Computer-mediated Scaffolding in L2 Students’ Academic Literacy Development

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ABSTRACT
Learning to perform academic writing in university content classrooms is a major challenge facing nonnative-English-speaker (NNS) students. Computer-mediated communication (CMC) offers new possibilities for bidirectional peer-to-peer scaffolding in which students interact and negotiate meaning concerning academic writing and thus represents a new pathway to academic literacy development. This case study examined how CMC influenced a group of NNS graduate students’ development of academic literacy in applied linguistics courses. Data were gathered from multiple sources: questionnaires, online discussion posts, students’ written assignments, and general as well as discourse-based interviews. The data were analyzed qualitatively using different methods and allowed substantial data triangulation. Results of the data analysis indicated that CMC allowed two-way collective scaffolding, which played an important role in facilitating the participants’ development of academic literacy skills. Specifically, computer-mediated collective scaffolding helped the participants orient themselves to the writing tasks, provided them with opportunities to rehearse writing and negotiate revisions of writing, and allowed them to develop an understanding of academic citation conventions.

KEYWORDS
Computer-mediated Communication (CMC), Scaffolding, Academic Literacy, Nonnative-speaking (NNS) Students, Interaction

INTRODUCTION
In the last two decades, the number of nonnative-English-speaker (NNS) students seeking advanced degrees in the English-speaking countries has increased tremendously. Many of the students, however, are challenged to be successfully acculturated into their chosen discourse communities. Learning to function in the genres and with the discourse conventions of their discourse communities poses a particular challenge. Genres are seen as constitutive of discourse communities, deriving from the discourse expectations created by typified rhetorical actions based on recurrent situations (Miller, 1984). Genre and academic discourse are means through which members of a discourse community communicate with each other, and they are closely related to the discipline’s methodology and “conform to discipline’s norms, values, and ideology” (Berkenkotter & Huckin, 1995, p. 1).

Second language (L2) graduate students are eager to become members of the academic discipline of their choice. However, in order to accomplish this goal, they need specialized academic literacy that “consists of the ability to use discipline-specific rhetorical and linguistic conventions to serve their purpose as writers” (Berkenkotter, Huckin, & Ackerman, 1991, p. 191). Many studies in the 1990s approached academic literacy development from an induction perspective (e.g. Belcher, 1994; Berkenkotter & Huckin, 1995; Casanave, 1995; Dudley-Evans, 1991; Swales, 1990) in which students participate in the discursive practices.
of the discipline and are gradually inducted into the discourse community. The participation and induction enable students to move from novices toward being somewhat experts, that is, students not only master the genre conventions of the specific discourse community, but also share its goals, beliefs, values, and ideology to become new members of the discourse community.

In this paper we explore the development of academic literacy in L2 students from the Vygotskian perspective. In particular, we examine L2 graduate students’ development of academic literacy in a computer-mediated environment through the lens of the important Vygotskian construct of scaffolding, although Vygotsky never used the term himself. Scaffolding originally refers to the interactional support process by which adults mediate a child’s attempts to take on new learning (Wood, Bruner, & Ross, 1976) and is widely adopted in research on expert-novice interaction and communication. From the Vygotskian sociocultural point of view, cognitive development is a “social and communicative process” (Mercer, 1995, p. 73), and students learn in a social instructional network (Donato, 2000) in which novices are allowed to observe successful strategies to accomplish particular tasks while attempting the tasks themselves under expert guidance. Scaffolding enables those who have mastered certain tasks to take steps to assist others who are initially unable to carry out the tasks independently.

Research findings to date indicate that scaffolding is facilitative of students’ academic writing development (e.g., Parkinson, Jackson, Kirkwood, & Padayachee, 2007; Woodward-Kron, 2007). Woodward-Kron, for example, documented a writing consultation between one faculty-based advisor and an NNS student from a master’s program in public health. The findings indicated that the advisor scaffolded the student’s academic writing by addressing not only issues of linguistic form and text organization, but also ideational, interpersonal, and textual meanings through meaning clarification and negotiation, provision of evaluative feedback, probing for further information, and reformulation of the student’s verbal contribution. The student’s writing ability developed as a result of the advisor’s scaffolding.

Similar to Woodward-Kron’s (2007) study, other studies have focused on expert-novice scaffolding in which the expert suggests changes to the texts and guides the novice’s learning process in order for the novice to develop the literacy skills critical for a particular discourse community. In these studies, the novice tends to thoroughly incorporate feedback from the expert (e.g., Dong, 1996; Li, 2006). Adopting a sociopolitical perspective, Li described the efforts of Chen, a Chinese doctoral student in international publication, and the scaffolding he received from his two supervisors and other parties involved in the social network of his attempts to publish his work. Chen’s two supervisors provided him with important scaffolding at several major points in the form of, for example, the addition of an introductory paragraph and identification of Chen’s major problem (Chen tended to “report everything” in the manuscript). Chen incorporated the suggested changes and comments. In this case, scaffolding was unidirectional: the expert supervisors provided guidance on how to make changes to the text, and the novice student accepted their suggestions, although the internalization of the scaffolded guidance occurred much later. In fact, it was not until the paper was published that Chen realized the significance of the expert suggestions and revisions.

