REALIZING CONSTRUCTIVIST OBJECTIVES THROUGH COLLABORATIVE TECHNOLOGIES: THREADED DISCUSSIONS

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ABSTRACT

Two crucial aspects of implementing instructional technologies effectively in language classrooms are having an understanding of the capabilities of various technologies and evaluating the usefulness of the technologies in realizing curricular goals. This paper presents a situated study -- based on a prominent pedagogical framework -- of the implementation of threaded discussions, a widely used instructional technology, to meet constructivist curricular objectives in university ESL classes. The authors use constructivist principles as a framework to evaluate the three-semester process of their implementation of threaded discussions to fulfill constructivist curricular goals. Of particular interest is the extent to which the technology, as mediated by the instructors, promoted selected cognitive and social skills as well as addressed affective factors and individual differences in students.

INTRODUCTION: CONSTRUCTIVISM AND CALL

Recognizing the importance of determining how instructional technology can fulfill instructional goals, Bonk and Cunningham (1998) point out that "The blending of … technological and pedagogical advancements has elevated the importance of research on electronic student dialogue, text conferencing, information sharing, and other forms of collaboration" (p. 27). While general frameworks (Bednar, Cunningham, Duffy, & Perry, 1995; Chapelle, 1997; O'Malley, 1995; Ortega, 1997; Tella & Mononen-Aaltonen, 1998) provide a basis for investigating the effectiveness of various technologies in fulfilling pedagogical goals, of particular interest to educators who value constructivist principles of learning is the interactive and distributed nature of some technologies.

Constructivists have found that communication technologies can realize constructivist ideals of learning (Bonk & Cunningham, 1998): active, collaborative construction of knowledge instead of knowledge transfer from one person to another (Cobb, 1994; Jonassen, 1994; O'Malley, 1995; Schank & Cleary, 1995), engagement in contextualized authentic tasks as opposed to abstract instruction, and less-controlled environments versus predetermined sequences of instruction where "conditions for shared understanding" are created and "alternative solutions and hypothesis building" (O'Malley, 1995, p. 289) are promoted through student interaction. Such learning environments encourage thoughtful reflection and "empower … learners … to assume ownership of their knowledge, rather than reproducing the teacher's" Jonassen, p. 6).

But various technologies differ in the way and extent to which they facilitate the realization of constructivist principles (Tella & Mononen-Aaltonen, 1998). Instructors need to identify the technologies and the implementations of those technologies, which best fulfill curricular goals (Bonk & King, 1998; Chapelle, 1997; Tella & Mononen-Aaltonen). In recent years, a number of studies have investigated the advantages and disadvantages of asynchronous technology with both native and non-native speakers in a

variety of higher education settings. Asynchronous communication realizes constructivist tenets in that it changes the role of instructors and students and extends the classroom in time and space. Students take on a more active role and become "problem solvers rather than just memorizers of facts" (Collins & Berge, 1996, p. 3; Jonassen, 1994; Ocker & Yaverbaum, 1999). Asynchronous technology such as threaded discussion "facilitate[s] self-pacing and self-directed learning" (Benbunan-Fich & Hiltz, 1999, p. 411), promotes students' reflection on course content, and encourages students to take responsibility for their own learning (Chong, 1998; Collins & Berge; Greenlaw & DeLoach, in press; Lamy & Goodfellow, 1999; Ocker & Yaverbaum, 1999). In a threaded discussion, students participate in an asynchronous conversation by posting messages to an electronic bulletin board with threads (or strands) of discussion. The original posting and all replies posted in response to the original posting are hierarchically displayed.

The additional processing time provided through the asynchronous medium is particularly important when dealing with non-native speakers (Kamhi-Stein, 2000a; O'Malley, 1995). It promotes careful deliberation over course content, which in turn encourages critical thinking as students develop knowledge at their own pace (Jonassen, 1994; Kamhi-Stein, 2000b; Scarce, 1997). Merron (1998) found that students using threaded discussions wrote more thoughtfully than students who were not afforded such opportunities. Similarly, Parker (1999) and Irvine (2000) found significant improvement in students' metacognitive reflection and depth of thought with the use of threaded discussions. Chong (1998) reports that students became actively engaged by course materials which provided opportunities to test understanding of the materials. The interactive and collaborative nature of asynchronous technology allows students to share perspectives and experiences, to establish relationships, to seek assistance (Chong, 1998), to exchange information that can influence intercultural attitudes (Müller-Hartmann, 2000), and to support and encourage each other (Collins & Berge, 1996; Kamhi-Stein, 2000b; Sengupta, 2001). Further, it "allows everyone to be heard" (Greenlaw & DeLoach, in press), including students who do not normally participate in face-to-face discussions (Kamhi-Stein, 2000b; Schallert et al., 1998).

Several researchers have observed that asynchronous technologies also foster students' awareness of discourse-related aspects of communication as well as academic conventions (e.g., citing sources) and syntactic flexibility (Davis & Thiede, 2000; Hutton, 1999; Irvine, 2000; Sengupta, 2001). Especially when the technology is integrated over an extended time frame, students learn to "interpret and produce contextually appropriate language by recognizing, deconstructing, and analyzing texts they encounter" (Sengupta, p. 110). Comparing threaded discussions, chat, and listserv e-mail, Irvine found that threaded discussions exhibited largely content-related statements and few procedure-related statements and prompted referencing to outside sources and other messages in threads.

However, Ocker and Yaverbaum (1999) as well as Benbunan-Fich and Hiltz (1999) observed that students in their study were not always satisfied with the quality of asynchronous interaction, perhaps due to "log-in lags" (p. 423) typical of asynchronous technologies. Coordination of when and how often to contribute can be difficult and can lead to "lurking ... some group members read the electronic message but do not contribute" (Ocker & Yaverbaum, p. 429). Collins and Berge (1996) suggest that dissatisfaction can also be the result of an absence of visual and social context clues. Dissatisfaction for non-native speakers can also stem from the fact that their language output needs to be written, and they have insufficient linguistic flexibility to express complex thoughts well (Collins & Berge; Lang, 2000). In addition, threaded discussions can be perceived as busywork if they are not well integrated into a curriculum (Bannon, 1995; Chong, 1998; Collins & Berge, 1996; Scarce, 1997). They can also lead to information overload if group sizes are not controlled (Chong).

Despite noted disadvantages, researchers agree that asynchronous technologies add to students' learning in new and significant ways and are probably best seen as a a supplement, not a substitute for other class activities. While previous studies have attested to the usefulness of asynchronous technologies in addressing constructivist principles (e.g., Bonk & King, 1998), these studies have focused largely on the social aspects of learning. The present study, however, provides a broader view of constructivist learning

by examining not only social, but also cognitive, affective, and individual principles of learning. The focus here is on the application of the American Psychological Association's (1997) constructivist principles in a multiple case study of the implementation of threaded discussions by two English as a Second Language (ESL) instructors in their classes over a period of three semesters. The study documents how instructional mediation of threaded discussion has led to a realization of constructivist principles in the classroom.

In the following section, the constructivist principles used as a framework for the study are presented. Then, a description of the assignment is given, followed by a discussion of how these constructivist principles were realized through the use of threaded discussion.

ANALYTIC FRAMEWORK

Following is the framework used in this study (Bonk & Cunningham, 1998, p. 29).

Cognitive and Metacognitive Factors

1. *Nature of the learning process.* The learning of complex subject matter is most effective when it is an intentional process of constructing meaning from information and experience.

2. *Goals of the learning process.* Over time and with support and instructional guidance, the successful learner can create meaningful, coherent representations of knowledge.

3. *Construction of knowledge.* The successful learner can link new information with existing knowledge in meaningful ways.

4. *Strategic thinking.* The successful learner can create and use a repertoire of thinking and reasoning strategies to achieve complex learning goals.

5. *Thinking about thinking.* Higher order strategies for selecting and monitoring mental operations facilitate creative and critical thinking.

6. *Context of learning.* Learning is influenced by environmental factors, which include culture, technology, and instructional practices.

