Increasing Students' Interactivity in an Online Course

M Cecil Smith and Amy Winking-Diaz
Northern Illinois University

Abstract

Efforts were undertaken to increase students' interactivity in an online course in adult development. The purpose was to increase students' engagement with the course materials, heighten their online discussions, and deepen their thinking about course-related concepts, theoretical principles, and research findings. Several strategies were used towards this end. Analyses of students' discussions showed that they relied frequently upon personal anecdotes to make meaning of the theories and developmental principles covered in the course. The instructional strategies did not, however, bear a direct relationship to students' participation, learning, or course performance. Rendering the course materials sensible in light of their personal experiences is a critical indicator of students' understanding and learning. Instructors may want to redirect their attention from assessing students' knowledge of factual contents in online courses where ability to discuss and analyze concepts and principles is a critical indicator of learning.

Online education has come of age. Today, hundreds of universities and colleges are offering individual courses and degree programs online via the Web. Such academic offerings provide students with an important advantage in that they can take coursework at any higher education institution, or pursue studies at their local college or university without having to come to campus. Such flexibility is essential in creating distributed learning environments (Oblinger & Maruyama, 1996) that can increase students' opportunities for learning and academic achievement. It is estimated that 1.5 million students took part in online education in 1998 (National Center for Education Statistics, 1999); that figure continues to grow and more higher education institutions are increasing their offerings of online classes and entire programs of study on the Web.

The introduction of powerful and flexible course management software programs, such as Blackboard and WebCT, has made the development of online courses very appealing to higher education institutions and professors. Instructors can post course materials, such as assigned readings, lecture notes, videos, and PowerPoint presentations on secure sites and students can access these materials 24 hours a day. Online courses can create greater opportunities for instructors and students to interact more frequently, communicate more effectively, and collaborate on learning projects and research (Alexander, 1999; Ko & Rossen, 2004).

However, online learning presents a number of challenges to both the instructor and the student (Muirhead, 2001). Student attrition from online courses, for example, is very high (Carr, 2000; Hiltz, 1994). Undoubtedly, dropping out of an online course can be explained in part by the perceived lack of immediate social contact and the relative anonymity among students in online courses (Kember, 1989). Students also may underestimate the amount of time required to succeed in an online course. Some students perceive online courses to be less rigorous, perhaps assuming that the amount of content and the demands on their time is small relative to traditional, face-to-face courses. A challenge for instructors of online courses is to create courses that are equivalent to face-to-face courses in terms of their learning objectives, contents and assignments, and student learning outcomes (MacKinnon, 2002).

A significant problem for instructors and students is that the level of *interactivity*, between and among students and the course contents, may be difficult to achieve online (Guernsey, 1998). Interactivity is conceptualized as a vital learning process (Tu, 2000), and the level of interactivity, according to Muirhead (2001) has an impact on the quality of computer-mediated instruction. Interactivity has been defined as two-way communications among two or more persons (Hillman, Willis, & Gunawardena, 1994), the purposes of which are to promote explanation and challenge perspectives among learners (Garrison, 1993). Northrup (2001) and others (e.g., Moore, 1989; Northrup & Rasmussen, 2000), view interactivity as that which occurs not only between students and the instructor, and students among one another, but also between students and the course contents—including the assigned texts and related instructional materials. Although, strictly speaking, students and course contents cannot "interact," in that texts cannot respond to students, a number of educational technology advocates claim that interactivity may be present between learners, texts, and other materials and resources that are assigned to students (Bannan-Ritland, 2002; Soo & Bonk, 1998; Tremayne & Dunwoody, 2001). For the purposes of this paper, interactivity is defined as students' active engagement in the tasks of reading and acquiring an understanding of the required course reading materials, and demonstrating understanding of the information through participation in online class discussion activities.

Critics of online education have raised concerns about the level and quality of student interactivity in classes offered over the Internet (Stross, 2001). Instructors in online classes and educational technology researchers have investigated some of the factors that can influence interactivity. Burge (1994), for example, conducted in-depth interviews with two instructors and their students in courses offered via text-based computer conferencing (i.e., primarily e-mail). Two instructor behaviors were identified as being crucial to promoting student engagement and learning in these courses. The first was the ability to manage discussions by providing appropriate structure and pacing, and giving students sufficient time for thinking and creativity. The second important behavior was an amalgam of instructional activities that included giving students technical assistance in a timely manner, posting summaries of discussions, and offering students affective support.

In a survey of students in distance education courses for health professionals (e.g., occupational therapy, social work), Townsend et al. (2002) found greater interactivity took place when students had opportunities to communicate with their instructor rather than when working collaboratively in small groups. Students also reported that when

instructors graded students' participation, required students to post questions, or discuss case studies, then interactivity was enhanced. Larson (2002) found that student interactivity increased in an online marketing course when the instructor was frequently and actively involved in discussions. Thus, the primary issues of concern surrounding students' interactivity in online courses are related to instructors' involvement and feedback and students' successful time management to achieve the demands of the course.

Obviously, student discussion is critical to the success of an online course. However, as Levin (1997) pointed out, online learning is conducted largely within text. Thus, whenever students must read challenging texts in preparation for class discussions, some will find it difficult to be fully interactive in the course. Further, according to Northrup (2001), interactivity must be intentionally designed into a Web-based course, as it does not simply happen because the materials and tasks are presented to students for their consumption. A lack of interactivity was observed when the first author delivered an online adult development course for the first time in the fall of 2001. Student discussions within the course discussion forum suggested that they had not prepared for discussions by reading the assigned articles or lecture notes. Discussions tended to lapse into story swapping and students' sharing of personal anecdotes rather than thoughtful analyses of theoretical principles and research findings, as befits a graduate course (Bonk, Malikowski, Angeli, & East, 1998). Steps were then taken to remedy this problem and several strategies were developed to increase students' interactivity when the course was offered again the following year (fall 2002). These strategies, and their impacts on student discussion performance and learning in the course, will be examined in this paper. The second author took the course the first time it was offered and then served as a graduate teaching intern when the course was offered again, so her insights as both student and instructor are valuable to understanding the impacts of the instructional strategies for increasing the level of engagement with the course materials and assignments.

