

The Role of Instructor Interactivity in Promoting Critical Thinking in Online and Face-to-Face Classrooms

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Abstract

The current rise in online learning programs mandates that postsecondary faculty examine means of transferring successful, established critical thinking instructional strategies from the traditional classroom into the online environment. Theoretical arguments support, and even favor, the use of asynchronous learning technologies to promote students' critical thinking skills. The purpose of the current study is to examine students' application of critical thinking strategies when learning in a traditional, face-to-face environment compared to an asynchronous, online classroom. Results indicate that the mode of instructional delivery (face-to-face or online) is not as influential as the instructor's level of interactivity in promoting active engagement with course material. Findings suggest that the asynchronous component of online learning does not inherently prompt students toward enhanced critical thinking, but may serve as a vehicle for online instructors to encourage increased engagement and critical thinking.

Key words: asynchronous threaded discussions, online learning, critical thinking, instructor interactivity

Introduction

The value and importance of critical thinking is well-established in higher education. 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 a minority (19%) are able to provide a working definition of the concept. The challenge in defining critical thinking lies in the complexity of this abstract intellectual goal. As defined by Halpern (1999),

Critical thinking refers to the use of cognitive skills or strategies that increase the probability of a desirable outcome. Critical thinking is purposeful, reasoned, and goal-directed. It is the kind of thinking involved in solving problems, formulating inferences, calculating likelihoods, and making decisions. Critical thinkers use these skills appropriately, without prompting, and usually with conscious intent, in a variety of settings. That is, they are predisposed to think critically. When we think critically, we are evaluating the outcomes of our thought processes—how good a decision is or how well a problem is solved. (p. 70)

Despite an emphasis on critical thinking, there are ongoing questions concerning the relevant instructional strategies necessary to foster higher-order, critical thinking. The issue is further complicated by the rapid growth of online learning programs at the postsecondary level. Traditional challenges in fostering critical thinking are compounded by a generalized lack of faculty familiarity with effective online

instructional techniques. The result of this complex interaction is that existing concerns about critical thinking in traditional, face-to-face settings are intensified and become increasingly problematic for those teaching in the online classroom.

As explained by Dumke (1980), "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" (p. 3). While this instructional goal is relatively straightforward, implementing instructional strategies that achieve these ends is a daunting task, regardless of whether the mode of instruction is face-to-face or online.

A plethora of research has been done in the traditional classroom environment to examine the relative value of various instructional strategies for the promotion of students' critical thinking abilities (Acker, 2003; Bean, 1996; Bernstein, 1995; Beyer, 1995; Braun, 2004; Burbach, Matkin & Fritz, 2004; Center for Critical Thinking, 2004; Driscoll, 2005; Elder, 2004; Facione, Sanchez, Facione & Gainen, 1995; Galbraith, 2004; Gallimore & Tharp, 1990; Halpern, 1999; Halpern & Nummedal, 1995; Jones & Ratcliff, 1993; Lauer, 2005; McKeachie, Pintrich, Lin, Smith & Sharman, 1990; Merriam, Caffarella & Baumgartner, 2007; Paul, 1995; Paul & Elder, 2003; Paul & Elder, 2004; Paul, et al., 1997; Ortiz, 2000; Robinson & Kakela, 2006; Sanchez, 1995; St. Clair, 2004; Tremblay & Downey, 2004; Vanderburgh, 2005; Williams, 2005). 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, et al., 1990). The consistent finding across this research is that instructional approaches that incorporate constructivist, active-learning, student-centered philosophies are the most effective for enhancing students' critical thinking (Angelo, 1995; Cooper, 1995; King, 1995; McDade, 1995; Robertson & Rane-Szostack, 1996; Savery & Duffy, 1995; Strohm & Baukus, 1995; Thanasoulas, 2002; Underwood & Wald, 1995; Vella, 1994; Wade, 1995; Walker, 2003; Wlodkowski, 2004).