Many studies examining scaffolded guidance, such as those described above, focus on expert-novice scaffolding. The scaffolding is a predominantly unidirectional expert-novice interaction, with the expert such as a parent, native speaker, or master providing scaffolding to a child, novice, nonnative speaker, or apprentice. Yet, in reality, the expert does not constitute the sole source of scaffolded help. In the case of academic literacy development, for example, supervisors are not the only players in students’ social networks of academic literacy activities.
With the growing emphasis on collaborative learning in educational programs, students’ social networks now frequently involve peers in the local discourse communities in which scaffolding among peers may be the norm rather than the exception. The examination of scaffolding among peers would contribute to a better understanding of the role of scaffolding in student development of academic literacy.

Research informed by Vygotskian’s sociocultural theory has provided important insight into peer scaffolding. Donato (1994) proposed the possibility of “collective scaffolding” in which “learners are capable of providing guided support to their peers during collaborative L2 interaction in ways analogous to expert scaffolding” (p. 51). In Donato’s study of second language learning, student peers were able to provide collective scaffolding to each other when they were engaged in group tasks. Collective scaffolding allows students to engage in “collaborative dialogue” (Swain, 2000) in which students alternatively provide guidance to peers on tasks and knowledge they have already mastered and seek support from peers on tasks they have difficulty with. Although collective scaffolding offers immense learning potential for L2 students, how to engage them in collective scaffolding in the traditional classroom for the purpose of academic literacy development remains a concern. One particular difficulty consists of the limited time and opportunities available for collaborative dialogue during class in traditional face-to-face classrooms.

With the development of technology, classroom learning now extends beyond the walls of the classroom, and many activities can be conducted electronically through electronic discussion boards, a typical form of computer-mediated communication (CMC) widely applied in many sectors of education nowadays. The advent of instructional technology provides potentially increased opportunities for interaction with classmates through collaborative tasks and hence increased opportunities for collective scaffolding. Much research regarding CMC and L2 learning shows that through networked computers, students participate more equally in class activities (Beauvois, 1992; Chun, 1994; Kelm, 1992; Kern, 1995; Sullivan & Pratt, 1996; Warschauer, 1996), produce more language with higher quality (Chun, 1994; Kelm, 1992; Kern, 1995; Sullivan & Pratt, 1996; Warschauer, 1996), experience a less stressful environment for L2 practice (Chun, 1998), have more time to develop and refine comments (Chun, 1994), collaborate more with other students (Chun, 1994), and make the effort to express themselves in the target language rather than take the easy way out by using their native language (Chun, 1994).

Studies that have examined scaffolding in the CMC setting (e.g. Lee, 2008; Oskoz, 2005) indicate that peer scaffolding is beneficial to student language development. Lee reported on a study on the scaffolding between 30 Spanish-learning students working in pairs through synchronous CMC on three different tasks: jigsaw, spot-the-differences, and open-ended questions. Three chat logs representing each task type were selected and organized into collaborative episodes through microgenetic analysis. The results showed that synchronous CMC afforded learning environments to support both meaning-oriented communication and focus-on-form reflection that play an essential role in the development of students’ language competence.

CMC is used widely in many courses across disciplines to extend interaction between students and provides a potentially greater number of opportunities for L2 students to develop academic literacy skills through collective scaffolding. Yet limited research has examined CMC, particularly asynchronous CMC, and collective scaffolding in L2 students’ academic literacy development. The sections below report part of a larger study which investigated the role of CMC in the academic literacy development of a group of L2 graduate students in the discipline of applied linguistics. In the context of this study, scaffolding refers to support for learning and
problem solving related to academic writing through CMC. The sections describe the research methodology, report the findings, and discuss the implications of the findings for both teaching and research.

**METHODOLOGY**

The researcher adopted a case study approach to explore instances of a phenomenon—the development of L2 academic literacy in the CMC environment—in its natural context and from the perspective of the participants involved in the phenomenon (Gall, Gall, & Borg, 2003). The case study approach consists of “watching people in their own territory and interacting with them in their own language, on their own terms” (p. 438). This approach has been used in research on other areas of academic writing to collect information about writing, writers, and social contexts in specific circumstances. The case study method enables researchers to take into consideration the social and political aspects of the local interaction (Casanave, 1995) of key players, their writing tasks, and particular situations.

**Setting**

The study took place in two core courses of a master’s program of applied linguistics at a large public university in an urban area of the southeastern United States. The two courses were ESOL Curriculum and Instruction (ECI) and Methods of Teaching English as a Second Language (MTESE). These two courses were selected for the study because they both involved a significant amount of online discussion, required major writing assignments including genres specific to the discipline of applied linguistics (e.g., the language curriculum project), and enrolled a number of NNSs. These factors rendered the two courses suitable for the purpose of the study.