Motivational and Affective Factors

7. *Motivational and emotional influences on learning.* What and how much is learned is influenced by the learner's motivation. Motivation to learn, in turn, is influenced by the individual's emotional states.

8. *Intrinsic motivation to learn.* The learner's creativity, higher order thinking, and natural curiosity all contribute to motivation to learn. Intrinsic motivation is stimulated by tasks of optimal novelty and difficulty, relevance to personal interests, and personal choice and control.

9. *Effects of motivation on effort.* Acquisition of complex knowledge and skills requires extended learner effort and guided practice. Without the learner's motivation to learn, the willingness to exert this effort without coercion is unlikely.

Developmental and Social Factors

10. *Developmental influences on learning.* As individuals develop, they have are different opportunities and constraints for learning. Learning is most effective when differential development within and across physical, intellectual, emotional, and social domains is taken into account.

11. *Social influences on learning.* Learning is influenced by social interactions, interpersonal relations, and communication with others.

Individual Differences

12. *Individual differences in learning.* Learners have different strategies, approaches, and capabilities for learning that are a function of prior experience and heredity.

13. *Learning and diversity.* Learning is most effective when differences in learners' linguistic, cultural, and social backgrounds are taken into account.

14. *Standards and assessment.* Setting appropriately high and challenging standards and assessing the learner as well as learning progress (including diagnostic, process, and outcome assessment) are integral parts of the learning process.

Note that "Developmental influences on learning" (principle 10) is not included in subsequent discussions because it is not particularly relevant for adult students. While graduate students develop intellectually, this development did not appear relevant to study.

ELECTRONIC DISCUSSIONS ASSIGNMENT

Six classes -- one class for each of two instructors for three semesters -- participated in the threaded discussion assignment. All classes were advanced-level university ESL reading/writing classes. In this paper, the set of classes (for semesters 1-3) that were taught by one instructor are referred to as ESL1; the other set of classes taught by the other instructor are referred to as ESL2.

A total of 52 students (30 in ESL1; 22 in ESL2) participated in the study. All were international graduate students from various fields of study. Most were Asian, but several cultural affiliations and nationalities were represented in every class. All classes included male and female students ranging in age from mid-twenties to early thirties, and class size ranged from 7 to 15.

The technology used for the assignment evaluated in the study was asynchronous threaded discussion on a Web board. The instructors used Prometheus, a widely-used course management system in the US (Prometheus, 2001). Following is a description of the assignment specifications as they were developed over a three-semester period.

Introductory Materials

At the beginning of each semester, the assignment was introduced to students through an assignment description and evaluation form, which were jointly developed by both instructors (see Appendices A and B). The handouts provided a rationale for the assignment and descriptions of how it should be carried out and how messages would be evaluated. The instructors jointly modified the description and evaluation forms for semester 2 (see Appendices C and D) and independently modified the forms for semester 3 (see Appendices E, F, G, and H). The ESL1 instructor provided a discussion excerpt illustrating expected features.

Group Assignments

For all three semesters, each class was divided into groups of three or four students with at least one male and one female in each group. The instructors also strove for an even distribution of nationalities and at least one assertive student in each group. Group composition remained the same for the first semester in all classes, and in the ESL1 class it was the same for semesters 2 and 3 as well. The ESL2 instructor, however, changed group assignments midway through the second and third semesters.

Discussion Threads and Prompts

During semester 1, students were required to introduce a new thread each week and participate in a total of 12 discussions about course content. However, since the instructors and students felt that 1 week was usually not enough time for an effective discussion, most threads were extended to 2 weeks in the second

semester. In the third semester, the instructors varied the length of the discussions from one to three weeks, depending on the prompt and the students' interest.

In the first semester, students were required to post once per thread but were encouraged to post twice. The ESL2 instructor required two postings per thread in the third semester while the ESL1 instructor continued to require one posting.

In the first semester students were told that their discussions should focus on course content but they could decide on the specific subject. Each group then selected the student who would begin each week's discussion. For subsequent semesters, instructors provided discussion prompts.

Instructors' Role

The instructors' role in semester 1 was limited to observation and evaluation of the discussions. During semesters 2 and 3, the ESL1 instructor participated in the discussions, providing ideas for discussion, modeling desired discourse, and encouraging student participation, as well as managing the discussions in general. The ESL2 instructor intervened only once in order to clarify a misunderstanding.

Evaluation

Instructors evaluated each student's messages on a weekly basis using the jointly developed analytic scale (see Appendix B). Students were required to post at least one message per week. Each posting was to relate to course content, demonstrate critical reflection, and be linked to previous postings. The requirement for "critical reflection" was based on an expectation for critical commentary (see Bloom, 1956). Linguistic accuracy was not evaluated.

Revisions to the evaluation form (see Appendix D) in semester 2 were made to clarify the requirement of "reflective thought." For semester 3, the ESL1 instructor used an evaluation form similar to the one used in semester 2. For that same semester, the ESL2 instructor elaborated the analytic scale using Bloom's terminology (see Appendix H), and then subsequently abandoned it for a holistic evaluation without the use of a scale.

Survey

At the end of each semester, students completed a survey in which they assessed the benefits of the assignment. References to survey results are included below.

APPLICATION OF CONSTRUCTIVIST PRINCIPLES

In the following section, we describe how the two instructors' implementation of threaded discussions in their classes fulfilled (or did not fulfill) constructivist principles (see Bonk & Cunningham, 1998). The first semester is discussed for both ESL1 and ESL2 since both instructors implemented the technology in the same ways. For some principles, similarities between the two sets of classes for the second and third semesters are then discussed when the principles were similarly addressed. Then, where appropriate, the application of the principles is discussed for each set of classes for the second and third semesters.[1]

Cognitive and Metacognitive Factors (Principles 1-6)

1. Nature of the Learning Process

Intentional process of constructing meaning from information and experience

Semester #1

In the first semester, student initiation of the topic promoted intentionality of postings; that is, students had to take the initiative to contribute to the week's discussion. Furthermore, the analytic scale promoted students' intentional choice of topic (aspects of course content), intentional references to course materials and own experiences, and intentional inclusion of reflective thought. The intentional construction of

meaning entailed students' linking their own experiences to course materials and to the experiences of the other students (Lamy & Goodfellow, 1999; Muirhead, 2000; Nunan, 1999a). Meaning was jointly constructed as students presented viewpoints and experiences and reacted to those of their group members. Students had to make explicit (hence intentional) connections to others' contributions (Berge, 1998).

However, there was a lack of explicit connections between the discussions in class and the threaded discussions which led students to see the threaded discussions as an isolated assignment rather than an integral part of the course (Chong, 1998; Scarce, 1997). This did not effectively promote intentionality of constructing meaning from information presented in the classrooms.

Semesters #2 and 3 for Both Instructors

In semesters 2 and 3, both instructors provided course-related prompts, but the students again had to take the initiative to contribute to the discussion and link their previous knowledge and experience to the discussion. This provided for more overt connections between the threaded discussions and classroom discussions, promoting more intentional construction of meaning through this "carry-over" (O'Malley, 1995). In survey responses, approximately 40% of all students for all three semesters identified the sharing of ideas as the greatest benefit of the assignment. Sharing provided information and experience from which meaning was constructed in the threads and in the classrooms.

The variable assignment of discussions during semester 3 so that they correlated more closely with classroom activities -- rather than assignment on an arbitrary weekly basis -- promoted more thoughtful construction of meaning (Berge & Collins, 1993; Kamhi-Stein, 2000b; Ocker & Yaverbaum, 1999). The creation of meaning also became more intentional, since the discussions became a more direct extension of classroom discussions cut short by lack of time.

Semesters #2 and 3 for Each Instructor

ESL1

For semesters 2 and 3, the discussion assignment was given greater weight in determining the final course grade, thus underscoring the importance of the assignment more than in semester 1. Instead of being part of the "participation" grade, which comprised 10% of the final course grade, the discussion assignment became a full 10% of the final grade, prompting students' intentional participation in the threaded discussions (Chong, 1998; Scarce, 1997).