While constructivist or student-centered instructional philosophies are not unique to any one teaching mode, proponents of online learning argue that the distinctive, asynchronous nature of the online classroom may be *more* conducive to the incorporation of active learning strategies than the time-limited interactions dictated by a traditional classroom (Astleitner, 2002; Bruning, Zygeilbaum, Horn & Glider, n.d.). As highlighted 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 argument is that student-centered learning and the development of critical thinking mandates that students are given the individualized time necessary for mastering the learning process. The asynchronous structure of online learning, unlike the time-limited constraints of a scheduled class period in the traditional classroom, allows students the time necessary for individualized reflection, investigation and inquiry. Rather than being required to immediately think and respond to the questions posed in a face-to-face class, students in online classes have the opportunity to ponder, investigate and question prior to submitting their responses (Pyle, 1997). In addition, the asynchronous, individualized nature of the online classroom removes peer-pressure and self-consciousness that can hinder classroom interactions (Hanna, Glowacki-Dudka & Conceicao-Runlee, 2000; Horton, 2000). In contrast to a traditional classroom that can be easily dominated by a select number of extraverted students, the faceless, equal-opportunity environment of asynchronous online interaction encourages active inclusion and engagement of all students (MacKnight, 2000; Muirhead, 2002; Murchu & Muirhead, 2005).

The theoretical arguments favoring the asynchronous interactions available in an online classroom for the encouragement of critical thinking are centered on students' opportunities to actively process information, reflect and investigate questions prior to responding (Mandernach, 2006). Key to this argument is that there is a forum for interaction, debate and exploration of target topics. In a traditional, face-to-face classroom, this interaction typically happens via class discussions; in an online classroom, this interaction is most likely to occur in asynchronous threaded discussions (Mandernach, Dailey-Hebert & Donnell-Sallee, 2007).

Asynchronous discussion boards in the online classroom maximize the benefits of student-teacher and

student-student interaction in an environment that encourages planned, meaningful, prepared discussion (Bruning, 2005; MacKnight, 2000; Muirhead, 2002; Murchu & Muirhead, 2002; Peirce, 2003; Walker, 2005). In contrast to the immediate demands of a live discussion, threaded discussions create a forum for higher-order interactions that may require additional thought, investigation or research. While active-learning, constructivist theories would support any classroom interactions (synchronous or asynchronous) that encourage students to actively engage with course material, online threaded discussions may have increased advantages above and beyond the benefits fostered by traditional classroom discussions as they provide an asynchronous avenue for facilitating a more reflective form of critical thinking than can be produced through spontaneous interactions.

The theoretical arguments favoring online classes for the critical thinking benefits provided by an asynchronous learning environment may be compelling, but there is little empirical evidence to back these claims. The purpose of this study is to compare the critical thinking skills of students learning identical course content in either a traditional, face-to-face classroom or an asynchronous online environment.

Method

Participants

College students enrolled in two online versions ($n=20$ and $n=16$) and a traditional, face-to-face version ($n=36$) of an introductory level psychology course on human development participated in the study. All students from each online course were included in the study; to allow for comparable sample sizes, we randomly selected thirty-six face-to-face students from a larger class of 60. Although, students self-selected into the classes, at our institution, students who take undergraduate online courses are similar to face-to-face students in age, college experience, and geography (K. Premer, eCampus Instructional Designer, personal communication, September 25, 2008). We chose not to collect demographic information (such as age, sex, ethnicity, year in school) to protect the anonymity of all student participants. All students were treated in accordance with APA ethical standards.

Design

Recognizing that the terms “online” and “face-to-face” are generic descriptions of the mode of instructional delivery but provide little insight into the actual educational processes within the course, it is important to examine the instructional strategies used in each of the target courses. All three courses target comparable learning goals and utilize comparable curricula. The primary difference between the two formats is the synchronous versus asynchronous nature of course discussions and interactions.