The ECI course focused on helping students develop an ability to create effective ESOL curriculum, and the most important assignment of the course was the curriculum project. The class from which data for the study were collected was taught in a summer term and met twice a week for a total of three and a half hours per week for six weeks. Students in the class completed a real-world needs analysis in groups and finished the ESL curriculum project in the form of a take-home exam. Students performed these activities through understanding the needs analysis, determining instructional goals and objectives, analyzing and developing syllabi, developing lesson plans, and evaluating textbook materials. A literature review was also an important part of the curriculum project because it informed the approach to the needs analysis, the choice of the syllabus, the formulation of instructional goals and objectives, and the selection of the teaching approaches. As with all the other classes at the university, the curriculum class was given access to Blackboard (the course management system adopted at the university). Students participated in whole class discussion and focused on group assignment by utilizing the discussion board, e-mail, and file exchange functions of Blackboard. A forum was created in the discussion board for each component of the curriculum project; for example, a needs analysis forum was created for the needs analysis component of the curriculum project, and so forth. For forums corresponding to the major components of the project, additional threads such as the literature review thread and the instrument thread were created, allowing further division of the course content into subcomponents. Instructions were provided for each forum and thread. Students responsible for writing specific sections generally assumed the role of facilitators for the discussion of the corresponding sections in the discussion board.

The MTESE class was designed to help graduate students build a foundation in the theories and practices in teaching English as a second language. The class met during a regular aca-
academic semester for 3 hours per week for 15 weeks. Students were required not only to understand the major characteristics of different teaching methods but also to observe, microteach, and reflect on their microteaching experiences. The major written assignments in the course included two observation reports, a microteaching report, and a statement of teaching philosophy. Blackboard discussion boards were utilized both for whole class discussions of the observation and microteaching reports and for group discussions of the statements of teaching philosophy. In the class observation and microteaching report forums, students were encouraged to raise questions, provide answers, and share tips and resources about second language learning and teaching. In the group forums, students were required to post drafts of their statement of teaching philosophy, comment on the drafts of the other members in the group, and revise their own drafts after taking group members’ comments into consideration.

Participants

Of the 10 NNS participants in the larger research study, 3 participants enrolled in the ECI and MTESE courses were selected as the primary participants of the study reported here. Among them, Park and Pinky (pseudonyms) were first-year students enrolled in the MTESE class, and Blanca was a second-year student in the ECI class. The participants were chosen because they were NNS students from various cultural and linguistic backgrounds and represented different levels of experience within the applied linguistics program. Although the participants’ language backgrounds and academic writing experiences varied, their experience with instructional technology was quite similar; all of them indicated that they had intermediate-level proficiency in using Blackboard’s discussion boards. The case profiles presented below were constructed on the basis of the participants’ responses to a questionnaire (described in the Data Collection and Analysis section below).

Park was a young male student in his late twenties from Korea. He had just started the program and had been in the US for only 3 weeks at the start of the study. In spite of his short stay in the US, his ability in oral communication in English was rather strong; he had studied English for 13 years at the elementary, middle school, high school, and university level in Korea. Park had a bachelor’s degree in linguistics from a university in Korea and had limited experience writing any type of academic paper in English. Upon joining the program, Park realized that he would be required to perform research and academic writing tasks right away, and this realization made him nervous mainly because he was not familiar with the conventions of academic writing in applied linguistics. Although he did not have much experience in writing academic English, he believed that more practice would help him succeed in his writing tasks.

Pinky was a young female student in her early twenties. She was a first-year student in the master’s program in applied linguistics, and her goal was to receive the degree and teach English as a foreign language in Germany. She had been in the US for 9 months at the time of the study. Pinky earned a bachelor’s degree in Physical Education & German in Germany and worked as an elementary school teacher for a short period of time. She had some experience writing research papers in German and considered academic writing a learning process, something that needed to be learned over time in order to be well performed. However, she was intimidated by new writing assignments, particularly those in new genres. She believed that practice would lead to success and wished to have more experienced people review her writing to help her improve.

Blanca was a native Spanish speaker from Puerto Rico. After achieving a mastery of English from attending various English language programs in the US, she chose a major in televi-
sion production and started to learn script writing and news writing. However, her efforts did not result in finding a job in the highly competitive media world dominated by native-English speakers (NSs). In her early thirties, Blanca decided to pursue the profession of teaching English as a second language. Blanca realized her script and news writing experience could not help much in her efforts to perform academic writing tasks in applied linguistics since her experience was acquired in a totally different discipline. At the time of the study, she was a second-year master’s student and had experience performing several types of writing in applied linguistics: annotated bibliography, research proposal, research critique, and lesson plans.