Providing an annotated example of a previous thread in the introductory handout for the third semester also increased the intentional focus of students on producing critical discourse. One difficulty which students faced during the first and second semesters was reaching a clear understanding of "reflective thought." Most students came to understand this criterion by the second or third week because of modeling by the instructor and other students and instructor comments given as evaluations (Berge, 1998). In response to student suggestions and the instructor's observations of the lack of reflective thought, it was decided that a model should be offered (Peirce, 2000). Students seemed to take a more intentional approach to including reflective thought in their messages.

Students' survey responses noted that the instructor's occasional participation influenced their electronic communication by prompting them to include reflective commentary, indicating that students intentionally constructed meaning from course materials in response to the instructor's presence and evaluation.

An unintended improvement of the dialogic nature of the discussions during the third semester deserves discussion. Two students, without being prompted by the instructor, assumed the roles of discussion leaders by initiating and managing their groups' discussions. They not only started the discussions but also set agendas for the discussions, encouraged responses from group members, commended members

for particularly valuable contributions, and routinely summarized discussions. Partially as a response to peer pressure, this helpful addition to the discussion was an intentional construction of meaning and promoted other students' intentional construction of meaning (Benbunan-Fich & Hiltz, 1999; DeLoach & Greenlaw, 2002; Tella & Mononen-Aaltonen, 1998).

ESL2

In the third semester, the ESL2 instructor's adoption of a holistic evaluation and elimination of the evaluation form may have facilitated the evaluation process. However, this may also have meant that students approached the assignment with less intentionality.

2. Goals of the Learning Process

Creation of meaningful, coherent representations of knowledge over time and with support and instructional guidance

Semester #1

The introductory handout and technical training given in all three semesters provided students with instructor support and guidance, which were also provided in the form of feedback and evaluation on a weekly basis (Berge, 1998; Chong, 1998). In the ESL1 classes, the instructor returned both marked copies of messages and the evaluation form, making the guidance specific in terms of indicating how students' messages addressed the criteria. In the ESL2 class, instructional guidance may have been less effective as instructor comments were made on the evaluation form only; students were not given copies of their messages with comments.

Maintenance of the same groups promoted sustained social support from classmates. The students contributed to their group on a weekly basis, over 12 weeks, promoting coherence in terms of meeting expectations (e.g., developing critical thought) and tying together information and ideas (Kamhi-Stein, 2000b; Lamy & Goodfellow, 1999).

Semesters #2 and 3 for Both Instructors

The provision of an instructor-provided prompt served as a means of support and guidance. Both instructors were thereby able to more directly guide the learning, which came from readings and classroom discussions.

Varying the length of threads during semester 3 may have slighted principle #2. There were times at which no threaded discussions were carried on, since some students posted only the required one message. Thus, the continuous nature of the assignment was decreased. However, while the length of the discussions varied from one three weeks, the students were still expected to participate every week throughout the semester, thus promoting the construction of meaning over time.

Semesters #2 and 3 for Each Instructor

ESL1

The participation of the instructor allowed for additional support and guidance (Gamas & Solberg, 1997). Thus, the instructor was also able to answer questions if necessary and to guide discussions so that they were more reflective (Muirhead, 2000). Also, the provision of the discussion excerpt in semester 3 provided increased guidance (Peirce, 2000) by clarifying students' expected roles in the co-construction of coherent representations of knowledge.

The assumption of discussion management tasks -- initiation of discussions, establishment of agendas for the discussions, and routine summaries -- by two students further enhanced the amount and types of support and guidance individual students received. The students' encouragement of group members and

commendation of members for valuable contributions provided support from fellow students in addition to that offered by the instructor (Sengupta, 2001).

ESL2

The ESL2 instructor regularly discussed in the classroom each week's contributions in terms of their meeting the criteria. The instructor identified model messages, providing additional guidance to students (Nunan, 1999a; Peirce, 2000).

3. Construction of Knowledge

Linking new information with existing knowledge in meaningful ways

Semester #1

One of the two criteria that remained essential throughout the three semesters in all of the classes was the requirement to make connections between students' own viewpoints and those of their group members (Benbunan-Fich & Hiltz, 1999). This promoted the linking of new information (from other students' postings) to previous knowledge (Jonassen, 1994; Lamy & Goodfellow, 1999). The other constant criterion was the requirement to include "critical reflection." This promoted linking previous knowledge (course content) to new information (extrapolations in the form of reflective thought).[2]

Semesters #2 and 3 for Both Instructors

Varying the length of threads to more closely tie classroom and threaded discussions gave students additional opportunities to link old and new information in the creation of meaning.

Semesters #2 and 3 for ESL1

Opening a thread immediately after an interesting point in class was discussed promoted the linking of information discussed in the classroom with other information. Providing a written example of the types of linking expected as well as how to linguistically realize those links also facilitated students' linking information from the classroom to new information offered in the discussions. Coherent construction of meaning was also promoted by the instructor's participation in discussions as several students noted in survey responses.

In addition, by periodically summarizing group messages, discussion mediators modeled the linking of information from course materials and from other group members. They also prompted other students to do the same (Benbunan-Fich & Hiltz, 1999; DeLoach & Greenlaw, 2002).

4. Strategic Thinking

Creation and use of repertoire of thinking and reasoning strategies to achieve complex learning goals

Semester #1

The students discussed course-related aspects by using various strategies reflected in Bloom's taxonomy (see Appendix H). The assignment promoted the use of those types of thinking strategies (DeLoach & Greenlaw, 2002). However, the ambiguity of "critical reflection," the lack of a model and the fact that the discussions were student initiated, led to little use of analysis, synthesis and evaluation.

Semesters #2 and 3 for Both Instructors

The introductory handout introduced students to a range of thinking and reasoning strategies. In addition, the instructor-provided prompts promoted the use of a repertoire of critical thinking skills by focusing students' attention on critical, analytic issues related to course materials.

The following excerpt from a thread about culture as a factor of emotional expression exhibits the use of a repertoire of thinking and reasoning strategies -- comprehension, analysis, and evaluation -- in the service of commending valuable contributions and concluding the thread:

> I agree with my classmates' opinions, and would like to elaborate on several points they raised. First, Heyoung has brought up the issue of cultural evolution, and how cultural differences have decreased over time…[Comprehension]. This, in my opinion, is a natural product of social and cultural evolution throughout history [Analysis]. The fact that it's clearer in the last few decades, is probably caused by technological advances and globalization [Analysis].

> Nan mentions an important point. Her discussion of personality brings into light the vital role personality plays in filtering and interacting with the individual's intangible surroundings [Evaluation]. Finally, Lee lists religion as a factor affecting behavior [Comprehension]. The author [of the reading being critiqued] has overlooked the crucial importance religious beliefs…on the smallest details on of the followers' day-to-day lives [Evaluation].

Semesters #2 and 3 for Each Instructor

ESL1

Two changes promoted students' use of a repertoire of thinking and reasoning strategies. The provision of a discussion excerpt illustrated a range of strategies, while the instructor's participation in discussions prompted the use of a range of strategies.

The instructor's devotion of one thread to discussion of research paper topics promoted interaction but seemed to limit the range of thinking strategies. The contributions to this thread were mostly limited to reporting with some evaluation. This limitation is no doubt attributable to a lack of knowledge and a reluctance to seem critical of a classmate's proposed topic (Sengupta, 2001). Chong (1998) recommends, however, the use of such prompts which elicit more critical thought to elicit use of a repertoire of thinking strategies.

ESL2

As a result of discussing postings in class on a regular basis, there was more evidence of a range of thinking and reasoning strategies than in semester 1. Furthermore, revision of the evaluation form for semester 3 so that it incorporated Bloom's levels of thought prompted students to use a repertoire of thinking strategies.

