valuable class time is freed to devote to more interactive critical thinking activities.

Asynchronous Learning Tools

A key feature of online education is the asynchronous learning environment that it creates. Online activities provide educators with the means to offer instructional assistance and learning activities that meet the demands, pace and interest of individual students. As described by Pyle (1997, ¶1) "At present, asynchronous learning may be the ONLY path to critical thinking for most undergraduates. . . .much of academic online teaching is done backwards. Instead of borrowing from classroom teaching, online education should be revolutionizing it." Central to this position is the notion that an asynchronous environment allows for prepared, individualized, thoughtful interactions that are free from the constraints of time, self-consciousness, learning style and other student learning variables. There are a wide range of asynchronous teaching strategies available and advances in educational technology continue to contribute to the growing body and diversity of options; the most effective asynchronous tools for the promotion of critical thinking are treaded discussions and alternative assignments based on emergent technologies.

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Online Asynchronous Threaded Discussions – Threaded discussion boards provide an opportunity to take advantage of the benefits of student-teacher and student-student interaction in an environment that encourages planned, meaningful, prepared discussion (MacKnight, 2000; Muirhead, 2002; Murchu & Muirhead, 2002; Peirce, 2003; Walker, 2005). Supplementing the time-based, spontaneous interaction that occurs in a face-to-face classroom, threaded discussions create an outlet for in-depth interactions that may require additional thought, investigation or research. While threaded discussions are not necessarily better than classroom discussions, they provide an alternate avenue for facilitating a different type of critical thinking than can be promoted through spontaneous interactions.

For online discussions to be meaningful and engaging, it is vital that they are structured in a manner that effectively facilitates critical thinking (Hanna, Glowacki-Dudka & Conceicao-Runlee, 2000; Horton, 2000). As such, it is essential that threaded discussions are based upon *discussable* questions, problems, debates or situations (i.e., you do not want to utilize discussion questions that have a definite answer or require little investigation). To encourage on-going thought and in-depth analysis of an issue, it is recommended that instructors facilitate threaded discussions utilizing a range of convergent, divergent and evaluative questions. As

recommended by Collision, Elbaum, Havvind and Tinker (2000), effective threaded discussions integrate full-spectrum questions that encourage critical thinking by 1) probing the “so what!” response targeting relevance, interest level, urgency and context; 2) clarifying meaning or conceptual vocabulary as they challenge ambiguity, vagueness and common misconceptions; 3) exploring assumptions, sources and rationale; 4) seeking to identify causes and effects/outcomes including primary or secondary sources, and internal or external factors; and 5) considering the appropriateness of various courses of action

The educational value of a threaded discussion depends upon the thoughtful interaction of both students and instructor. As such, it is important that instructors teach students how to participate in an online discussion (i.e., you will want to make recommendations concerning the number and frequency of interactions as well as the expected content of initial responses and peer replies) and that instructors contribute to ongoing discussions via the use of discussion scaffolding to maintain the focus of the discussion and guide interactions toward a more critical analysis of a given course concept (MacKnight, 2000). Within the threaded discussion environment, instructors may create a variety of different discussion formats to facilitate critical thinking; Appendix A provides a sample of various formats for promoting in-depth analysis of course topics. While the potential uses of threaded discussions for the promotion of critical thinking are limited only by an instructor’s creativity; the key is to design learning strategies that take advantage of the unique asynchronous environment to engage students in critical thinking activities that are not possible within the confines of a traditional classroom.

Alternative Assignments Based on Emergent Technologies – As the available educational technologies continue to grow, the challenge for instructors is to identify tools that facilitate existing learning objectives (as opposed to creating assignments simply for the sake of using novel technologies). Several emerging technologies (including blogs, wikis, and podcasting) offer distinct instructional advantages in the promotion of students’ critical thinking skills. The following narratives describe the basic tools; examples of how to use each emergent technology to enhance critical thinking can be found in Appendix B.