**Data Collection and Analysis**

Data for the study were collected from multiple sources: a questionnaire (see questionnaire in Appendix A), online discussion entries, students’ written assignments, and student interviews. The questionnaire elicited information in three areas: first, the students’ personal information such as their country of origin, native language, and language study experience; second, their academic writing experience in both English and their native language; and third, their technology experience such as their comfort level using online discussion boards.

All the online discussion entries related to the participants were saved for data analysis. The entries included those in which the participants expressed their own opinions or responded to peers’ opinions. They also included those in which the participants asked questions and elicited suggestions on their writing. The purpose of collecting online discussion entries was to examine peer interaction and scaffolding provided through CMC. In addition to the online discussion entries, all versions of the participants’ major written assignments were collected: a collaborative ESOL curriculum project, two individual observation reports, a microteaching report, as well as a statement of teaching philosophy. Although a draft was only required for the statement of teaching philosophy, drafts for other assignments were either volunteered by the students or solicited by the researcher.

Semistructured general interviews and discourse-based interviews with the participants also served as sources of data for this study. The author conducted both types of interviews. During the general interview sessions, the interviewees were informed of the purpose of the interview and were asked not to be selective in their responses. Participants were asked to share (a) their experiences interacting with their peers in online discussion boards, (b) their perceptions of the roles of their peers in their writing of academic papers, and (c) their approaches to as well as difficulties in interacting with peers. The discourse-based interviews followed a modified version of the discourse-based interview procedure described in Odell, Goswami, and Herrington (1983) and focused on selected discussion entries, peer feedback, and the participants’ texts (Prior, 1991) to explore the connection between CMC and writing performance development of the participants.

Each participant was interviewed twice with one general interview and one discourse-based interview for around one hour each time. The general interviews were conducted in the latter half of the semester, and the discourse-based interviews took place after the semester was over. All interviews were audio taped and transcribed for data analysis.

To examine the role of CMC in the participants’ academic literacy development, the researcher utilized various methods of data analysis including discourse analysis, textual analysis, and constant comparison. All the participants’ online discussion entries (e.g., initial posts and responses to others’ posts) were examined in terms of both the focus of communication (e.g., citations, task instructions, aspects of writing, etc.) and the communicative functions per-
formed (e.g. showing disagreement, supporting and confirming, questioning, advising, etc.) to identify instances of scaffolding. In this process, the initial post and responses to the initial post on a particular topic were also read and compared to examine the role of the participants in the scaffolding process and to discern the effect of the scaffolding.

Textual analysis was applied to examine students’ papers. Students’ drafts were read and compared with the online discussion entries to examine if/how CMC influenced the participants’ writing. Also, students’ drafts and final papers were compared side by side. Differences between drafts and final papers were identified and compared with the discussion entries in the corresponding forums. The differences included both grammatical changes and discourse-based changes dealing with, for example, citation conventions, organization, and specific supporting information and details. The discourse-based changes were coded either as initiated by online discussions or by the participants themselves. A summary of the discourse-based changes is provided in Appendix B.

The interview data (both general and discoursed-based) were analyzed with the constant comparative method, which allowed the researcher to take into consideration the exploratory nature of the study. In the constant comparative method, the researcher “combines inductive category coding with a simultaneous comparison of all social incidents observed” (Goetz & LeCompte, 1981, p. 58). Initial observations are labeled, and emerging categories are constantly compared and refined in the coding process. New categories, once discovered, are included in the comparison and refinement process until all the possible categories are discovered and compared. In accordance with the constant comparative method, the interview transcripts were read repeatedly and coded based on emerging themes such as “interpreting task requirements,” “finding the right focus,” and “understanding conventions.” During the coding process, categories were added, modified, and eliminated.

The credibility of the study was ensured through prolonged engagement and persistent observation. Peer debriefing and member checks were also conducted both during the research process and at the termination of the study. Further, multiple data sources allowed data triangulation. In particular, the researcher was able to corroborate findings from discourse and text analyses with those from the analysis of interviews. The sections below report the findings concerning the role of CMC in the participants’ academic literacy development.

RESULTS
Performing academic writing is the most important way for students to acquire academic literacy in the discourse community. This section reports on how CMC afforded collective scaffolding among the participants and others, assisted the participants in performing academic writing tasks, and hence supported the participants in the development of academic literacy.

**CMC Scaffolded Students’ Understanding of Writing Tasks**

The students started their journey of writing each academic paper from reading and understanding instructions of written assignments provided by their professors. Instructions conveyed important messages about task requirements and therefore played an important role in students’ writing of academic papers. Online discussion forums associated with each written assignment provided opportunities for students to seek and provide clarifications on task instructions, check the appropriateness of approaches to tasks, and negotiate tasks. As such, they scaffolded students’ understanding of writing tasks.
In the forum where the instructions on observation reports for the MTESE class were discussed, Pinky’s post caught the attention of some peers. In her post, Pinky was seeking clarifications on a number of issues regarding the observation report. Both NS and NNS peers responded to her post in the forum. Figure 1 shows Pinky’s questions and a response by one of the peers (native).