5. Thinking About Thinking

Higher order strategies for selecting and monitoring mental operations facilitate creative and critical thinking

Semester #1

Since critical reflection was required, some students' contributions included higher order strategies, which resulted in creative thinking (DeLoach& Greenlaw, 2002; Kamhi-Stein, 2000b; MacKinley, 1999). In the first semester, however, many students' postings remained at the lower half of Bloom's taxonomy. This was because no prompt was provided and students could select their own topics (as long as these were course-related). Students did not often challenge each other (or themselves) to analyze, synthesize, or evaluate (Lang, 2000; Richardson & Turner, 2000).

Semesters #2 and 3 for Both Instructors

With more explicit instruction and guidance, students demonstrated thinking skills related to monitoring their critical thought. The provision of instructor-provided prompts elicited selection of critical, analytic operations in dealing with course materials.

In the following excerpt, a student demonstrates explicit use of argument structural elements to advance his argument:

> In last discussion, I pointed out that people have different triggers for their anger due to cultural differences [Cause/Effect Warrant]. As a result, they often have difficulty understanding why certain things seem to anger us in the first place [Claim]. Now I give an example, Kosinski's (1976) autobiographical novel [Authoritative Warrant], *The Painted Bird* … In this novel, a hermit caught a bird that he had painted in a colorful. Later, he released the colorful bird and watched the bird jointed the flock. However, the flock attacked the colorful bird and pecked 'the alien' to death … [b]ecause the flock feared of the difference … [Support]. In the same manner, I have seen [Authoritative Warrant] people dismiss some people… [Reiteration of Claim].[3]

Semesters #2 and 3 for ESL1

Participation allowed the instructor to explicitly identify and model the selection of critical thinking expected of the students (Peirce, 2000). In the following excerpt, the instructor attempts to refocus a discussion by identifying previous relevant contributions and posing questions to prompt analysis and evaluation of conditions for catharsis as discussed in a course reading. The instructor then prompts application of the results to arguments of whether "closure" justifies the death penalty:

> I'd like to refocus your attention on the connection between catharsis and the death penalty. Anna and May have touched on the issue, but I'd like you to deal with it more directly … Some people have argued that executing a murderer provides catharsis for the family and friends of the victim. Anna described an interesting case in which a woman seemingly found catharsis…Do you believe that the death penalty is warranted by the catharsis/relief that the family and friends find? Must the 4 conditions apply in the case of the death penalty?

The group discussion managers' contributions served as appropriate models for selection of critical thinking strategies. The managers demonstrated the usefulness of synthesizing various members' contributions to furthering the group discussion. Similarly, their summary of parts of the discussion and of the complete thread demonstrated the usefulness of providing a coherent perspective of discussions. In the excerpt below, one student proposes an agenda for the week's discussion and suggests applying reading strategies learned in class:

> Hi all … we can debate the contents of the two readings or debate our individual's opinions about catharsis and death penalty … There are a lot of reading strategies that we have learned from our writing class can be applied to our discussion.

6. Context of Learning

Learning influenced by environmental factors, including culture, technology, and instructional practices

Semester #1

Students had access to the discussions 24 hours a day and could thus participate whenever they had the time and desire. Campus and home access to technology extended learning through the discussions outside class (Bannon, 1995; Berge & Collins, 1995; Gamas & Solberg, 1997; Ocker & Yaverbaum, 1999).

It might be argued that the asynchronous nature of the technology threatened the coherence of thought and social interaction (Benbunan-Fich & Hiltz, 1999). However, the opposite effect seemed to be evident. By facilitating response and reference to previous messages, the students had time to read each other's contributions and to think carefully about their own contributions, which promoted coherent discussion. The linear display of threaded discussions (Lang, 2000) also created coherence of thought and social interaction.

The grouping function of the technology provided a non-threatening environment for the students. Quiet students took active roles in discussions, which promoted their learning (Bannon, 1995; Ocker & Yaverbaum, 1999; O'Malley, 1995; Sengupta, 2001), and the instructional practice of grouping the students with one assertive student per group promoted learning by providing a model and setting higher standards (Kamhi-Stein, 2000b; O'Malley, 1995).

Semesters #2 and 3 for ESL1

For subsequent semesters, the ESL1 instructor incorporated a second technology and altered instructional practices so that most of the threaded discussions could be devoted solely to developing students' use of critical thinking skills. A computer-mediated testing software was used to test students' basic understanding of readings. Misunderstandings could be addressed in class, allowing the threaded discussions to be used for critical discussion.

Motivational and Affective Factors (Principles 7-9)

7. Motivational and Emotional Influences on Learning

Learning influenced by the learner's motivation. Motivation to learn influenced by the individual's emotional states

Semester #1

The "distance" provided by technology motivated students who rarely participated in the physical classroom due to potential embarrassment (Greenlaw & DeLoach, in press; Kamhi-Stein, 2000a, 2000b; Scarce, 1997; Warschauer, 1996). The novelty of the technology and social interaction also motivated students (Warschauer, Shetzer, & Meloni, 2000). Students also understood that familiarization with the technology would be useful in other courses and in their professional work.

However, the frequency of the postings and the long term nature of the assignment seemed to be a demotivating factor for some students. They felt that the threaded discussions were a burdensome addition to other more traditional assignments, which were already required.

Poor group dynamics in one of the groups in the ESL2 class also had a negative effect on motivation in the first semester. One student did not participate in all of the weekly discussions, frustrating other members of his group (Muirhead, 2000).

Semesters #2 and 3 for Each Instructor

ESL1

The discussion assignment was given greater weight in determining the final course grade. This change gave students greater extrinsic motivation to participate in the threaded discussions (Bannon, 1995; Scarce, 1997).

ESL2

Students had positive affective responses to the change in group assignments. The additional motivation may have led students to learn more about each other. Unfortunately, a lack of participation on the part of some group members continued to be a problem for both semesters. This lack of motivation seemed to demotivate other students (Benbunan-Fich & Hiltz, 1999; Ocker & Yaverbaum, 1999; Scarce, 1997).

8. Intrinsic Motivation to Learn

Intrinsic motivation is stimulated by tasks of optimal novelty and difficulty, that are relevant to personal interests, and provide for personal choice and control.

Semester #1

During all three semesters and for all of the classes, the novelty of the task increased the intrinsic motivation of the students. Only a few (approximately 20%) had participated in threaded discussions before, and these students had not had extensive experience.

Since students chose their own discussion topics, they could choose those relevant to their personal interests (Korenman & Wyatt, 1996; Sengupta, 2001). However, these topics did not necessarily represent optimal difficulty. Students apparently avoided topics that they felt were difficult to discuss (Sengupta). In contrast to the choice of topics, students could not control the length of the threads, which may have decreased some of their intrinsic motivation.

Semesters #2 and 3 for Both Instructors

Although prompts were assigned during semesters 2 and 3, students often related the prompts to their own experience and interests (Nunan, 1999a). Also, by assigning prompts, instructors could provide tasks of optimal difficulty.

Many of the discussions in the classes were given 2 weeks rather than one week in the second and third semesters. Students frequently asked to continue a discussion because they were intrinsically motivated to do so (Kamhi-Stein, 2000b; Sengupta, 2001).

Semesters #2 and 3 for ESL1

Tying the discussions more closely to classroom activities -- by initiating discussions when classroom activities warranted this -- appeared to increase students' intrinsic motivation (Sengupta, 2001). Likewise, there is evidence that the initiative of the two discussion managers prompted an increase in other students' intrinsic motivation. Group members were motivated to provide meaningful, useful messages as evidenced by the interest shown in others' contributions, and the investment of time they made in reading others' messages (Benbunan-Fich & Hiltz, 1999).

9. Effects of Motivation on Effort

Acquisition of complex knowledge and skills requires extended learner effort and guided practice

Semester #1

Evaluative feedback from the instructors provided guidance as to whether or not students needed to reflect more on course content or make more explicit links to prior postings. Guidance was less direct in the ESL2 class since feedback was provided on the evaluation form rather than on copies of the actual messages. Instructors also occasionally provided guidance through additional models of complex skills such as critically analyzing course content and providing clear references to sources of information. This guided practice further promoted students' acquisition of complex knowledge and skills.