The traditional, face-to-face course is typical of most medium-sized lecture courses with one faculty member teaching approximately 60 students. The instructor provides weekly lectures and supplements in-class information with online materials such as PowerPoint slides and optional multiple-choice quizzes. While online supplements are utilized in the face-to-face course, there are no asynchronous interactions; all course discussions occur in class. Course discussions are informal and involve students generating examples of concepts discussed in class as well as applying those concepts to their own lives. The instructor first models this behavior by providing examples relating to herself or her children and then asking students to present similar events from their own lives. One way the face-to-face instructor encourages class participating is by navigating through the auditorium style classroom regularly rather than exclusively standing at the front of the room. PowerPoint slides are progressed using a remote and the instructor teaches from any point in the room. This technique is especially useful for discussion because it decreases the distance between the instructor and the individual students and appears to increase their likelihood of responding to questions. Also students perceive themselves as having a smaller more intimate conversation with the instructor rather than “speaking out” in a large lecture hall. In addition to class discussion, there is an expectation of higher-order thinking within this course as exams consist of 60% content questions and 40% applied conceptual questions.

Each online class is taught by one faculty member and enrolls approximately 20 students. The two online courses are identical in content, assignments and structure; the only difference between the two online courses is that they are taught by different faculty with varying instructional styles. Both online classes are supported by Blackboard course management system and rely on semi-scheduled asynchronous participation. The online courses are divided into eight-modules that are each scheduled for a defined

time period; within each module, students are required to participate in an asynchronous threaded discussion, complete an online quiz and a written homework assignment. Course threaded discussions assign students to respond to an initial discussion question and post a minimum of two follow-up responses to the postings of their classmates. Students are graded on their participation in the threaded discussions. The final course exam is approximately 75% factual, content knowledge and 25% higher-order, contextual application of information.

Because the theoretical arguments favoring online instruction for the promotion of critical thinking center on the use of asynchronous threaded discussions, we examined how each of the online courses was using the threaded discussion feature. In one online class, the instructor frequently participated in the threaded discussions by posting questions, comments and issues for further investigation; the instructor in this class averaged 12.4 posts per discussion topic. The instructor in the other section of the online course did not visibly participate in the threaded discussions; rather the instructor monitored and graded the discussions but did not actively respond to the students' postings.

Based on the difference in online instructors' implementation of the asynchronous discussion threads, we divided the online condition into two separate groups: instructor interactive online (designating the course in which the instructor was interactive in the discussion threads) and instructor non-interactive online (designating the course in which the instructor was not visibly interactive in the discussion threads). The resultant design of our study is a three course environment (instructor non-interactive online; instructor interactive online; face-to-face) analysis on measures of critical thinking.

Materials

The critical thinking task. We designed a critical thinking task to encourage students to reflect on the material covered over the course of the semester as well as require them to apply that learned information to a new context. Both are key components of critical thinking. The critical thinking task was worded as follows:

As you reflect on your experiences and knowledge gained throughout this course, I would like you to critically analyze and respond to the following situation:

Imagine that you have been hired as a consultant for the United States government. Your task is to create a priority list of the top 3 initiatives that the government should fund with the primary goal of enhancing biosocial, cognitive and/or psychosocial human development for U.S. citizens. Based on your understanding of human development, what are the three most important developmental challenges that the government should address? Defend your selections and highlight their developmental significance.

As you think about this question, you are encouraged to reflect on the various theories, milestones and challenges that individuals are faced with from conception to death. Then go on to provide justification for the areas you select by explaining the importance for human development within our modern society. Your answer should be three distinct paragraphs that state the initiative and provides a justification for your selection using developmental principles and theories; each paragraph should be 300 words or less.