Figure 1
Pinky’s Post and an NS Peer’s Response

Note: In the header, the “last modified date” in this and other figures in this paper differ radically from the “posted date.” We inquired about the “last modified date” header and were informed that the header likely indicates the date of a system upgrade.

In her post, Pinky asked if she needed to address questions and/or comments after describing each step of her observation, and the peer who responded to Pinky’s post expressed her opinion that a step-by-step approach would be the most effective. Unanimously, other responses either supported or expanded the peer’s points. Pinky’s subsequent post regarding her questions indicated that she had developed a clear understanding about how to proceed with the observation report as a result of the help from her peers through computer-mediated collective scaffolding (see Figure 2).

Figure 2
Pinky’s Follow-up Post

The participants also took advantage of the discussion boards to check whether their planned approach to writing would be appropriate for the intended task. In their posts, the participants described their approaches to the task and asked their peers to comment on their proposed approaches. When planning for the microteaching report for the MTESE class, Park, for example, posted an entry in the corresponding online discussion board to check whether his
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plan to structure his microteaching report according to the bulleted questions provided in the assignment guidelines would be appropriate (see Figure 3).

Figure 3
Park’s Post in MTESE Class

This post received a great amount of attention and generated some rather heated discussions in the forum. Some students regarded the use of bulleted questions as subheadings inappropriate; others thought that, although it was not commonly seen, it ought to be acceptable to use questions as subheadings. Another NNS peer, Pinky, scaffolded Park on this matter (see Figure 4).

Figure 4
Pinky’s Reply to Park’s Question in MTESE Class

In her reply, Pinky indicated that whether or not to use the questions as subheadings was a decision that the writer needed to make depending on the circumstances of the assignment. Based on the information provided by his peers, especially Pinky, Park included the questions as subheadings, and he produced a paper which received an excellent grade and positive comments from the instructor. Park reflected on this process during the discourse-based interview.

Yeah, I used the questions as my subheadings. These are the questions in the instruction that the teacher wants us to consider. When I was working on my report, I found these questions serve well as the subheadings. But I am not sure whether it is appropriate to use it. ... I posted my question on this in the discussion board; I think the replies are helpful. I agree that the formality may not be the most important thing in a paper. What matters more is whether the formality can help me organize and express my thoughts. (Discourse-based Interview, Park, December, 9, 2005)

CMC also helped participants negotiate changes in task requirements, although such negotiation was relatively rare. One component of the ESOL curriculum project in the ECI class was
objectives, and the instructor provided the following instructions on the objectives component.

- Considering one of the goals for the specific course that would be a part of the program: (20pts)
- Break it down into course objectives, creating at least one objective for each of Bloom’s Cognitive domains (9pts)
- Discuss how these objectives contribute to fulfilling the course goal (3pts)
- Include in the discussion how you used the criteria discussed in class for creating the objectives (6pts)
- Provide your rationale for the creation of the objectives (2pts)

Blanca questioned the necessity of writing objectives at the synthesis level given the project’s particular population: elderly refugees preparing for the U.S. citizenship test.

Thinking of our audience of the curriculum, they are older, refugees, have no English and take the course to pass the citizenship test, do we need to create so many objectives to match each component of Bloom’s Taxonomy? They barely come to class. I know Bloom’s Taxonomy is great. But is it true that high level objectives along Bloom’s Taxonomy are something too complicated for them? I think it is going to be hard for them to achieve. (Discussion board, July 23, 2005)

Blanca’s concern prompted her group members and other students to consider their specific audience and context. Most students voted for low-level objectives in this case. The discussion among students caught the instructor’s attention who thought the students’ concerns were reasonable. As a result, the instructor changed the first bullet into “Break it down into course objectives, creating several appropriate objectives taking Bloom’s Taxonomy into consideration.” Blanca also identified more appropriate objectives for the population such as acquiring more knowledge of American history and culture and improving listening comprehension and speaking skills.

From the participants’ perspective, communication and interaction with peers on task requirements via the discussion board not only allowed them to receive the help they very much needed, but also enabled them to serve as the providers of help, a role they found difficult to perform in regular face-to-face classes due to the rapid flow of speech turns. Park’s comments during the interview illustrated this point.

My professor set up a discussion board for us in Blackboard. I can post my question there. If someone knows, they will answer. If I know the answer of some questions, I will reply the post. My professor usually did not need to get in the discussion, because some problems are solved before we ask her. ... No, I don’t think I can do the same thing in class. Some explanations are still confusing to me. I don’t have lots of the chances to ask it. But I can do it in the discussion board...I don’t think I will provide as much input in the classroom. Even if I could say something, somebody will say it before me, so there is no need for me to say it again. (General Interview, Park, December 1, 2005)

CMC provided opportunities for NNS students to get involved with the immediate discourse community of their class. It enabled collective scaffolding on task understanding to take place.
in the social network made available by the use of computer-mediated technology and allowed the participants both to seek and provide scaffolded help.