Students had to exert extended effort in meeting the criterion to demonstrate critical thinking skills. For example, simply preparing and posting a summary of what they had read would have required considerably less effort than evaluating course materials. Prompted by the instructors' encouragement and guidance, some students did analyze, synthesize, and evaluate information.

Developmental and Social Factors (Principle 11)

11. Social Influences on Learning

Learning influenced by social interactions, interpersonal relations, and communication with others.

Semester #1

This assignment required social interaction and communication within sustained groups on an ongoing basis, thus promoting interpersonal relationships (Kamhi-Stein, 2000b; Korenman & Wyatt, 1996; Nunan,

1999a). In fact, in response to the survey, approximately 50% of all students each semester identified social interaction (i.e., sharing ideas and experiences, and familiarization with classmates and other cultures) as the greatest benefit of the assignment.

However, uneven participation among group members reduced the amount of communication and interaction among students as well as the relationships that could have thereby been established (Chong, 1998). This, in fact, was identified as the greatest weakness of the assignment by approximately 15% of the students, with fairly equal distribution across classes and semesters. In addition, the assignment of students to one group for the whole semester precluded building interpersonal relationships with other classmates in the discussions.

Semesters #2 and 3 for Each Instructor

ESL1

The thread devoted to discussion of students' research paper topics during the second semester provided opportunities for social interaction, for creating interpersonal relationships, and for communicating with classmates (Nunan, 1999a). Students presented their topics, helped each other choose and clarify topics, and suggested direction for topics and sources (Kamhi-Stein, 2000a).

The discussion excerpt provided at the beginning of semester 3 prompted more substantive messages. However, it also led to longer contributions, which in turn reduced the interactive nature of the discussion (Benbunan-Fich & Hiltz, 1999; Irvine, 2000). Few students were willing to contribute more than one message because of the additional work involved. Thus the social interaction was reduced, whereas the use of higher order thinking was increased.

In contrast, social interaction and interpersonal relationships were enhanced by the self-initiated discussion leaders. These students prompted participation, encouraged fellow group members, created social cohesion among members, and enhanced the quality of the communication within groups.

ESL2

By reassigning students to different groups, interaction with more than one group of students was promoted. Interpersonal relationships were thus broadened as students communicated with all classmates instead of an unchanging group, as noted by 20% of all students in survey responses. This change may partially explain in part the ESL2 students' increasingly favorable view -- from semester 1 to 3 -- of the ability of the assignment to build relationships and promote familiarity with other students. During the last two semesters, ESL2 students thought the assignment was more helpful in promoting familiarity and relationships with other students than did the ESL1 students. Group reassignments in ESL2 -- in contrast to the use of fixed groups for all three semesters in ESL1 -- may account for this difference.

Individual Differences (Principles 12-14)

12. Individual Differences in Learning

Learning determined by different strategies, approaches, and capabilities for learning that are a function of prior experience and heredity

Semester #1

The assignment accommodated various strategies, approaches, and capabilities for learning. For example, students who wanted to take their time preparing postings and those who wanted to communicate at a faster pace were able to work within their own style and pace of learning (Collins & Berge, 1996; Kamhi-Stein, 2000b; Lamy & Goodfellow, 1999; Ocker & Yaverbaum, 1999).

The assignment also promoted the use of different strategies and approaches for learning (Bannon, 1995; Benbunan-Fich & Hiltz, 1999; Collins & Berge, 1996). Based on their prior experience, students shared

ideas about how to tackle course assignments thereby adding to others' experiences. In discussing a writing assignment, for example, one student wrote, "I read your thoughts about how to organize the writing. To my mind, the most interesting thing is the adaptation of the American organization of academic writing to our native language organization…" Furthermore, students had to evaluate the contributions of other students, thus using a strategy, which is often used by the instructor only (Berge, 1998; Collins & Berge, 1996).

The assignment helped the instructors become familiar with individual students' learning strategies and abilities and, in turn, to accommodate and promote strategies in the classroom. For instance, students who exhibited a more reflective learning strategy in the threaded discussions could be accommodated in the classroom by allowing them more time to formulate responses. On the other hand, those same students could be taught the usefulness of developing other strategies as well.

Semesters #2 and 3 for Both Instructors

While prompts were general enough for all students, regardless of their background, to address, they also allowed students to draw on prior experience, as exemplified in the following response to a prompt on anger and catharsis:

> I agree … that the damage is already done. Especially when … "most victims, their family and friends, never recover from the damage, even after the convicts have been executed" … I was victimized when I was 8 years old, and although I know that he has been dead for a long time, that fact does not make me feel any better … because I know that this person did to other innocent people what he did to me because he was twisted and rotten already.

Semesters #2 and 3 for Each Instructor

ESL1

The self-initiated discussion managers demonstrated different learning strategies: Classroom discussions of critical reading strategies were actually exemplified by the discussion leaders as they evaluated messages, synthesized ideas, and summarized threads. This, in turn, promoted the use -- or awareness -- of various strategies in the other students.

ESL2

In the third semester, the ESL2 instructor shifted from one required posting per week to a more variable structure, in which students were required to post twice on a given topic, irrespective of the length of the thread. Thus, while students' strategies, approaches, and capabilities for learning were accommodated in a way similar to semester 1, students also had to learn to adapt according to the changing length of topic threads. While students with more reflective styles seemed to feel at ease with a pace of two postings over a three-week thread, they may need to adapt this preference when they have to post twice over a one-week thread. Such flexibility can be beneficial for developing capabilities for learning in a variety of circumstances.

13. Learning and Diversity

Learning is most effective when differences in learners' linguistic, cultural, and social backgrounds are taken into account.

Semester #1

The assignment facilitated students' sharing of information about their linguistic, cultural, and social background differences (Benbunan-Fich & Hiltz, 1999; Kamhi-Stein, 2000a, 2000b; Korenman & Wyatt, 1996). They applied this new information to their own backgrounds, thus promoting learning. For example, during a discussion about academic writing in U.S. universities, students shared information

about writing conventions in their own languages. One student wrote, "For me, the most exciting thing in every new language is its structure and organization. We have to study not only grammar, which is like the visible part of a language iceberg, but how to organize our thoughts in that language." This information could, in turn, be used by the instructors to address individual differences in the classroom.

The grouping of students so that various linguistic/cultural backgrounds would be represented in each group promoted the interest and learning of students who relished telling about their own cultures and learning about those of other students (Kamhi-Stein, 2000b).

14. Standards and Assessment

Setting appropriately high and challenging standards including diagnostic, process, and outcome assessment as integral parts of the learning process

Semester #1

Appropriate and challenging standards for assessment were set at the outset of the semester (Killion, 1998). Critical reflection, analysis, and evaluation are essential skills for graduate students (Scarce, 1997). Instruction in using and demonstrating these skills is necessary for many international students, some of whom come from educational systems which do not promote critical thought to the extent that American universities do (Nunan, 1999b).

As noted by other researchers (Benbunan-Fich & Hiltz, 1999; DeLoach & Greenlaw, 2002), students also set standards for themselves and other group members. Some students tried to enforce standards (e.g., the number and timeliness of postings) set by the instructors, and some also implicitly set standards for the tone and substantive nature of postings. As noted above, the standards were not always appropriately high or challenging.

The continuous assessment contributed to students' learning progressed over time. The assignment allowed the instructors to diagnose students' critical thinking skills at the beginning of the semester as well as track the development of those skills throughout the semester.

Semesters #2 and 3 for Both Instructors

The provision of a prompt allowed the instructors to tailor the difficulty level of the discussion. Rather than allowing students to focus mostly on simple association of information as happened in the first semester, the instructors were able to prompt the use of more challenging critical skills such as analysis, synthesis and evaluation (Kamhi-Stein, 2000b; Muirhead, 2000).