Critical-thinking rubrics. We used two existing critical thinking rubrics for grading responses to this question. The first scale, Guide to Rating Critical and Integrative Thinking (Center for Teaching, Learning & Technology, Washington State University, 2006) assesses on a 6-point Likert scale a student's ability to accomplish several key components associated with critical thinking. These components include a) identifying and summarizing the issue, b) identifying and considering contextual influences, c) developing one's own perspective, d) presenting supporting data or evidence, e) integrating other perspectives, f) identifying conclusions and g) communicating effectively. According to the criteria for this measure, students scoring in the 1-2 point range are *emerging* in that skill, in the 3-4 range *developing*, and in the 5-6 range, *mastering*. Students receive a separate score for each component. A second measure, the Holistic Critical Thinking Scoring Rubric (Facione & Facione, 1994) uses a 4-point Likert scale but rates the entire product rather than individual components. In general, scores of 1 or 2 indicate more bias and errors in presentation whereas scores of 3 or 4 indicate well-rounded evaluations of evidence and greater accuracy in reporting. For a more detailed discussion of how to evaluate students' critical thinking using

either one of these measures, see the Guide to Rating Integrative and Critical Thinking at <http://wsuctproject.wsu.edu/ctr.htm> or the Holistic Critical Thinking Scoring Rubric at <http://www.insightassessment.com/HCTSR.html>.

Procedure

Participants in both the online and lecture human development classes were enrolled at the same university and followed comparable curricula. Toward the end of the semester, instructors assigned the critical thinking assignment. All students had approximately two weeks in which to complete and turn in the assignment. Primary instructors graded the assignments for course credit. For the purpose of this study two additional graders unfamiliar with the students graded the critical thinking assignments using the previously discussed critical thinking rubrics. To ensure that formatting would not influence scoring, we chose a standard double-spaced formatting and applied it to all documents. We also removed all student and course section identifiers. The first grader rated all of the documents and the second grader rated a subset of the documents. We then compared their ratings on the seven components of the Washington State measure of critical thinking as well as the Holistic Critical Thinking Scoring Rubric to determine interrater reliability. Table 1 illustrates the reliability scores across both the individual components of the Washington State scale as well as the Holistic Critical Thinking Scoring Rubric.

Table 1. Interrater reliability measures across coders.

Item	Cronbach's Alpha
Guide to Rating Critical & Integrative Thinking	
<i>Identifying problem</i>	.83
<i>Considering context</i>	.76
<i>Develop position</i>	.79
<i>Present supporting data</i>	.77
<i>Integrate other perspectives</i>	.79
<i>Identify conclusions</i>	.74
<i>Communicate effectively</i>	.79
Holistic Critical Thinking Rating Form	.82

Results

Main effect of course environment. To examine the effect of course environment on ratings of critical thinking we conducted a one-way multiple analysis of variance (MANOVA). A significant effect was found, $F(16, 124) = 1.70, p = .055$. Follow-up univariate ANOVAs indicated that course environment influenced all of the individual components of critical and integrative thinking as well as Holistic critical thinking (See Table 2). In order to determine which of the three teaching environments contributed to the higher levels of critical thinking, we conducted post hoc paired comparisons using Tukey's HSD test with p set at .05. The Huynh-Feldt corrected mean square error and degrees of freedom were used in calculating the HSD critical value. Table 2 compares the mean critical thinking scores across course environments for components of the Rating Critical and Integrative Thinking Rubric as well as the Holistic and Critical Thinking measure.

Although there was a significant effect of course environment on ratings of critical thinking, the findings cannot be easily explained by a comparison of online to face-to-face course environments. For example, although participants in the instructor interactive online and face-to-face course conditions performed similarly, those in the instructor non-interactive online environment earned significantly lower ratings in identifying the problem, considering the context, integrating perspectives, and communicating effectively. When evaluated on developing a position, presenting supporting data, and identifying conclusions,

participants in the instructor non-interactive online condition scored significantly lower than did individuals in the face-to-face condition; however those in the instructor interactive online condition scored similarly to individuals in both the instructor non-interactive online and face-to-face conditions. Finally, individuals in the instructor non-interactive online condition scored significantly lower on the Holistic Critical Thinking Rubric than did the participants in the face-to-face condition. However, Holistic Critical Thinking scores for participants in the instructor interactive online conditions were not significantly different from either the instructor non-interactive online or face-to-face participants.