**CMC Scaffolded Students’ Identification of the Focus for Writing**

Data from the discussion boards in the ECI class showed that collective scaffolding on writing focus took place through CMC. The activity described below illustrated this type of scaffolding.

In this activity, a group of students in the ECI class in which Blanca was a member divided up the tasks related to the curriculum project. Blanca was assigned to write the literature review and therefore assumed the role of facilitating the online discussion of the literature review for the curriculum project. She posted her outline of the literature review and invited other group members to make comments and suggestions. According to Blanca, the purpose of doing so was not only “to be aware of what team members are doing” but also to “detect problems as early as possible and correct them immediately” (General interview, July, 30, 2005). Figure 5 presents Blanca’s initial outline of the literature review and the comments elicited from one of the group members.

**Figure 5**
Blanca’s Literature Review Post and a Peer’s Response

The peer suggested that Blanca narrow down the focus from “ESOL programs” to “Adult immigrant English programs.” Similar advice that Blanca be more specific and focus more closely on the population of the project was also provided. Blanca incorporated peers’ suggestions in her outline and posted the revised outline in the discussion forum. The information exchange between Blanca and the same peer on the revised outline is presented in Figure 6.
In her response, the peer indicated that Blanca did not need to focus on “types of special needs,” and her suggestion was supported by other members of the group. Blanca was then convinced that she needed to further modify her outline to reflect the appropriate focus of the literature review. Her third version, presented below, was adopted by the group as its outline of the literature review.

Literature Review

- **Adult Migrant English Programs**
  - Factors for success
  - Factors for failure
- **Adult ESL Learners with Special Needs**
  - Types of Special Needs
  - Recommendations for Elderly Population
- **Teaching ESL to the Elderly**
  - Common Problems
  - Recommendations

During the three rounds of discussion and revision of the outline, Blanca benefited from the scaffolding provided by her group members in their feedback and suggestions. She later disclosed that peer scaffolding helped her realize the importance of finding the appropriate focus not only for the literature review of the curriculum project but also for other literature reviews or papers. She commented “I know what I need to pay attention to when I write literature reviews later. I also feel with narrowed focus, it’s easy for me to find resources and write because I know what is needed in each part. I have to thank my group members for it” (Discourse-based interview, Blanca, August 12, 2005).
CMC Scaffolded Students’ Writing by Providing Opportunities for Students to Build on Their Own and Peers’ Texts

The analysis of online discussion entries and participants’ academic papers revealed many connections between online discussion and participants’ writing. The interview data further indicated that participants regarded discussion entries as natural components of their papers. They utilized the discussion board as a forum to rehearse their writing. For this type of rehearsal, the participants first presented ideas and thoughts in their online discussion entries and later incorporated the entries into their papers.

In Park’s statement of teaching philosophy, he had the following metaphor of the teacher’s role in giving students directions:

> When driving to a certain place where we have never visited, we may ask someone for directions along the way. The people providing the directions will explain how to get to the destination, each in their style and words. But, the most helpful answer will come from the person who carefully explains as if he or she were driving. In other words, clear and precise directions like ‘after passing the gas station, take the first right’ are much easier to understand and follow than vague explanations such as ‘It is over there, on the right side from here.’ Although the person providing directions knows the roads very well, their imprecise explanations may cause confusion that will not help the driver much. I believe most people have experienced such situations. Education has the same characteristic. (Statement of Teaching Philosophy, 2005)

An entry similar to the above paragraph was found in the online discussion section for the statement of teaching philosophy.

> When driving to a certain place where we have never visited, we usually ask the direction of someone. People explain how to get to the place in each style. But, the most helpful answer can be heard from the person who carefully explains as if he or she were driving. In other words, the clear explanation like ‘after passing the gas station, turn to the right’ is much easier to understand and more acceptable than the expression like ‘It is over there, right side from here.’ Although the person who knows the roads very well could make the latter explanation, it cannot help the driver much. I believe most people have experienced such situations. Education has the same characteristic. (Discussion board, October 27, 2005)

Apparently, Park kept in his paper the information initially presented in the post. In this case, Park built on the ideas and text presented in his own post, with the post serving as a scaffold for his writing.