The Online Course

Adult Educational Psychology

After teaching a graduate educational psychology course in adult development and learning, Adult Educational Psychology (AEP), periodically for a decade, the first author developed an online version of the course. The purpose was to try to reach a wider audience of students. Generally, the course contents (i.e., assigned texts and other readings) and assignments (i.e., research papers and projects) were similar between the face-to-face and online versions. The online course convened for 13 weeks and enrollment was limited to graduate students at a large Midwestern university. Those who typically take the course are students in educational psychology, adult education, gerontology, instructional technology, and counseling.

The class met three times face-to-face: at the beginning, near the midpoint of the semester, and at the end of the course. Otherwise, all class activity took place online. The face-to-face meetings served several purposes. The first purpose was to gauge students' motivation for and ability to participate in distance education, and for students to become

acquainted with one another in order to increase their comfort when engaging in asynchronous discussions. The two final meetings allowed the instructor to gather course-related feedback from the students directly, to direct small group activities toward building greater cohesion among the students (second meeting only), and to complete the course evaluation (final meeting). Thus, the face-to-face meetings did not delve very much into the course contents and materials.

Blackboard software was used for the course. All course-related materials were available for students to download, except for three assigned textbooks. Traditional course lecture notes and related PowerPoint slides were available, as was the course syllabus and detailed instructions and grading criteria for assigned papers and projects. Numerous "hot links" to online resources and information that are relevant to the course were also provided to students in external links folders within the Blackboard course environment. Students were asked to contribute to this list of links whenever they located, used, and evaluated relevant Web sites. Different topics (e.g., research methods, cognitive development, memory and intelligence, adult education) were covered each week with a corresponding set of assigned readings. A discussion board corresponding to the weekly topic and also posted in Blackboard contained one or more discussion questions that served to initiate students' discussion. These questions were based upon the assigned reading materials. An example question is

> If you could design a social program to increase the "intellectual capital" of American adults, what would it look like? What is your [theoretical] rationale for each component of the program?

Students were required to not only answer these questions, but to also read and respond to one another's comments and ideas, and share and exchange information. Thus, the questions served only as a starting point for discussion. The instructor facilitated discussions by asking probing questions, prompting for clarification, and occasionally summarizing divergent points of view—or asking students to do so. Students' discussion contributions were evaluated to assess their class participation.

Five assignments were also required for the course. First, students selected a published research article pertaining to adult learning and development, adult education, or an aging-related topic. They then prepared a detailed summary of the article that was posted as an attached document in a discussion board forum and they posed several discussion questions for the class. Subsequent discussion of the research article was facilitated by the presenting student. At the conclusion of the discussion board forum, the student posted a summary of the discussion.

Second, four written papers were required. The first was an evaluation paper of adult development and adult education Web sites in which a set of criteria were used to appraise a selected site's credibility, accuracy, reasonableness (i.e., information presented in a fair and objective manner), and support (i.e., corroborating information contained in the site). The second paper was a brief lesson plan for teaching a specific skill or "knowledge unit" to an individual or a group of adult learners. The third paper was a brief, critical review of a recently published popular press book (selected by the student) on adulthood or adult development. A discussion board forum was used to post the completed book reviews so that students could discuss the books they read. Thus, this

discussion board served as a virtual "book reading club" for students. The fourth paper required students to conduct an interview with an adult learner, to frame, analyze and interpret information drawn from the case within a specific theoretical perspective (e.g., Levinson's developmental theory, 1986; Mezirow's transformative theory, 1991), and to report the findings of the interview.

When the online course was first offered (Class 1), 14 students enrolled—a slightly higher number than was typical for the face-to-face version. However, by the end of the semester, only five students remained. Generally, the students who dropped the course indicated that they had underestimated the amount of time required to successfully complete an online course (including a few who had previously taken online courses). The second time the course was offered (Class 2), 10 students enrolled, and all were able to complete it, although one student failed the course. These students agreed that the course was highly demanding, but they were a very motivated group of individuals who established good rapport and were highly supportive of one another.

Strategies

Effective teachers use a variety of instructional strategies to impart lessons and teach content, motivate and engage students, direct attention, assess learning, and provide feedback (Berliner, 1988). While some instructional strategies are explicit, others are less so. Different instructional strategies evoke different kinds of learner responses and levels of engagement. Thus, trying a variety of strategies and activities may be the best approach for meeting the diverse needs and interests of students (Northrup, 2001). Yet, too many instructional strategies can result in student confusion and frustration with the course (Berge, 1999). Thus, our instructional strategies were simple, few, and designed to organize and structure communication, increase instructor support, build upon student rapport, and increase their interest in the course materials. The instructional strategies included the following:

"Ask the Professor" discussion board. The purpose of this discussion forum was to create another forum for student-instructor communication. The discussion board provided students with a place to pose questions to the instructor in regards to course-relevant matters, such as to clarify instructions about assignments, or to ask about ideas and concepts within the assigned readings that need more explanation. Generally, these questions were presumably of interest to other students. Because there were few classroom meetings to ask the instructor specific questions, this discussion board served as a useful alternative. This feature was used for Class 2 only. An example question posted by a student was

> I'm prepared to lead an online discussion about research on gifted adult learners. I've prepared a summary of the research and its major findings, and I'm ready . . . for discussion. Do I need to set up a particular week for the discussion, or can I just put it up there anytime that seems appropriate? Also, the course assignment page indicates that you'll set up the discussion board forum, so should I just send you an attachment and then lead discussion after you've posted it?

Response labeling. Students were asked to label their discussion comments in discussion board using the following system:

RESPONSE: an answer to a discussion topic question of at least 250 words.
COMMENT: a meta-discussion statement, i.e., an observation regarding the content or characteristics of the discussion.
QUERY: asking one or more questions of a previous respondent.
CLARIFY: an explanation or elaboration of a previously posted response.
FYI: sharing information with others to assist in their learning and understanding of the discussion topic, or to pass along information about assignments.