Table 2. F-values and Mean Scores of Critical Thinking Skills by Course Environment.

Item	Instructor Non- Interactive Online (n=16)	Instructor Interactive Online (n=20)	Face to Face (n=36)	<i>F</i> (2,71)*
Rating Critical & Integrative Thinking				
<i>Identifying problem</i>	3.00 _a	4.10 _b	4.44 _b	5.47
<i>Considering context</i>	2.81 _a	4.10 _b	4.47 _b	6.59
<i>Develop position</i>	3.25 _a	4.25 _{ab}	4.67 _b	5.30
<i>Present supporting data</i>	2.69 _a	3.45 _{ab}	4.22 _b	5.23
<i>Integrate perspectives</i>	2.69 _a	3.85 _b	4.14 _b	5.37
<i>Identify conclusions</i>	2.44 _a	3.60 _{ab}	3.75 _b	3.53
<i>Communicate effectively</i>	3.25 _a	4.40 _b	4.75 _b	6.63
Holistic Critical Thinking	2.13 _a	2.75 _{ab}	3.00 _b	4.34

Note. * $p < .05$. Means with the same subscripts are not significantly different at $p < .05$ in the Tukey honestly significant difference comparison.

Discussion

In contrast to the theoretical argument that asynchronous interactions should provide critical thinking advantages beyond what is available in live discussions, the current study finds no superiority for either discussion format. The key to promoting students' critical thinking seems to lie with instructor interactivity; how the instructor facilitates and encourages the discussion is more important than the delivery style or discussion mode. These results suggest that enhanced critical thinking cannot be attributed to the simple process of discussion (synchronous or asynchronous); rather the type of discussion and the instructor's level of interactivity within the discussion is central to the discussion's effectiveness. For academic discussions to be intellectually beneficial, it is imperative that they are structured and facilitated in a manner that effectively encourages critical thinking (Hanna, et al., 2000; Horton, 2000).

Current findings reveal little (if any) difference in the critical thinking skills demonstrated by students in the face-to-face and instructor interactive online classes; the consistent finding is that students in the instructor non-interactive online class showed less critical thinking than the other classes. As such, it is faulty to assume that development of critical thinking is dependent upon the mode of instructional delivery. Rather, the key to development of effective critical thinking lies within the interactivity level of the instructor and the instructor's ability to facilitate course interactions in a manner that prompts higher-order thought. With this in mind, the emphasis shifts from a comparison of online and face-to-face instruction to an analysis of the role of instructor interactivity in the facilitation of course discussions geared toward the

development of critical thinking.

While common criticisms of classroom comparative research suggest that differences such as these can be explained by variability in class, instructor quality, or students' initial ability, we believe we have addressed these issues in a number of ways. First, all students completed the same introductory-level human development course with identical learning objectives. Second, while the three comparison groups were taught by different individuals, all are award-winning faculty with doctoral degrees and a minimum of 10 years of teaching experience. Third, university data (K. Premer, eCampus Instructional Designer, personal communication, September 25, 2008) reveals that, unlike many distance education programs, students in our undergraduate online courses are comparable to traditional face-to-face students in terms of age, background, educational experience and academic achievement. With these controls in place, we can conclude with increased confidence that higher levels of student critical thinking found in interactive online and face-to-face classes are not a spurious function of class, instructor quality or student ability.

Furthermore, others suggest that differences in critical thinking may be a function of course delivery (online or face-to-face). In essence, proponents of online learning highlight the asynchronous nature of online communication as an important scaffold towards critical thinking. However, if the key to critical thinking is simply the asynchronous aspect of online course delivery, there would be no differences between the instructor interactive and instructor non-interactive online delivery systems. But, as found in this study, simply teaching a course online does not promote enhanced critical thinking. This in mind, teaching method (specifically an instructor's level of interaction), and not instructional delivery mode, appears to be the one of most importance in impacting students' critical thinking abilities.