Another type of scaffolding observed was that participants included some of their peers’ ideas or discussion entries in their papers, even if the ideas or discussions were not directly provided to the participants as advice. This type of scaffolding occurred with relatively high frequency in the group projects. An example can be found in Blanca’s literature review for the needs analysis for the ECI course. In the literature review, Blanca listed the possible solutions to the language problems of the older refugee population as follows:

> There are some solutions and suggestions that an organization that is dealing with the refugee population can try to implement in their ESL programs. Ac-
According to Fitzgerald (1995), there are three identifying factors that relate to high levels of retention in adult ESL classes:

1. Learners who use support services provided by their programs (such as counseling, transportation, and childcare) persist longer than those who do not use these services;
2. Learners who attend day classes only tend to persist longer than those who study at night; and
3. Learners who participate in computer-assisted learning labs or whose instruction includes independent study persist longer than those whose instruction is only classroom-based. (Curriculum Assignment, 2005)

Comparison of the literature review with posts in the discussion board showed that similar content appeared in an NS peer’s post addressing the preliminary curriculum goals of the ESOL course proposed for older refugees, although the format of presentation and the wording were somewhat different.

Fitzgerald (1995) described three identifying factors that relate to high levels of retention in adult ESL classes: learners who use support services provided by their programs (such as counseling, transportation, and childcare) persist longer than those who do not use these services; learners who attend day classes only tend to persist longer than those who study at night; and learners who participate in computer-assisted learning labs or whose instruction includes independent study persist longer than those whose instruction is only classroom-based. Consideration of these factors might be useful for offering ESL services. ... (Discussion board, August 2, 2005)

In her post, Blanca expressed her interest in including this information in the literature review she was writing for the group curriculum project and also proposed some changes for the NS peer to consider in the preliminary curriculum goals section.

Great. I need something like this in my lit review. It fits well in my section on recommendations with curriculum needs for adult refugee students. I think you can be specific when you write preliminary curriculum goals. I mean, what we will really use and why we want to use it. (Discussion board, August 3, 2005)

Responding to Blanca’s post, the peer gave consent for Blanca to use the information and acknowledged Blanca’s suggestion “Right. Please feel free to use it. I agree it might be too general as our curriculum goals…” (Discussion board, August 7, 2005). Blanca subsequently incorporated in her literature review the identifying factors for higher retention by Fitzgerald which were originally presented in the post from a peer.

The rationale for borrowing peers’ ideas presented in their discussion entries was explored during the discourse-based interviews. Blanca regarded the discussion board as a forum for idea generation, sharing, exchange, and negotiation. According to Blanca,

All these ideas are there in the open forum. People create and share ideas in the discussion board. It’s fair to everybody. I can use others’ ideas and I don’t mind if they use mine. It’s like a brainstorming session for me. I think it’s good. (Discourse-based interview, August 12, 2005)
CMC Scaffolded Revision by Allowing Students to Exchange Feedback and Suggestions for Writing

CMC provided participants with opportunities to exchange ideas and suggestions for revision. Discussion of drafts via the online discussion board often led to textual revisions as well as a deepened understanding of academic writing practices.

Blanca’s literature review included a paragraph with a definition of refugees. According to Blanca, the inclusion of the definition was prompted by the peers in her group.

I think in my posting, I mentioned both asylum seekers and refugees. Some students replied my posting and asked me what asylum seekers are. Are they the same thing as refugees? Then I thought maybe I should give a brief introduction of the terms. Since my focus on this paper is about refugees, I provided a definition of the term. I think many people have some ideas of refugees in mind but are not really sure whether this person is regarded a refugee when they met. I think a definition is nice. So we can check against the definition to see whether the persons fall into this category. (Discourse-based interview, August, 12, 2005)

Peers’ questions drew Blanca’s attention to an important academic writing convention: definition of key terms. As a result of peer scaffolding, Blanca realized the need to carefully explain the key concept and revised her text by including the United Nations’ definition of refugees.

Not only did NNS participants receive scaffolding on revision, they also provided scaffolding for each other and for their NS peers. For example, Pinky provided some comments on one of her NS peers’ statement of teaching philosophy in the forum designed for the discussion of this assignment in the MTESE class (see Figure 7).

Figure 7
Pinky’s Comments and the NS Peer’s Follow-up Response

In her online comments, Pinky provided scaffolding for her peer by suggesting that he create a mind map to structure the thoughts before writing, to try to avoid overemphasizing the same content, and to be more specific and provide more examples for learning styles. Pinky’s NS peer welcomed her advice by responding positively to Pinky’s suggestions in the forum and modified his statement of teaching philosophy by incorporating Pinky’s comments.
Park also provided scaffolding for his NS peers in their statements of teaching philosophy. He suggested to one peer “flesh out the statement based on the thought about how to catch L2 learners’ thoughts effectively, what can be useful strategies to facilitate learners’ improvement, and some roles of learners with your ‘examples’ as a learner or a teacher” (Discussion board, November 1, 2005) and commented to another peer that her “writing would be much better with some specific teaching strategies like the methods of understanding learners’ background or with examples about learner-centered lesson outline that can make learners active” (Discussion board, November 1, 2005).