The purpose of response labeling was to assist students and the instructor in sifting through the sometimes lengthy lists of postings to discussion board forums. The instructor believed the system would also help to keep discussions on task. Students readily adopted the labeling system and used it consistently. Labeling was used for Class 2 only.

Simultaneous and overlapping discussions. As noted above, there was a discussion board for each weekly topic and then an overlapping research presentation by a student in another discussion board forum. Discussions for the weekly topic began on Wednesdays and concluded the following Tuesday. Student presentations began on Sundays and concluded on the following Saturday. Students moved back and forth between these discussion forums, sometimes bringing forward comments and ideas from previous discussions and making connections between the weekly topic and the research presentation.

Occasionally, two discussion boards were created for a given weekly topic. The class was divided into two groups and each group was assigned to one discussion board topic or the other. The purpose was to limit the total number of persons contributing to any one discussion, with the goal of increasing the number of contributions that students made to their respective group discussions (Flottemesch, 2000). Having 5 rather than 10 students in a discussion group would result in fewer overall postings to the discussion board. So many responses were posted in the larger group discussions (i.e., upwards of 50 responses within a few days) that it was difficult for students (and the instructor) to read all of the comments. Small-group discussions were easier to follow and less demanding of students' time (Jonassen & Kwon, 2000). The use of overlapping discussions was used for both classes.

Discussion weaving. Because the discussion board forums remained active throughout the semester, none of the discussions were considered to have concluded. Thus, students were encouraged to return to previous discussion topics and to find relevant comments and ideas that could be brought forward into the current discussion board forum. The goal was to weave together diverse points of view about the discussion topics into a richer, comprehensive tapestry of ideas (Feenberg, 1987-1987). This strategy was employed to create what Mabrito (2001) called "collaborative" interactivity where students and the instructors worked together to create new understandings. Discussion weaving was used during Class 2.

"Buddy system" for discussions. Bonk, Wisher, and Lee (2003) suggest the assignment of Web buddies students to keep each other informed of weekly course events

and due dates, thus aiding them in understand course requirements and staying on task. Students in Class 2 paired up and worked collaboratively on the assigned readings, and prompted one another to log onto the discussion board, check messages and read comments, and to contribute to the ongoing discussions. Students selected their "buddy" and agreed to e-mail and or call one another one or twice each week. This strategy enabled students to make more immediate connections with one another, build group coherence (Sherry, 2000; Zhu, 1998) and develop collaborative approaches to studying the course materials (Muirhead, 1999).

Adult Educational Psychology "Factoids." These were brief notes citing various statistics and other scientific facts pertaining to adult development and aging and adult education. The information was gathered from a variety of sources: news stories and press releases, U.S. Census Bureau data, journal articles, and textbooks. The factoids were posted periodically (one each week) on the Announcements page in Blackboard (the first page students see when they log onto the course site). An example AEP factoid is

> Alzheimer's disease affects about 1 in 10 Americans over 65 and nearly half of adults over 85. It can only be definitively diagnosed by examining the brain after the individual has died. Diagnosis in living patients is accomplished through a process of elimination—with MRI scans, cognitive evaluations and blood tests performed to rule out other possible causes of dementia.

The idea was to provide interesting information that served to raise questions or issues for further discussion and to prompt students to do more reading or research—and to contribute new factoids from their out-of-course reading (Sherry, 2000). Factoids were presented weekly for Class 1 and on a limited number of occasions for Class 2.

In the remainder of this paper, we examine students' interactivity in the discussion forums and their abilities to demonstrate their learning of the assigned course texts through these discussions and written assignments. That is, students' discussion should reflect the knowledge acquired through their reading of the course materials and by successfully completing the projects and papers. We also discuss the relative success of the strategies for promoting student interactivity and learning.

Method

This study examines the discussion contents for Class 2 only. Ten graduate students were enrolled in the course, including five doctoral and five masters students from educational psychology ($n = 2$), adult education ($n = 6$), and instructional technology ($n = 2$).

A total of 23 discussion board forums were posted for students' discussion over the semester. Twelve of these discussion forums were qualitatively analyzed to determine and evaluate students' abilities to demonstrate their knowledge of course contents (i.e., assigned readings). Nine of the 12 forums were randomly selected and the remaining 3 were purposely selected from among those judged by the instructors to be the best of the 10 student-led discussion forums. In general, we regarded our methodological approach as a narrative study of students' interactivity within the discussion board forums. Student comments in all of the selected discussion board forums that pertained to ideas, facts, and

knowledge based on or derived from assigned course readings were identified and coded. Instructor questions and prompts that facilitated discussions were also identified and coded. We identified common themes, or categories, regarding the types of comments that were posted in the discussion board forums, and these themes are described in the following section. Our approach is compatible with other qualitative, narratively-oriented investigations in which instructors have examined students' behavioral and/or attitudinal responses to their instructional tactics and strategies (Crone, 2001; Dicker, 1990; Hollander, 2002).

Results

Evidence of Students' Mastery of Course Materials

There were ample materials to be covered in the course and it was expected that students would read and then integrate ideas, concepts, principles, and facts from the reading materials into their discussion board responses. In other words, students had to do more than simply swap anecdotes, they had to demonstrate their knowledge by discussing relevant theory and research in an intelligent, thoughtful manner. This was a very challenging task, given the brief time provided for discussion before moving on to the next topic. Our analyses of the discussion board forums resulted in the identification of six broad themes, as follows:

1. Discussion of assigned course materials (e.g., citing author names, facts, concepts, and ideas presented in the readings and textbooks as source materials for the discussions). Nearly one fourth (22%) of student comments directly discussed the course materials. The following is an example in response to a question posed by the instructor regarding the distinction between learning and development:

> Grannot [*sic*] suggests that developing learning occurs as learner [*sic*] goes through these phenomena. In addition to the three phenomena that must occur in order for authentic learning to occur, there must be a clearly defined timeframe during which the learning must occur. Learners must also have a vested interest in what they are learning and be involved in the design of the learning activity itself.