Instructor Interactivity

The importance of an instructor's active engagement in a course is well established; best practices in higher education find that instructors who actively engage their students promote advanced understanding over classes that allow students to be passive consumers of information (Halpern, 1999; McKeachie & Svinicki, 2005). The challenge lies in operationalizing instructor interactivity based upon the mode of instructional delivery; instructor interactivity is perceived differently depending upon whether the involvement is face-to-face or online. But despite differences in how instructor presence is defined, the importance of instructor interactivity is no less relevant for either mode of educational delivery.

In a traditional class, instructor interactivity is a function of his or her physical presence in the classroom. The type of social interaction that occurs in a traditional classroom is an accepted function of the physical proximity of the instructor and students. Instructors facilitating a discussion in the traditional classroom pose questions, challenge answers, provide insight and engage students as part of the natural discussion process. Because this type of face-to-face social engagement is familiar within the traditional classroom setting, instructors typically require little guidance to become interactive in their own classes.

In contrast, instructors in an online classroom cannot be physically seen by their students, so the issue of instructor interactivity becomes more problematic (Mandernach, Gonzales & Garrett, 2006). The simple process of an instructor logging into the online class and monitoring the discussion threads does not automatically give students the impression of interactivity or engagement. For an instructor to be interactive in the online classroom, he or she must leave visible evidence of participation (Picciano, 2002). Research has established the importance of ongoing interaction as a vital component contributing to the quality of instruction in asynchronous, online courses (Muirhead, 2001 as cited in Smith & Winking-Diaz, 2004). Because threaded discussions provide one of the primary forums to facilitate instructor-student and student-student interactivity in an online course, online instructors must actively participate in the discussions to take full advantage of the educational benefits available through asynchronous education (Chou, 2003; Moore, 1989; Smith & Winking-Diaz, 2004; Su, Bonk, Magjuka, Liu & Lee, 2005).

Students gauge an instructor's presence on visibility within the class; an instructor is visible when he or she is participating in a manner that the students can objectively see and quantify. While research in online learning (Beck & Greive, 2005; Wlodkowski, 2004) finds that an instructor's active participation in online courses is essential for maintaining ongoing communication and providing a quality learning environment, Blignaut and Trollip (2003) report that online instructors are not responsive enough. Thus, it appears as though online instructors would benefit from increasing their overall participation in asynchronous discussions as it enhances communication, interactivity and engagement in the virtual

classroom.

An online instructor fulfills a number of roles within the threaded discussion: questioning, listening, responding, encouraging, challenging, reflecting and summarizing. The importance of an instructor's active, timely involvement in discussion boards is a critical component of the online learning experience (Northrup, 2002) as research finds that students gauge the importance and relevance of the discussion board based upon the instructor's level of participation (Schulte, 2004).

Blignaut and Trollip (2003) propose a model of faculty participation in online discussions that categorizes online instructor discussion postings into six groups: three focusing on course content (corrective, informative, and Socratic) and three which pertain to other aspects of instruction (administration, affective, and other). While specific implementation of the various categories of instructor postings depends on the course goals and targeted learning activities, the underlying theme is that an instructor's active participation in asynchronous discussion threads enhances instructor presence in an online course. This increased presence translates into enhanced student learning and student satisfaction.

As indicated by the results of the current study, the issue of instructor interactivity is not unique to online learning. Rather, interactivity seems to provide the impetus for students' critical analysis of course material regardless of instructional mode. As explained by Vella (1994), "The dialogue of learning is between two adult subjects: teacher and student" (p. 13). Results of this study indicate that the dialogue of learning does not change in online classrooms. "If anything, dialogue, operationalized as active participation in the virtual classroom, becomes more important" (Mandernach, et al., 2006, p. 256).