Semesters #2 and 3 for Each Instructor

ESL1

Students' comprehension of lectures and readings was assessed through quizzes and class discussions prior to the threaded discussions. Therefore, through the assigned prompt, the instructor was able to focus the threaded discussions on critical, analytic issues related to the lectures and readings. The threaded discussions thus provided an appropriate and challenging measure of each student's critical understanding of course materials, because basic understanding of the readings was assured through the reading comprehension quizzes and face-to-face discussions.

During the third semester, the discussion managers set appropriately high and challenging standards for their group members (Benbunan-Fich & Hiltz, 1999; DeLoach & Greenlaw, 2002). In addition to implicitly setting standards as models, they also explicitly set standards by praising group members for valuable contributions and by prompting members to contribute.

ESL2

In semester 3, the analytic criteria based on Bloom's taxonomy provided challenging standards for graduate students. Due to concerns about the reliability of the analytic ratings, the instructor changed to a holistic assessment, and was thus able to provide challenging standards as well as to more appropriately evaluate students' critical thinking.[4]

DISCUSSION

Over the course of three semesters, the assignment described in this paper was modified in order to better address constructivist principles. According to Berge (1998), constructivist teachers "model cognitive processes, provide guided instruction, encourage reflection about thinking, give feedback, and encourage [connections between old and new information]." Thus, they enable "students' exploration of the course goals rather than the teacher's presentation or delivery of course materials and content" (p. 3). The instructors' role in the present study was to create a learning environment "where learners actively participate in the environment in ways that intended to help them construct their own knowledge, rather than having the teacher interpret the world" (Jonassen, 1994, p. 4; see also Tella & Mononen-Aaltonen, 1998). In the instructors' attempts at targeting some principles more explicitly, others received less emphasis, but the path of development has highlighted the enormous potential of threaded discussions for realizing constructivist principles. The implementation of the assignment has also made clear the responsibilities that constructivist instructors need to be prepared to take on. The following discussion highlights the major recommendations and insights gained from the present study.

Role of Instructors and Benefits to Students

In threaded discussion, "a general and diffuse goal of exchanging messages … [is] insufficient to maintain the dialogue between [students]" (Bannon, 1995, p. 273; see also Tella & Mononen-Aaltonen, 1998); therefore, an important role for the instructors, evident after the first semester, became the provision of prompts that would target specific course-related topics and thinking skills, and as observed, the quality of students' contributions subsequently increased. In an attempt at tying threaded discussions closely to course objectives and class themes and promoting critical thinking, students were provided a variety of prompts for their discussions which addressed aspects of course content (Bailey & Luetkehans, 1998; Chong, 1998). In addition, once the instructors' role included tying threaded discussions more closely and deliberately to classroom discussions, the assignment's long-term promotion of constructions of meaning increased as a result (Peters, 2000). It is also recommended that instructors vary the length of ongoing discussions instead of setting an arbitrary limit. This allows instructors to realize long-term construction of meaning, appeal to students' intrinsic motivation and sustained effort, and exchange ideas collaboratively on topics of greater interest.

Another change in instructor roles over the course of the semesters was increased guidance through the provision of a discussion excerpt, illustrating not only critical thinking but also ways in which links between students' own ideas and those of classmates or readings could be achieved (Lang, 2000; Nunan, 1999a). This also led to longer postings and increased intentionality of students since the expectations of the instructor were clearer. A positive impact on the quality of discussions was noted as students' attention was focused on critical, analytic issues related to course readings and lectures (Collins & Berge, 1996; Peirce, 2000); thus instructors can provide appropriate guidance in line with constructivist principles. Also, through the sample discussions with three or four people interacting, students may realize that their postings do not have to be long in order to contain critical thought. These aspects are especially important when teaching non-native speakers who are unfamiliar with expectations of American academic assignments (Nunan, 1999b). However, while the principle of critical thinking was addressed more fully in semesters 2 and 3, the principle of interaction seemed to fall short. The size of the groups remained relatively stable over the three semesters, including three to four students, as a number of researchers

recommend (Bailey & Luetkehans, 1998; Korenman & Wyatt, 1996; Peirce, 2000). This possible limitation in interpersonal relationships and viewpoints can be overcome by changing groups during the semester or by opening a temporary forum for whole class exchange of ideas, two strategies both instructors in the present study followed. Thus, instructors need to be keenly aware of group processes and dynamics that develop both in the threaded discussions as well as in class and may need to re-assign students to new groups or increase or decrease group size throughout the semester.

Nunan (1999a) argues that it is important to "find ways for students rather than the teacher to take control of the interaction" (p. 71), a principle realized in the present study through threaded discussions. The instructors took on a passive role by not intervening in the group discussions during the first semester and providing feedback only on student contributions. Similarly, the students' greater involvement became particularly evident in the voluntary group leaders in one of the classes, representing excellent examples of independent students who managed their group discussions in a productive manner. However, the instructors' participation also gradually increased over the next two semesters. They influenced "the discussion process by encouraging new topics, sharing new material, and redirecting the conversation patterns" (Muirhead, 2000, p. 2). Thus, their role became more active as they provided guidance and support by directly joining student discussions. The instructors were thereby able to model and promote students' use of various learning and thinking strategies. Their active participation facilitated students' productive interaction; that is, they fostered and modeled productive group discussion skills -- an important aspect when teaching non-native speakers, who need appropriate guidance in order to take control in similar interactions in the future. Through their participation, the instructors contributed to coherent construction of meaning, thus providing the type of guided instruction typical of a constructivist teacher.

As evaluation criteria changed over the course of the semesters, the instructors' role in the evaluation process became more active. Each instructor made criteria for evaluation of critical thinking skills more explicit. One instructor felt a more holistic evaluation was more adequate, while the other felt that an analytic scale would better clarify to students what they had and had not done well, and promote intentionality. In order for the criteria to be relevant to students, the instructors needed to develop these criteria in advance and to ensure that they were unambiguous and transparent in order to more directly promote use of higher level thinking. In addition, the assignment was given greater grading weight, increasing extrinsic motivation by making the importance of the assignment more obvious (Chong, 1998; Knowlton, Knowlton, & Davis, 2000; Scarce, 1997).

Similarly, the instructors' role in the described threaded discussion assignment became one of continuous assessment, which allowed tracking students' understanding and development of critical thinking skills in ways that are not typically possible in classroom discussion or other types of assignments.

Benefits of Asynchronous Medium

The asynchronous nature of the threaded discussions makes this assignment particularly useful for the promotion of coherent discussion. The additional time available for reading and composing postings encourages reviewing and responding to classmates' arguments, as does the linear display of postings, which is easy to follow and process (Kamhi-Stein, 2000a, 2000b; Sengupta, 2001). The asynchronous nature of the medium invites quiet students to play active roles as their more reflective learning styles are easily accommodated (Collins & Berge, 1996; Lamy & Goodfellow, 1999). However, lack of participation of some students, as noted by one of the instructors in the present study, suggests that students need to be responsible for a certain number of postings, determined by either the teacher or jointly by the class, and that some threads need to be allotted more time, as determined by students' motivation to respond. Such adjustment of discussion time is typically not possible in the classroom, where instructional time is limited and curricular obligations need to be maintained. The asynchronous

nature of the threaded discussions allows extension of discussion time, which would not be possible if only physical classroom time were available.

Link with Class Activities

The shifting role of the instructors over the course of the semesters included the preparation of appropriately challenging prompts at the beginning of the semester to ensure that they were well integrated with the topics of the course. However, as one of the instructors observed, some of the best discussions and prompts developed spontaneously out of discussions in class and gave students opportunities to pursue topics that were of genuine interest to them, thus contributing to intrinsic motivation. This also makes the connection between in-class activities and threaded discussions more explicit and allows students to continue engagement with content and with each other between classes. Thus, it is recommended that instructors be flexible in their approach and possibly give students options as to which prompts to address.