Students summarized assigned readings, drawing from the textbooks in their responses to discussion questions, as in the following example:

> Erikson's psychosocial theory of development focuses on the development of the ego through a series of 8 stages. Each stage of development is defined as a crisis in which particular stage-specific issues present themselves as challenges to the individual's ego; each stage unfolds from the previous stage. Erikson's theory begins with early infancy and ends with later adulthood (Whitbourne, 2001). Levinson's theory of adult development is based on the idea of life structures ('the basic pattern or design of a person's life at a given time," Levinson et al., 1978, p. 41 in Whitbourne, 2001). Levinson links the time periods, which range from early adult transition to era of late adulthood, to specific age periods. Although Erikson's developmental stages are linked with age, "Erikson maintains

that as adults we may revisit earlier stages to resolve or re-solve conflicts from earlier periods in different ways," while Levinson's life structures do not allow for movements between stages (Merriam & Caffarella, 1999, p. 103).

In the above example, the student drew from two text sources: the course textbooks by Whitbourne (2001) and by Merriam and Caffarella (1999). We found that students rarely cited specific text materials in their discussion contributions. Less than five percent of all comments posted contained citations to support a student's arguments.

2. Application of course materials (e.g., describing how knowledge acquired in the course was used to solve a problem in professional practice). Nearly one third (30%) of students' comments in the discussion boards focused on ways that the ideas, facts, research findings, theoretical principles, or other information culled from the assigned readings could be, or were used, in authentic situations (e.g., teaching, assessment, therapy). Here is an example from a student who conducts research at a public high school for gifted youth:

> Arnett is clear about the distinction between emerging adulthood and adolescence, and I have been trying to connect this argument to the students I work with. As I mentioned . . . one of my projects is a longitudinal study of a gifted and talented population, and I know that a good number of them leave high school with very clear professional pursuits in mind . . . [f]or these students . . . the characteristics of emerging adulthood doesn't seem to fit very neatly.

In another case, a student explained how a particular theoretical model of participation in adult education could account for her decision to return to graduate school.

> I personally like Boshier's Congruency model. This model suggests that there must be an alignment with the individual and the educational environment in order for participation to occur. I can apply this to my decision to return to school. . . . Knowing from the outset that I wanted an advanced degree, I would take classes sporadically, looking for a program that was a "good fit." At one point I enrolled in an MBA program and immediately felt out of place. . . . It didn't take me very long to realize that my philosophy is more in alignment with human services . . . . Because congruence didn't exist between my goals and the program goals, I dropped out of that program and enrolled in . . . a program in public services management, which was more closely aligned with my personal beliefs.

Students often responded to the course materials in a very personal way and this seemed to reflect efforts to understand and make personally meaningful the theories or research findings that they encountered in their reading. Here is an example from a student who took issue with Arnett's (2000) theory of emerging adulthood:

> A great deal of Arnett's emerging adulthood theory doesn't work for me either. Maybe it has a lot to do with my own matriculation after high school. I paid for my undergraduate and graduate school education while working full time. I didn't have to pay for my own college education, but chose that financial responsibility.

> I was an only child from an upper middle class family, but because I didn't want to be under my father's thumb, I paid for my own education. . . . Instead, Arnett should have examined the maturity level and socioeconomic situation of individuals rather than grouping them by age.

Although both of the above examples are personal anecdotes, they are rooted in the students' attempts to draw meaning and relevance from the reading materials. In contrast, a number of comments in Blackboard were little more than personal stories with little obvious connection to the course materials.

3. Discussion of personal anecdotes; content not directly related to the course materials (e.g., accounts of events and activities that are only tangential to the course). Anecdotal stories comprised 15% of the discussion contents. The following is an example in response to the instructor's request that students describe one or more community-based programs that support adults' activities towards generativity and/or ego integrity, following an introduction to Erikson's theory:

> I came from a long line of ministers . . . and in our family's denomination, ministers who are retirement age don't disappear quietly into the congregation. . . . Instead, many of them take on new roles in the church and travel around the country doing missionary work. . . . It's ironic that these folks find themselves traveling quite a bit more than they ever did as pastors . . . and the years of wisdom are irreplaceable in training new ministers. My uncle, for example, is now teaching himself Spanish . . . and doing construction in Central America.

Some students, because of the nature of their work, were able to bring an insider's perspective into discussions—particularly in regards to research methodology. One student, employed in a major medical center, commented in response to our discussion of research methods in studies of adult development:

> I have participated in a clinical study over the past 12 years regarding how we deliver care to a specific patient population. We use that information to benchmark ourselves against the other in the group and ourselves. It always helps that every year we collect data we include an additional 4 to 6 new institutions in the study which gives us a larger sample. This study helps us to see if we have improved not only against ourselves but against other institutions.

It is interesting to note that the comment conveys this student's understanding of a group comparison study in terms of competition between institutions in regards to the quality of patient care. Responses such as this one created opportunities for the instructors to further query students about their understandings of the course materials and to provide additional information that might clear up such misconceptions.

4. Reference to source materials external to the course (e.g., discussing a book or article not assigned in the course, but relevant to the discussion topic). Only about 5% of students' discussion pertained to materials and sources that were not assigned in the course. The following example illustrates a student's incorporation of ideas from Vygotsky in regards to the distinction between learning and development:

I think that Vygotsky addressed the question very deliberately in "Thought and Language," and Grannot [*sic*] restates Vygotsky's argument and supported by contemporary research (p. 23). In particular, Vygotsky states and summarily dismisses other competing learning theories in laying the groundwork for his zone of proximal development.

A second example is a student's use of a textbook that was not assigned in the course:

One of the texts that I read for another class I'm taking this semester on the Learning Organization is pretty clear about the need for managers to take responsibility for the application and integration of the new skills (Gilley, Eggland, & Gilly, 2002, Principles of Human Resource Development). They say that "less than 10% of expenditures result in observable behavior change on the job."

Another student made a connection between a course reading assignment and a topic assigned in a different class:

The Birren and Shroots article gives a nice overview of the development of a systematic study of the psychology of aging, but a topic came up in another class that was in many ways related to the . . . readings so far, namely a definition of cognitive development that is necessary for clinical assessment. In particular, in diagnosing mental retardation, the characteristics . . . must be identifiable before the age of 16 (or 18, depending on the manual you consult). So, for at least one group of clinicians, adult learning that is unhindered by potential developmental problems begins as early as 17. I just offer this an as alternative—but related— definition of adulthood.