- *Blogs* – Blogs (shortened form of weblog or web log) are websites in which journal entries are posted on a regular basis and displayed in reverse chronological order. Blogs may be used within a course management system (usually private) or on a number of free, public, blog sites available throughout the Internet (typically organized by common theme, topic or point of interest).
- *Wikis* – A wiki is a piece of server software that allows users to freely create and edit Web page content using any Web browser; they support hyperlinks and have simple text syntax for creating new pages and crosslinks between internal pages. The advantage of a wiki is that it allows users to easily add and edit content; as such, it is especially suited for collaborative writing or group projects.
- *Podcasting* – Podcasting is a method of publishing audio and video programs via the Internet that lets users subscribe to a feed of new files. Generally, podcasts are audio recordings (made via cell phones, digital voice recorders, computer microphones, etc) made into downloadable MP3 or RSS files.

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Conclusions and Recommendations

As highlighted by this review, there are a variety of ways to utilize online technologies to supplement traditional classroom activities and promote critical thinking in the virtual classroom. With the primary goal of promoting students' critical understanding and analysis of course information, the focus should not be on the technology itself; rather the emphasis must be on the careful selection of appropriate online instructional strategies to meet course content and process goals. By expanding students' time-on-task outside of the limitations of a scheduled class period, instructors can shift many low-level learning activities outside of the classroom to free valuable contact time for critical thinking endeavors. Through this shift, instructors are able to enhance individual participation in large classes by providing outlets for academic expression of ideas, and engage students both in and out of the confines of a typical class period. In addition, the thoughtful integration of asynchronous instructional strategies encourages students to go beyond the spontaneous interactions of a face-to-face class to delve deeper into the intricacies, details, exceptions and circumstances of the learning experience that are at the core of critical thinking. The effective integration of online technology is more than a delivery medium; it is a *way of learning* that challenges current views of teaching, thinking and instruction by blurring the line between teacher and student by shifting the focus from knowledge acquisition to critical application of information.

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Appendix A: Online Threaded Discussion Formats to Enhance Critical Thinking

Alternative formats for online threaded discussions (MacKnight, 2000):

- Create specific learning communities or workgroups based on interests or experiences;
- Introduce guest “speakers” who have invited access to a specific discussion topic;
- Utilize role playing by assigning specific positions or roles to defend within the discussion;
- Incorporate audio or video as the “spark” for a discussion;
- Structure small group activities led by student discussion leader;
- Create buzz groups that focus on a specific topic for a designated, short period of time;
- Engage in-depth analysis of a case study or simulation;
- Assign debate teams to formulate ideas, defend assigned positions and refute opposing viewpoints;
- Create jigsaw groups to divide learning tasks then re-engage to develop a comprehensive understanding of a given topic;
- Structure mock trials to investigate and debate assigned issues.

Appendix B: Using Emergent Technologies to Enhance Critical Thinking

Blogs encourage critical thinking through the encouragement of self-reflection, sharing of the learning process and peer-review. Blogs may be used to promote critical thinking by supporting:

- Dissemination of news, current events or experience
- Outreach activities
- Opinion forming
- Archives of human thought
- Reflection or learning logs
- Electronic scrapbooks
- Dialogue for groupwork
- Networking and personal knowledge sharing
- Reflective or writing journals
- Annotated links
- E-portfolios

Wikis break down the barrier between content creator and content consumer by promoting genuine interactivity and collaboration. Through the reciprocal nature of learning, knowledge and investigation, wikis support critical thinking activities such as:

- Brainstorming
- Planning of learning activities
- Document editing
- Perpetually updated lists
- Bulletin boards
- Collaborative experiments
- Informational debates
- Teaching network literacy
- Ongoing revisions, changes and modifications

Podcasts facilitate on-demand education that allows students access information when they need it that allows educational resources to be tailored to various learning styles, pace and interests. Podcasting can be used to facilitate critical thinking via:

- Instructional explanations
- Lecture supplements
- Student presentations
- Guest speakers
- Commentaries on current issues
- Project soundtracks
- Integration of news media
- Music enhancements
- Creative assessments such as relevant playlists