Research on critical thinking emphasizes the importance of active-learning, constructivist educational strategies to push students toward higher-order thinking processes (Halpern, 1999). Active learning processes imply engagement of both the instructor and students (Vella, 1994). While this type of social engagement is naturally promoted in the physical confines of a face-to-face classroom, it may not be so effortlessly translated into the online environment. Yet, the importance of social interaction and engagement is no less important for either educational setting. Research on student barriers to online learning suggest that "social interaction is strongly related to online learning, enjoyment, effectiveness of learning online, and likelihood of taking another online class" (Mullenburg & Berge, 2005, p. 45). In essence, students in the online environment desire what they would normally have in the face-to-face classroom: interaction between students and instructors. An instructor's effective use of asynchronous discussion threads provides a vehicle for this type of interaction.

Role of Discussions in Development of Critical Thinking

There are two key instructional components of a discussion within the direct control of an instructor: the discussion question(s) and discussion facilitation strategies. Regardless of whether a discussion is live or asynchronous, effective discussions are based upon *discussable* questions, problems, debates or situations; discussion questions should not be discrete questions that have a definite answer, rely solely on opinion, or require minimal insight and investigation (Bruffee, 1997; Mandernach, 2006). To maximize student engagement and participation in the discussion, discussion questions should be student-centered and relevant to the lives and interests of the students, but also directly tied to the content of the course. As recommended by Shaping a Life (2007, ¶3-4), good analytical discussion questions:

- Speaks to a genuine dilemma in the text. In other words, the question should focus on a real confusion, ambiguity or gray area of the text.
- Yields an answer that is not obvious. The question should allow room for exploration and not be too specific or answered too easily.
- Suggests an answer complex enough to sustain a vibrant discussion. If the question is too vague, it won't elicit deep analysis and reflection.
- Can be answered by the text rather than by just generalizations or emotional feelings.

In addition:

- “How” and “why” questions generally require more analysis than “who,” “what,” “when,” or “where” questions.
- Good analytical questions can highlight patterns and connections OR contradictions, dilemmas and problems.
- Good analytical questions can also ask about some implication or consequences of the analysis.

Once effective discussion questions are identified, instructors must strive to facilitate discussions in a manner that encourages on-going thought and in-depth analysis of an issue (Bonwell & Eison, 1991; Davis, 1993; Finkel, 2000; Halpern, 1994). To ensure an effective discussion, instructors should strive to be open, free-ranging and non-judgmental. As such, it is important to pose questions in a manner that avoids creating the impression that there is a pre-determined correct answer; rather instructors must clearly communicate that the discussion is to explore students’ thoughts, views and reasoning in relation to course concepts. The instructor’s role in the discussion is to facilitate students’ conversion, but not to dominate the flow of communication. Instructors can increase and deepen students’ active engagement in the discussion by asking follow-up questions, explicitly pairing the comments of various students, or directly seeking the opinions of specific students or specific viewpoints. By treating students’ opinions with respect, utilizing reflective comments, and reinforcing relevant discussion points, instructors can effectively direct classroom discussions in a manner that engages students in higher-order, critical thinking and advanced application of course concepts.

Perhaps the greatest instructional challenge when transferring best practices in teaching from the traditional classroom to the online environment is that the novelty and lack of familiarity with asynchronous instruction impedes instructors’ ability to effectively translate their instructional strategies (Mandernach, Donnelly, Dailey & Schulte, 2005). Research (Su, et al., 2005) finds that online instructors believe instructor-student interaction is an important element in quality instruction, yet many instructors do not feel they have the skills or expertise to increase interactivity in their courses. Thus, despite the apparent heuristic that “effective discussions are effective discussions regardless of the mode of interaction,” it may be of value to faculty new to online learning to highlight how effective discussions can be facilitated within an asynchronous discussion format.

Collision, Elbaum, Havvind and Tinker (2000) recommend that 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.