These kinds of contributions to class discussions are indicative of the students' abilities to integrate and synthesize information from a variety of sources and activities and to create a developing web of knowledge. Because adult development was a new field of study for these students, most did not have an elaborate knowledge base, so making these kinds of connections to information across courses and texts, was critical, but relatively infrequent.

5. Requests for clarification of a statement or claim, from one student to another (e.g., asking for more information and to give another example). About 11% of student contributions to the discussion board were requests to other students to clarify or restate a claim, idea, or statement. Here is a typical example:

Tim—Please help me now. Are you suggesting that to get the best results would be to perform a cross-sectional and longitudinal study simultaneously?

Another student sought assistance from her peers to help her to better understand how researchers can tease apart age and cohort effects from research designs that incorporate both cross-sectional and longitudinal methods:

Now I need someone to help me with the complex designs—I think I understand the basic ideas, but when the text starts talking about the interpretation of the results, I don't have any sense of how reasonable the interpretation might be. I guess I just don't see how the repetitions of the studies help you to figure out what results are due to age and what results are from the environment. Anybody have any good examples?

6. Questions or comments posted by the instructor and/or teaching assistant to facilitate discussion, clarify comments, or to ask students to elaborate their comments. One in five of all postings (20%) to discussion boards were comments, questions, or clarifications from the instructors. Here are two examples, each of which are directed to specific students. The first response asks the student to elaborate upon their initial response:

Tim—say some more about the "incentives and opportunities" that might set the stage for literacy development. Try to be specific.

The second example is the instructor's response to a student who had described her approach to learner assessment, which the instructor had judged to be incomplete:

Margaret—you don't say how you assessed the student's learning. How did you test their knowledge? Did they have to produce a product (e.g., writing code for a program)?

We further analyzed and coded the kinds of comments and questions that we posted in the discussion board forums in response to students' discussion contributions. Presumably, our comments and follow-up questions to the class served to promote additional discussions. The following types of comments were identified.

1. Recognizing a student's comment and contribution to the discussion (e.g., "Nice summary and good example, Lisa. Does anyone have any comments or questions about the ISSTAL model for Lisa?").

2. Requesting additional student input for a discussion (e.g., in response to a student's brief survey of other students in the course, the instructor posed this question following the students' summary of the survey responses: "So . . . what is your interpretation of these data? Can you draw any meaning from our responses to your survey?").

3. Providing an example or explanation to students, or giving a directive for a task (e.g., in response to a student's explanation of differences in developmental stages between children and adults, the instructor offered the following explanation: "Developmentalists consider that development consists of the joint occurrence of gains and losses. 'Losses' need not be negative, because new skills may develop in their place or the individual may compensate for the loss.").

4. Requesting clarification of a previous statement or claim (e.g., in response to a student's description of how an effective adult education classroom could be established, the teaching assist asked, "Can you expand on your example? I'm interested . . . how you

might create the safe environment, vary the class to meet the needs of the students, and get them to buy into the need for . . . feedback so you could reassess your role . . . ."). Forty percent of our comments were of the first two types, another forty percent were of the third type, and the remainder was requests for students to clarify their comments.

Evidence for Students' Learning of the Course Material

We looked closely at the first two categories of students' discussion comments to determine how well they appeared to understand, and thereby, have acquired some knowledge of the required course materials. Further, we reviewed example papers for two of the writing assignments students completed for the course: the adult learner lesson plan and case study interview. These papers are essential artifacts of the course that demonstrate how well students could integrate information from the assigned textbooks and research articles into their written work in ways that supported their lesson plans and interpretations of their learner interviews.

Students' demonstration of their understanding of an assigned reading was often limited to paraphrasing very specific information cited in an article:

> Arnett defines this developmental stage as the period between 18-25 . . . individuals in this age group are generally too old to be considered as "youth," and too young to be considered full-fledged adults.

Less common were comments that illustrated students' abilities to elaborate the information contained within an assigned text. Typically, attempts to explain information took the form of anecdotes that often strayed far from the central idea or question that was the focus of the discussion forum. For example, in a discussion of Arnett's (2000) theory of emerging adulthood, one student described her experiences in the following manner:

> I happen to fall into his demographics as a person who did emerge into adulthood from 18-25 with many changes, and in fact 25 was when I finally embraced . . . my "passionate" mission and work. However, like yourself, I used to teach . . . at a vocational school, where I put together . . . a fully developed web development programming course for adult students who were looking to change their careers . . . .

Thus, while this response illustrates the student's understanding that Arnett claims emerging adulthood to occur in the age range of 18 to 25, the comment fails to acknowledge any other of the fundamental propositions of Arnett's view, such as the subjective experience of emerging adulthood resulting in a sense of ambiguity about one's status as an adult, and the extensive opportunities for identity exploration which the emerging adulthood period affords.

Certainly, students' inability to go beyond some of the "facts" presented in the texts and assigned readings reflect a critical dearth of background knowledge—an obvious problem in an introductory course such as this. Lacking sufficient knowledge to apply or to elaborate information from the articles that they were assigned to read, students simply restated text information and then resorted to descriptions of personal

experiences and anecdotes that they assumed would be sufficient to illustrate their knowledge of the material.

Yet, a few students could readily relate new information to existing knowledge and demonstrate critical understandings of theory, as in the following comment:

> I would like to respond to the major claims posed by Sinnott on the concept of postformal thought. First, I realize that stage theorists have lost a bit of currency over the years, but I still believe that Piagetian development can inform educators' work in many ways. I also know that Piaget made few forays into adult learning, so there is a need to extend our understanding of cognitive development beyond late adolescence. . . . But, I don't agree that Sinnott's conception of postformal thought is a logical extension of Piagetian development, even though several characteristics are grounded in Piagetian development theory, namely the ability to take another's perspective into account. What struck me is that relativistic thinking has been characterized as higher order thinking in other theories and with much deeper connection to their lower stages of development. In other words, relativistic thinking is the highest order of intellectual development in stage theories that are characterized by progression of epistemology that flows from dualistic to relativistic (ala William Perry) rather [than] Piaget's development of logical thinking.