As some students in one of the classes in the present study demonstrated, it appears to be quite useful to enlist students to help in moderating discussions in order to foster a sense of student "ownership" and relieve instructors of some of the work of managing the discussions (Chong, 1998). We recommend that each group include discussion leaders (Bailey & Luetkehans, 1998) who would pose questions, set an agenda for the group, manage the flow of the on-line interaction, and provide carry-over from the Web-discussions to the classroom, thus addressing increased intentionality in the assignment as well as social dynamics. The different roles should be rotated throughout the semester so that each group member has a different responsibility within the group each week. The connection between the electronic and the physical classroom would also be enhanced. Through successful participation in online discussions, some students developed confidence to participate more actively in class. This may have been due to greater understanding of the course work, increased interest in course materials or greater familiarity with classmates as a result of the online discussions. But it may also have been due to a better understanding of interaction inherent in group discussions, a teaching technique which is not used in some countries. The increased classroom participation may also have been due to a greater facility with English used in online group discussions, which may have carried over to classroom discussions. As suggested by the above comments, however, it should not be assumed that students will understand and be able to apply group discussion skills. Instruction in group discussion roles and in related language skills may be necessary.

Benefits to All Learners and to ESL Learners

The constructivist principles addressed through the assignment described are not exclusive to classes teaching ESL skills to non-native speakers. Students in all disciplines will benefit from the continuous nature of the assignment and the ongoing guidance that they receive from their instructors as students develop and refine their critical thinking skills. The threaded discussion affords extended effort over time which is clearly beneficial to students from various disciplines as they receive more than one opportunity to practice academic writing skills on which they will be evaluated. Asynchronous threaded discussions have been used in a variety of non-ESL university courses (Benbunan-Fich & Hiltz, 1999; Chong, 1998; DeLoach & Greenlaw, 2002; Greenlaw & DeLoach, in press; Lamy & Goodfellow, 1999; Merron, 1998; Parker, 1999; Scarce, 1997), demonstrating that they are a technology which students should learn to use. The use of threaded discussions in ESL classes can thus prepare pre-academic ESL students for this type of discourse in non-ESL classes in a unique and authentic way.

Similarly, the role of the students in threaded discussions is not dependent on discipline. While students are foremost respondents to teacher-provided or student-provided prompts, they can take more active roles as discussion leaders, who pose problems to their classmates, set agendas, summarize postings, and synthesize readings and course discussions. Thus, students are encouraged to become active participants in the class discourse instead of remaining passive recipients of course information. For ESL students, the

added processing time provided by the asynchronous nature of threaded discussions provides a safe environment in which to try out and practice more active roles.

While native speakers easily carry over discourse conventions from other disciplines, ESL students have less experience with discourse-related expectations in American academia (Kamhi-Stein, 2000b; Nunan, 1999b). Therefore, provision of model postings and model threads before the start of the assignment in a class is particularly critical to ESL students. This might even be supplemented by weekly selections of model postings, which help make instructors' expectations explicit and expose students to the conventions of this new type of discourse.

CONCLUSION

While the specifications of the assignment were the same for both classes during the first semester, the specific experience each instructor had with the given class and the particular context of each class (instructor and student differences) determined changes implemented in subsequent semesters. By the third semester, the similarities in assignment implementation and evaluation had decreased, and the differences had increased. However, even though to different degrees and despite different implementations, each instructor grew as a constructivist teacher in Berge's (1998) sense and realized the 14 constructivist principles.

As Bannon (1995) aptly notes, "rather than viewing new media as replacements for others, we can construct contexts in which a variety of media can be used to support collaborative learning practices" (p. 274; see also Bonk & Cunningham, 1998). Thus, threaded discussion can represent an important forum for opening up new learning possibilities that might not be achievable in a face-to-face classroom alone. Especially for non-native speakers in university ESL courses, who need to gain greater flexibility and fluency in academic language skills, this medium provides both the interactive features and the reflective qualities that oral face-to-face interaction cannot provide (Sengupta, 2001). However, unless the technology is tightly integrated with the remainder of the course, and unless this integration is carefully structured and monitored by the instructor (Collins & Berge, 1996; Peters, 2000), it is not likely to bring about the desired effect of targeting important constructivist principles.

APPENDIX A. ELECTRONIC GROUP DISCUSSION ASSIGNMENT

Semester 1 (ESL1 & 2)

Electronic Group Discussion Assignment

Student Guidelines

1) Your instructor will assign you to an electronic discussion group of 3 or 4 students for the semester. The purpose of the discussion groups is to promote evaluative reflections on course content and to provide your professor with another opportunity to evaluate your understanding of course content.

2) Each group will be expected to carry on electronic group discussions throughout the semester. Each of you will make weekly contributions to the discussions in the form of threaded discussions in Prometheus. Your instructor will provide additional information on how to use threaded discussions.

3) Your contributions will be evaluated based on the criteria given below. They will NOT be evaluated for language accuracy.

Criteria

- You will be expected to send at least 1 message per week to your group.
- Your contributions should be reflections of course content, including lectures, class discussions, readings, and anything else related to the course.
- Your contributions need to include -- but need not be limited to -- **evaluation** of course content. In other words, you need to include critical reflections, not only descriptions or summaries. Examples of "critical" questions are: Is the content supported well? Is it clearly organized? How does it relate to other information/ knowledge/experiences that I have?
- Each message that you write should be a response to previous messages. This means that each contribution must build on previous contributions. Your contribution should not be a separate, independent message without a relationship to messages from others in your group.

You will each receive a weekly grade for your participation in the discussions. Your instructor will give each of you the following evaluation form each week.

APPENDIX B. EVALUATION FORM

Semester 1 (ESL1 & 2)

Weekly Evaluation Form for Electronic Group Journal Assignment			
Student: _____			Date: _____
At least 1 email sent (to group members and instructor)	1	2	3
Messages are on course content	1	2	3
Messages include critical reflection	1	2	3
Messages build on previous messages	1	2	3
3 = Good, 2 = Adequate, 1 = Inadequate		**Grade: _____**	

APPENDIX C. ELECTRONIC GROUP DISCUSSION ASSIGNMENT

Semester 2 (ESL1 & 2)

Electronic Group Discussion Assignment

Student Guidelines

1) Your instructor will assign you to an electronic discussion group of 3 or 4 students for the semester. The purpose of the discussion groups is to promote evaluative reflections on course content and to provide your professor with another opportunity to evaluate your understanding of course content.
2) Each group will be expected to carry on electronic group discussions throughout the semester. Each of you will make weekly contributions to the discussions in the form of threaded discussions in Prometheus. Your instructor will provide additional information on how to use threaded discussions. Note that your instructor may occasionally participate in your discussions.
3) Your contributions will be evaluated based on the criteria given below. They will NOT be evaluated for language accuracy.

Criteria

- You will be expected to send at least 1 message per week to your group.
- Your contributions should reflect your understanding of course content, including lectures, class discussions, readings, and anything else related to the course.
- Your contributions need to include -- but need not be limited to -- **evaluation** of course content. In other words, you need to include critical reflections, not only descriptions or summaries. Examples of "critical" questions are: Is the content supported well? Is it clearly organized? How does it relate to other information/ knowledge/experiences that I have?
- Each message that you write should be a response to previous messages. This means that each contribution must build on previous contributions. Your contribution should not be a separate, independent message without a relationship to messages from others in your group.

You will each receive a grade for your participation in each discussion. Your instructor will give each of you the following evaluation form for each discussion thread. Please note that your instructor will respond to each message, but one grade will be assigned for all messages associated with a discussion thread.