MacKnight (2000) highlights that online instructors should contribute to ongoing discussions via the use of scaffolding to maintain the focus of the discussion and guide interactions toward a more critical analysis of course concepts. Recognizing that there are a number of ways to achieve active discussions that promote a critical analysis of ideas in a threaded discussion format, MacKnight (2000) offers suggestions for a variety of approaches:

- Creation of 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
- Small group activities led by student discussion leader
- Buzz groups who focus on a specific topic for a designated, short period of time
- In-depth analysis of a case study or simulation
- Debate teams assigned to formulate ideas, defend assigned positions and refute opposing viewpoints
- Jigsaw groups to divide learning tasks then re-engage to develop a comprehensive understanding of a given topic
- Mock trials to investigate and debate assigned issues

As indicated by this list of possible approaches, there is no single strategy for promoting critical thinking within asynchronous discussion threads. Rather, instructors should strive to creatively identify teaching and learning strategies that take advantage of the unique opportunities available in an asynchronous discussion environment.

The educational value of an asynchronous threaded discussion depends upon the thoughtful interaction of *both* students and instructor. Just as faculty may be unfamiliar with effective use of a threaded discussion forum, students may also lack the knowledge to actively engage in the threaded discussions. It is important that instructors provide students with direct, concrete instructions concerning how to participate in an online discussion as well as expectations for interaction. For example, instructors may want to set guidelines concerning the number and frequency of interactions as well as the expected content of initial responses and peer replies. Requiring participation and grading discussion involvement has been found to increase meaningful interactivity in online courses (Schulte, 2004; Smith & Winking-Diaz, 2004).

Again, it is important to note that these suggestions and strategies for facilitating effective discussions are not unique to the online classroom. Our findings indicate that the forum in which a discussion occurs (face-to-face or online) is not as important to the development of critical thinking as the ability of the instructor to effectively facilitate discussion activities. The challenge for instructors is to adapt the familiar and comfortable discussion facilitation strategies of the traditional, face-to-face classroom to the unique dynamics of the asynchronous, online classroom.

Summary and Conclusions

Our findings suggest that the asynchronous component of online learning does not inherently prompt students toward enhanced critical thinking. Rather the mode of discussion (asynchronous, online or synchronous, face-to-face) is simply a tool which instructors can use to actively and intentionally promote students increased engagement with course material. Key to the success of a discussion in fostering students' higher-order thinking strategies is the instructor's interactivity in leading the discussion. Instructors who actively engage their students via a more critical exploration of course concepts are more successful in promoting students' critical thinking than those instructors who take a more passive role in their teaching. Thus, despite theoretical arguments favoring the value of asynchronous discussions over more spontaneous face-to-face interactions, the mode of discussion does not appear to be uniquely relevant to the development of critical thinking. Rather, the value of asynchronous discussions in the online classroom may be their value in creating a vehicle for instructors to encourage increased student engagement and critical thinking in the absence of face-to-face exchanges.

As is the case with most research in online learning, it is key to note that the findings of the current study may be attributed, at least in part, to the novelty of online learning for many faculty and students. As instructors and students become more familiar and comfortable with the unique nature of virtual education, it is possible that they will be more equipped to take advantage of the theoretical benefits available through asynchronous discussion. Ongoing research is needed to explore the mediating effects of familiarity with trends in online education.

It is also worthy of mention that the findings of the current research may be limited due to the course level of investigation in the current study. The current study examined critical thinking in a lower-division, general studies course in which students have limited background knowledge from which to build a critical analysis. As such, they may be more dependent upon instructor interactivity and the ability of the instructor to lead discussions in a manner that guides higher-order thinking. It is possible that upper-division, advanced or graduate-level courses in which students have more extensive background knowledge, incentive, interest and experience with critical thinking might respond less to the interactivity of the instructor and more spontaneously engage in critical analysis of information.

The current findings provide impetus for ongoing research on the role of instructor interactivity in discussions for the promotion of critical thinking. Our results challenge the traditional comparison between online and face-to-face instruction; rather shifting the focus from a superficial analysis of the comparative value of each instructional mode to a more insightful investigation of instructional factors that are uniquely relevant and valuable in the distinctive settings created by online and face-to-face education.

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Manuscript received 17 Nov 2008; revision received 25 Feb 2009.



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