It is also true that students' responses to the discussion questions posed by the instructors reflected the type of tasks that were inherent in these questions. For example, in at least one discussion board, the task was to respond to a hypothetical scenario. Here, students were asked to imagine themselves as aged adults two or three decades hence and to describe the kinds of activities that might assist them in aging "successfully." Quite naturally, students responded in ways that reflected their knowledge of themselves. While it was assumed that students would draw upon the course literature on successful aging (e.g., Baltes & Baltes, 1990) to support their responses, they did not do so. Here is a typical response to this question:

> Twenty years from today, I will be 74 years old. If I am like my parents and grandparents, I will be active, involved in volunteer work, devoted to my family, and having physical problems with arthritis and my hearing. I expect to work, at least part time, well into my sixties, but by 74, I imagine, I will be retired. I would like to remain involved in some sort of volunteer activity—maybe literacy tutoring or volunteering in the local schools.

This is certainly a marvelous response to the discussion question and illustrates the student's view of how successful aging can be accomplished—even if it did not draw directly upon or cite the reading materials. Thus, there is at least some understanding of the requisites of successful aging (e.g., involvement in some kinds of social activities). The student's response also illustrates the problem may lie in the nature of the question: it did not explicitly require students to go to the literature to support their conceptions of successful aging (although this expectation was made explicit at several points during the course and was stated within the course syllabus).

Students' Written Work

We reexamined a few examples of students' papers for the lesson plan assignment and the adult learner interview. The task for the lesson plan assignment was to create and describe a detailed lesson plan for teaching some skill or specific knowledge to a group of adult learners. This assignment drew upon students' knowledge of adult learning theories, research on information processing and cognitive development, strategies for motivating adults, and methods for assessing adult learning. The task for the second assignment was to interview an adult engaged in some kind of formal or informal learning activity to learn about their motivation for learning, knowledge of strategies or actions that would facilitate their learning, and their learning goals. Students were to interpret the data gathered from the interview within a specific theoretical model.

Students' papers generally demonstrated their ability to incorporate the course material, cite appropriate sources to support their arguments, and apply theory and research findings appropriately. For example, one student's lesson plan was designed to teach graduate students about Vygotsky's social constructivist theory. The student draws upon a range of source materials (e.g., Piaget, Vygotsky, Perry, Kegan) and several theoretical concepts (e.g., dialectical thinking, stages of development) and much of this material was drawn from course materials. Another student described his plans for a lesson to teach community college students in a computer technology program about diagnosing problems with computers:

> This lesson fits into phases two through five of a "cognitive apprenticeship" (Brandt, Farmer & Buckmaster, 1993). Earlier in the course, I focus on phase one, where I model the desired behavior. They get a few weeks of hearing me "think out loud," which hopefully they will remember when approaching this assignment. During the reading part of the assignment, I provide some key words and concepts for the students' focus. In this way, I am providing a certain amount of guidance while still asking them to learn somewhat independently. During the small-group discussion, my involvement decreases, and their situation becomes more of an approximation of the real world. The learning is more self-directed, and I provide assistance when requested. After that is completed, we do a whole-class discussion, where we look at the specifics, correct any errors, and then generalize the material.

The student's description reflects familiarity with Vygotskian principles of mediated learning, and also draws upon other notions about group learning (e.g., reciprocal teaching, collaboration) and learning in authentic situations—content that is covered in some of the course textbooks (e.g., Merriam & Caffarella, 1998).

Thus, students' written assignments, in contrast to their online discussions, provided better evidence of students' knowledge of the assigned course materials. This difference may be a reflection of students' relative comfort and familiarity with written assignments compared to somewhat impersonal "virtual" discussions held via computer.

Evidence for Effectiveness of Instructional Strategies

As is true in any course—whether taught in a traditional manner or within the Internet's virtual environment—some of the instructional strategies of the course were more useful to promoting students' interactivity and engagement than were others. We had hoped that the AEP factoids, for example, would serve not only to give students some random bits of interesting information about adult development and aging, but might also prompt occasional, spontaneous discussion topics. Unfortunately, this proved not to be the case as students rarely responded to any of these factoids. Feedback from students indicated that, while they found the factoids to be interesting, they were too consumed with the other demands of the course to be able to make much use of these added pieces of information.

Students utilized the Ask the Professor discussion board extensively, however. Over the course of the semester for Class 2, for example, 17 questions and 53 comments were posted by students, including the following response and question:

> One of the comments you made in your introduction to the course really stunned me. . . . [You said that] there is no evidence to support claims that instruction designed to capitalize upon an individual's preferred manner of learning has any benefit over and above "traditional" group-oriented approaches to teaching. A significant chunk of what I was taught in methods classes and workshops has been related to learning styles, so it's rather overwhelming to find out there's no quantitative data justifying its use. But before I freak out here, I need to ask you a couple of clarifying questions—When you say learning styles, do you mean things like "I'm a visual learner," or are you also referring to . . . the Myers-Briggs personality types? . . . It really amazes me that adult ed and ed psych would be so far apart in this area.

We also found that response labeling was one of the most useful features for facilitating discussions. Because the number of responses posted within a few days could sometimes be overwhelming (Mills, 2000), a system was needed so that we, students and instructors, could make sense of the postings and their content without going through and rereading each response. Instead of simply responding to the posted question(s) within a thread, the students, prompted by the use of labeling, created responses that were not always "answers" to questions. The FYI label created many interesting discussions. For example, one student posted an FYI about an article from *The New York Times* regarding the beneficial effects of positive thinking on aging. A link to the article was included in the student's message to the discussion board. A brief discussion among several students then ensued based on their reading of the *Times* article.

Students' labeling of their discussion comments was also helpful in terms of our ability to survey and facilitate the discussions. Rather than having to sort through every posted comment, we could focus on specific types of comments, primarily those marked "Response." Some discussion boards had as many as 80 comments posted in the course of a week's time. Thus, it was a challenge to keep up with the task of reading every response. The labeling system was also useful for evaluating students' contributions to discussions and their overall course participation. We could more readily determine the

kinds of discussion comments that students offered throughout the semester. It was typical to see an array of students' discussion responses posted in the manner shown in Table 1.