APPENDIX D. EVALUATION FORM

Semester 2 (ESL1 & 2)

Evaluation Form for Electronic Group Discussion Assignment		
Student: _____	Week(s): _____	
1. Shows understanding of the course materials	yes (1)	no (0)
2. Relates new information to relevant previous information	yes (2)	no (0)
3. References messages of other students appropriately	yes (2)	no (0)
4. Evaluates course materials effectively	yes (2)	no (0)
5. Offers new insights	yes (2)	no (0)
Prompt: _____		
	Total: _____	
Comments:		

APPENDIX E. ELECTRONIC GROUP DISCUSSION ASSIGNMENT

Semester 3 (ESL1)

Electronic Group Discussion Assignment

Student Guidelines

1) Your instructor will assign you to an electronic discussion group of 4 or 5 students for the semester. The purpose of the discussion groups is to promote evaluative reflections on course content and to provide your professor with another opportunity to evaluate your understanding of course content. It also provides an opportunity for you to practice your English outside the classroom. Finally, the assignment promotes exchanges of useful information.
2) Each group will be expected to carry on electronic group discussions throughout the semester. Each of you will make weekly contributions to the discussions in the form of threaded discussions in Prometheus. Your instructor will provide additional information on how to use threaded discussions.
3) Your instructor will initiate the discussion with a question or comment.
4) Your instructor may also occasionally participate in your discussions.
5) Your contributions will be evaluated based on the criteria given below. They will NOT be evaluated for language accuracy although your instructor may correct language errors.

Criteria

- You will be expected to send at least 1 message per week to your group.
- Your contributions should include reflections on course content, including lectures, class discussions, readings, and anything else related to the course. You may discuss any topic, but there should be some reflective evaluation of course materials included.
- Your contributions need to include -- but need not be limited to -- **evaluation** of course content. In other words, you need to include critical reflections, not only descriptions or summaries. Examples of "critical" questions are: Is the content supported well? Is it clearly organized? How does it relate to other information/ knowledge/experiences that I have?
- This assignment requires group discussion, not independent messages from individual students. Therefore, you need to refer to previous messages and address issues raised in previous messages. You should, of course, also raise other issues of interest to you.

You will each receive a weekly grade for your participation in the discussions. These grades will make up 10% (for participation) of your final course grade. Your instructor will complete and provide each of you the following evaluation form each week.

Below is a short excerpt from an exchange which exemplifies the qualities your professor will be looking for in your messages.

Prompt:

Consider the effects of anger on health and the necessary conditions for catharsis discussed in the first two readings. What are the implications of these findings for use of the death penalty? One argument often given for use of the death penalty is that it provides "closure", a sense of relief, for the victims' family and friends. How might the information in our first two readings be applied to this argument?

Student:

Freudian psychologists assert that expressing anger purge emotions. They point out that when people retaliate against the person, who caused their problems, they feel catharsis. According to their

assertion, if murder victim's family would get the retaliation against the murderer, their anger may be reduced. Therefore, the death penalty may give them relief.[1]

As a example,[2] 'Dead Man Walking', movie discovering the truth and the false points of the death penalty, explain the effect of retaliation well. Just as portrayed in the movie, Robert Lee Willie killed two teenagers Loretta Bourque and David LeBlanc on November 4, 1977, in an Iberia. The girl was raped and both were shot in the back of the head.

The stepfather and mother of murder victim have been vocal supporters of the death penalty with retaliation against the murderer. Robert Lee Willie, who raped and killed an 18-year-old woman, was finally executed. Before execution, he told the victim's parents, "I hope you get some relief from my death."

They did not move or show emotion as Willie spoke to them. But 30 minutes later, outside the penitentiary gate, smiling victim's father poured drinks and offered to dance with reporters. And he said to reporters, "I feels 100 pounds lighter. Robert Lee Willie has gone straight to Satan's company and the fires of eternity." At that time, he felt catharsis.

However, as time went by, he felt guilt. He thought later that although homicide was a capital offense, execution was overdone retaliation. The feeling of guilt harassed him, and he could not find a means of calming himself down. In conclusion, if retaliation goes beyond the reasonable level, on the contrary, people get the retaliation deserved.[3]

Professor:

Some people would agree with you[4] and would argue that the death penalty is too great of a retaliation, even for murder. They support their argument by pointing out that "two wrongs don't make a right" and the fact that some criminals commit crimes partially as a result of their physical/psychological/social background.[5]

Other people make the argument of "an eye for an eye."[6] This sounds very cold hearted, but I wonder how I would feel if my wife or child were murdered. I believe that my first reaction would be to look for the killer's execution.[7]

Thanks for pointing out that the film Dead Man Walking deals with this issue.[8] I haven't seen it yet, but I'll put it on my list of movies to rent.

----

[1] This introductory paragraph summarizes relevant points from Reading #2, providing a basis for why people might support the death penalty.

[2] The following text provides an illustration -- based on a real-life case, which was the basis for Dead Man Walking -- of information in Reading #2.

[3] This conclusion raises the question about the level of retaliation needed to satisfy the urge to strike back, an issue mentioned in Reading #2.

[4] This is a reference to the student's apparent argument that the death penalty is too great of a retaliation.

[5] This comment raises issues for further analysis: What types of backgrounds lead to crime? What are the connections between crime and the criminal's background? How might various backgrounds of criminals affect the wish to retaliate and the attainment of catharsis?

[6] This comment articulates an opposing argument.

[7] This is a very short personal application.

[8] This is another reference to the student's contribution.

APPENDIX F. ELECTRONIC GROUP DISCUSSION ASSIGNMENT

Semester 3 (ESL2)

Developing Critical Thinking Skills through Electronic Discussions

Bloom et al. created a hierarchy of critical thinking skills. They began with **comprehension,** then placed **analysis, application,** and **synthesis.** At the top of the hierarchy they placed **evaluation.** Keep these skills in mind.

* Comprehension
* Analysis
* Application
* Synthesis
* Evaluation

Each week you will be given a question related to your course readings on the Web Board. You should respond to it and discuss it with your peer group. You will be evaluated on the evidence you gave of the five thinking skills.

The question will be posted to the Web board on Friday. The discussion will be closed 8 days later on the following Saturday at midnight. You should post two messages per week. If you are the first poster of the week, you will receive extra credit. If you post both messages by noon on Thursday, you will receive extra credit as well.

If you mistakenly post your message twice, edit the second one by deleting the message and writing BLANK in the white space.

APPENDIX G. EVALUATION FORM
Semester 3 (ESL1)

Weekly Evaluation Form for Electronic Group Discussion Assignment		
Student: _____ Week(s): _____		
Question/Prompt: _____		
	YES	NO
Shows understanding of course materials	____	____
Includes reflective, evaluative comments on course materials	____	____
References messages of other students and addresses issues	____	____
Offers new insights	____	____
Grade: _____		
Comments:		

APPENDIX H. EVALUATION FORM

Semester 3 (ESL2)

<div style="border:1px solid black; padding:10px">

<div align="center">**Evaluation Form**</div>

Name: _____ | **Topic**: _____

Part I.
- Understands the content of the reading (comprehension) [2 points]
  Evidence: **summary of the main points of the reading**
- Understands the structure of the reading (analysis) [2 points]
  Evidence: **reference to the organization of the reading**
- Applies the content of the reading (application) [2 points]
  Evidence**: reference to relevant past knowledge or past experience**
- Evaluates the reading (evaluation) [3 points]
  Evidence: **references to the quality of the content and the writing**
- Synthesizes ideas in an original way (synthesis) [3 points]
  Evidence: **creation of original content beyond the reading**

Part II.
- Peer response [3 points]
  Evidence: **significant response to at least one peer**
- First poster [2 points]
  Minimum number of postings [2 points]
  Evidence: **two unique postings**
- Timely posting of messages [1 point]
  Evidence: **both messages posted by Thursday**

</div>

NOTES

1. If the instructors did not institute changes in subsequent semesters that departed from the realization of constructivist principles in semester 1, no discussion is provided.

2. Students were not given full credit unless the links to the postings of other group members or to previous knowledge were explicit and substantive. If a student simply wrote, for example, "I agree with Takeshi" or "I read about global warming in an undergraduate course" with no further development, no credit for linking was given.

3. The terms for higher order strategies (in brackets) are based on Toulmin's (1958) description of argumentation.

4. The analytic scale reduced the concept of "critical thinking" to elements which, when assessed individually or collectively, did not reliably reflect the students' quality of thought. Students' messages can exhibit critical thinking despite the fact that not all elements of Bloom's taxonomy are present. Through the holistic rating, the ESL2 instructor was able to take this into account more appropriately without compromising the high standards of the assignment.

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