Table 1

Example of Discussion Board Comment Labels

FYI: New York Times Article
　　　　Comment: Re: FYI: New York Times…
　　　　Comment to: New York Times Article…
　　　　　　　COMMENT Re: FYI: New York Times…

RESPONSE- Successful aging
　　　　Response: Successful aging…
RESPONSE Successful aging…

RESPONSE: Question 2 Support Genera…
　　　　Re: RESPONSE: Question 2…

QUERY: Curiosity?
　　　　Re: QUERY: Curiosity?
　　　　　　Re: QUERY: Curiosity?
　　　　　　　　Re: QUERY: Curiosity?

FYI: Website Address

COMMENT- Schank article
　　　　Re: COMMENT- Schank article
　　　　　　Re: COMMENT- Schank article
　　　　　　　　Re: COMMENT- Shank article.
　　　　　　　　　　Re: COMMENT…Shank article

The demand to keep up with and to facilitate the discussion threads was further complicated because there were often two or more discussion boards taking place at any time. Thus, the instructor usually took responsibility for facilitating one discussion board, and the teaching assistant took responsibility for the other. Typically, one of the discussions concerned the weekly topic, and the other was a student's research article presentation. On occasion, discussions that had begun previously were still going on, but winding down to conclusion. It was certainly easy to empathize with students' feelings regarding the demands on their time. Nonetheless, it was apparent that the overlapping discussions served to enrich students' experiences in the course. We found that students' comments often cut across the different topics and, on occasion, they brought elements

from one discussion into another, seamlessly weaving ideas brought forth previously that served to energize a discussion, or to point to a new way of considering an idea.

For example, the course teaching assistant (TA) responded to a question posed by a student who was presenting and leading discussion of a research article. The student asked,

> What would you do to create a learning environment in which all learners could thrive?

The TA replied,

> In my Career Planning class, I begin the 2nd meeting with an "expectations" exercise. Each student fills out a form that asks them to list what they expect from one another in the class AND what they expect from me, the instructor. At the 3rd meeting, I give them a collective version of their responses including a third section that includes what I expect from the students. Together we process each entry in all 3 categories and decide if all responses are appropriate and if we missed anything. . . . Once agreed upon fully . . . the students sign a contract based on the class expectations.

The student discussion leader then asked,

> It sounds as though your career planning class is on its way to being an inclusive learning environment. You reminded us in your response that [yours] is a career planning class... was that to say that you would not use this method in teaching other courses? How do others feel about this?

The TA responded,

> I actually have students sign a contract stating that they understand the expectations and are willing to abide by them. I . . . believe the initial process could work in any class.

Another student then joined the conversation by stating,

> I see [the TA's] contract much like the discussion we had with Monica's article regarding group work or collaborative learning. If the students set up the expectations in the beginning and the instructor holds them to those expectations, the group is included in the planning process and is more invested in the course.

Students tended to encapsulate their knowledge because a different topic was covered each week. That is, they restricted their comments to the issues surrounding the designated discussion topic and did not often see connections to previous materials. Undoubtedly, this reflects students' relative lack of familiarity and expertise in the knowledge domain. Occasionally, we prompted students to look for these connections

and to think of the course material as a whole rather than as isolated, unrelated texts. However, there was little time to check and determine if students could do so.

When facilitating discussions, we carefully chose discussion questions that allowed for many perspectives and multiple inputs from students. The following question provides an example:

> Imagine yourself 20 or 30 years from now. How are you likely to see yourself as an aging person, based on what you know of yourself now? What kinds of behaviors and activities are you most likely to engage to assist you in aging successfully?

A student then responded with the following comment:

> If there's one thing I've learned about aging, it's the fact that our bodies have a "use it or lose it" effect. . . . I'd like to stay physically . . . and mentally active too. I honestly have no plans to retire—I hope to keep teaching as long as they'll let me. If I ever do retire, then I plan to spend my retirement learning as much as I can. As I watch people age, I can see that those who stay active are happier and healthier. Those who don't, end up miserable, spending their "golden years" waiting for death. I know which group I want to emulate.

A second student addressed successful aging from a somewhat different angle:

> I'm just curious. How many people would still be engaged learners if most of what there is to learn in 30 years [is] offered . . . through the Internet taking computer- and web-based online training interactive simulations?

Several students responded to this query, including the first respondent, who replied,

> When he invented the motion picture, Thomas Edison predicted that books would soon disappear from schools. I don't think the traditional classroom is going anywhere. I can see web-based learning filling a niche for those who find the classroom inconvenient, and also for enhancing the classroom experience, but I don't expect it to replace classrooms.

Both instructors worked diligently to keep discussions going whenever they seemed to lag, and we posted prompts such as the following:

> About half of the class has begun to discuss the questions [the instructor] has posed for week #2. I encourage those who have not yet responded to do so today and tomorrow. Another question will be posted soon that covers week #3 readings.

One of our goals was to bring previous discussions back to the forefront and integrate these into current discussions whenever possible. Therefore, we posted requests for students to summarize the discussions. This activity served to bring closure to some

discussion topics while maintaining other, ongoing open discussions. Summarizing enabled the students to use many higher-order thinking skills. They sorted through a collection of comments, evaluated them, and synthesized the responses. Sometimes students would contribute new ideas to dormant discussions and these discussions would then be revived and revitalized.

Whenever only one or two students were participating in a discussion, we addressed the other students by reflecting on the first posting and asked others for their thoughts on the topic. For example, during one discussion on theories of adult development, the following question was posed:

> I know Tim got us started on this question earlier this week—what do the rest of you think? How would you describe adult development to someone who knows very little about it?

There were two to three students in Class 2 whose responses were infrequent and sometimes not very thorough. For example, one of these students posted the following statement:

> The idea of [Boshiers' congruency] model left me wondering if it isn't a bit outdated due to the changes . . . in the past 10 years. This model would have applied and been used as a predictor about who would and would not participate in a structured learning activity 10 years ago.

An attempt was made to draw the student further into the conversation by posting a response that asked for a more detailed comment:

> Could you speak to this a little bit more . . . what changes are you referring to? Why are these changes important to adult learning?

The student then replied,

> 10 years ago there was no incentive to get off of welfare. As a matter of fact the more kids you had the more money you received. Now there is no additional aid for additional children and the mother must be enrolled in a formal training program or attending college.

This kind of prompting was sometimes useful, but generally, the more reluctant students' participation tended to wax and wane throughout the semester.

As discussion facilitators, we often struggled to determine the extent to which we should participate in or lead these discussions. Generally, whenever we noticed that student discussions were lagging, either one of us would then post a response. For example, one very active student posted a fairly thorough response in the discussion regarding research methods for studying adult development. Other students contributed similar responses, but we both felt that none of them were addressing one particular aspect of the topic. Here is part of the exchange that followed:

As for "how rough an estimate is the cross-sectional format?"—I would say it could be fairly rough. An additional drawback to using a cross-sectional method for studying human beings is one of "era." If you are currently looking at several groups of people from distinct age brackets, how do you account for their individual differences not based on age but based on the time (or era) in which they were born?

In response, the TA replied,

I don't know how many times I heard my grandmother speak of the Great Depression and how they wouldn't spend any money on anything [unless] . . . absolutely necessary. If she had been included in a cross-sectional study . . . where the researcher was looking to identify "spending trends," her views would be different than [a] 20-something who hasn't really experienced a Depression in their lifetime. What do you all think of this idea?

As described above, students were required to summarize, present, and lead a discussion of a research article. Students' facilitation of discussions was an important catalyst for engagement in the course and its contents. When students had to lead discussions, they quickly realized the importance of everyone's involvement in the discussions because these interactions were the essence of the course. It appeared that students who led discussions early on in the semester benefited from the experience compared to those who did so near the end of the course.

Conclusions

This paper has described an online course in which different instructional strategies were used to increase students' interactivity with the course materials and assignments, and engagement in discussions. Levin, Waddoups, Levin, and Buell (2001) identified five dimensions that contribute to effective online learning. These dimensions include using relevant and challenging assignments, having coordinated learning environments, providing adequate and timely feedback from instructors, developing rich environments for student-to-student interaction, and flexibility in teaching and learning. From our perspective, the course described here largely contained these important dimensions.

There is, however, another dimension that also may be important to effective student learning in the online environment. The ways in which student interactivity, or engagement, is fostered within a course is also critical (Berge, 1999; Lally & Barrett, 1999; MacKinnon, 2002; Northrup, 2001). Instructional strategies that can support and extend learner engagement must be carefully considered. Interactivity goes beyond simply having students discuss ideas or critiquing articles in a real-time chat room or an asynchronous discussion board (Northrup, 2001). The instructional environment must be arranged so that students can read, critically reflect, discuss, argue, generate and present new interpretations, and share and exchange information and ideas. At a minimum, sufficient time must be allowed for critical reflection and for responding to discussion questions.

In face-to-face courses, class discussions and students' responses to instructor's questions are often spontaneous and demonstrate students' ability to think "on the fly." Because online courses are not limited to three-hour class meetings per week, as is the case with most traditional courses, students presumably have more time to think through problems or to analyze issues. They do not have to formulate a complete response to the instructor's questions within those few seconds of "wait time" that are typical of real-time in-class discussions. Students can, in principle, return again and again to previous online discussions and share ideas that may not have occurred when a topic was initially discussed.

The work demands on students create significant challenges in online courses. Such courses lend themselves to information overload because of the ease with which the instructor can upload course materials at any time. Thus, new reading assignments and related tasks can constantly be added. There were numerous assigned readings in the course described in this paper, and these had to be consumed in a relatively brief time, leaving little opportunity for students to reflect on the meaning, significance, or applicability of the contents.

Occasionally, students returned to previous discussion boards, so conversations never really ended—some discussion topics were just more active than others. Thus, the open-ended nature of the class discussions helped some students to, in a sense, "catch up" over the semester. Clearly, this is a great advantage over real-time face-to-face courses where, once a discussion ends, it is gone forever. In the online world, class discussions need never end. This also illustrates the kind of distributed learning across time and place that is possible in online courses—a real advantage over more static forms of learning and instruction.

Evidence from several studies, however, suggests that online discussion often fails to adequately engage students in learning (Williams & Pury, 2002). The depth of student learning is likely to vary depending upon the type and purposes of the course, the nature of the discussions, and the ways that students' learning is assessed. Prompting students with challenging questions that require them to think carefully and critically about the course reading materials, or giving assignments that necessitate application (of theory), analysis (of data), and synthesis (of diverse points of view) go a long ways toward increasing the quality of student discussions. Also, as suggested by our experience and as reported in this paper, different kinds of instructional strategies, feedback, and discussion questions may be useful to prompting and facilitating students' engagement with the course materials (Bonk et al., in press; Northrup, 2001; Rosenberg, 2001).

Some of the students attempted to demonstrate their learning of the course contents by explaining the course readings in their own words. Others demonstrated their learning by posting either applied examples or personal anecdotes, some of which were not clearly related to the course contents. Undoubtedly, students often feel more comfortable with challenging text materials when they can rely upon personal examples to make meaning of abstract theories and complicated research findings (Bonk et al., in press). Also, personal examples are easy to write about because the student "owns" the experience. It is difficult to find fault in a personal example that illustrates what the student believes is a salient point.

Analyses of students' online discussions have implications for examining and understanding the nature of classroom discussions in face-to-face as well as online

courses. Generally, the selected instructional strategies did not bear a direct relationship to students' participation, learning, or performance in the course. Students' acquisition of personal meanings and abilities to render the course materials sensible in light of their own experiences is a critical indicator of individual understanding and learning (Bonk et al., in press). Instructors may want to redirect their attention from assessing students' knowledge of factual course contents. Rather, determining the manner and effectiveness with which students appropriate and apply information from texts, readings, written assignments and other course activities to affect greater understanding of their professional practices and individual development as learners is a more authentic, informative, and valid indicator of students' achievement.

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