Thus, CMC allowed the participants to participate in feedback activities, engaging in two-way scaffolding. Through these activities, the participants enhanced their understanding of academic writing practices, revised their papers based on peer feedback, and provided input to their peers’ revision processes.

**CMC Scaffolded Students’ Learning of Academic Citation Conventions**

Properly acknowledging sources cited in one’s writing represents an important part of academic literacy practice. The analysis of our data showed that CMC scaffolded students’ learning of academic citation conventions and practices in three important ways.

First, participants had extensive opportunities to directly ask questions on citation conventions in the online forum. For example, Blanca had some confusion regarding the citation of articles with multiple authors. In a discussion forum, she asked “There are three authors in the article that I want to cite. Should I list all the names of the authors or should I just use the first author’s last name and et al. I have seen people using et al. Is that the way it should be?” (Discussion board, June, 26, 2005) She received answers immediately from her peers. One of the NS peers replied: “If you are using the citation for the first time, you need to include the last names of everyone. However, if you are using the same citation again, you can use the last name of the first author plus et al. format. Hope this is helpful” (Discussion board, June, 26, 2005). The direct question and answer exchange enabled Blanca to obtain scaffolding from more experienced peers, which allowed her to learn the convention regarding citing articles with multiple authors.

Second, the participants learned various aspects of the APA style (required of assignments examined in this study) through exposure to peers’ postings with citations and references. Because the guidelines for many online discussion activities addressed students’ papers, the participants treated online discussion not merely as oral communication in the written format, but rather as a written task, or at least as “preparation for writing” as indicated by Blanca (General interview, July 30, 2005). Therefore, citations and references often appeared in the postings. Participants’ comments during the interviews indicated that inclusion of references in the postings not only helped students practice their citation skills but also gave them opportunities to learn citation practices from each other. Park’s statements during the interview illustrated this point.

> I will include the citations in discussion board if I need them. I feel it is a good way to gather everything together. I see some students do that too. I guess I learned a lot from other students in the class. When I read their postings, I will pay attention to what and how they cite. I will think myself whether I will do the same way. If they did something special that I never did before, I will pay close attention and try to remember how they did it. I learned how to cite materials from websites in the online discussion. If I see something suspicious or was different as the right way I thought, I can raise questions and tell them what I think the right way is. The result is sometimes, I am right which I am happy
because I can help my classmate to learn and sometimes I am wrong which is ok too because I can learn from it. (General interview, December 1, 2005)

Further, Park’s statements indicated that CMC allowed L2 students to engage in two-way scaffolding on citation practices.

Third, participants were able to discuss misunderstandings and malpractices of citation procedures in the online discussion forums and correct the malpractices in their writing. Two specific problems that the participants addressed via online discussion are discussed below.

**Inclusion of mismatched citations**

The mismatch could occur in three forms: (a) authors were cited in the body of the paper/post but not in the reference list, (b) authors were included in reference list but not cited in the body of the paper/post, and (c) students had different sets of citations in the paper/post and reference list. One example of mismatch was found in Blanca’s posting in the online discussion board for the curriculum project. In her posting, Blanca presented a paragraph that she intended to include in her final project. At the end of the paragraph, she listed a few sources, one of which read "Yost, A. D. & Lucas, M. S. (2002). Adjustment Issues Affecting Employment for Immigrants from the Former Soviet Union. *Journal of Employment Counseling*, v39 n4 p153-70" (Discussion board, August 1, 2005). One of her group members raised a question regarding this reference: “I didn’t see Yost and Lucas in your paragraph. Did you cite them in other parts?” (Discussion board, August 1, 2005) Blanca’s response to this question revealed that she did not update the reference list when she updated the content. She admitted that “I cited them in my previous version and then I changed my mind. But I forgot to change it in the reference …” (Discussion board, August 1, 2005).

**Inclusion of citations which did not conform to the APA style**

As part of his statement of teaching philosophy assignment, Park posted the following paragraph:

“Education must provide the opportunities for self-fulfillment; it can at best provide a rich and challenging environment for the individual to explore, in his own way”. This is what Noam Chomsky said about education (1970, Language and Freedom). I strongly agree with this view because I believe the main role of teachers is to facilitate learning, not to direct the classroom using one-sided methodology. The ultimate goal of teaching is independent learning; the stage where learners can realize the meaning of new things without guidance from their teacher. (Discussion board, October 27, 2005)

In this paragraph, Park cited Chomsky to strengthen his view of the role of the teachers. However, it was pointed out by his peers in the discussion board that he made several citation mistakes. One peer commented “You did not provide the page number for the direct quotation and included both first and last names of the author. I don’t think it is right to include the name of the book in the parenthetical citation” (Discussion board, November 4, 2005). Park corrected his citation errors in the following way based on the above error detection:

“Education must provide the opportunities for self-fulfillment; it can at best provide a rich and challenging environment for the individual to explore, in his own way” (Chomsky, 1970, p. 389). I strongly agree with this view because I
believe the main role of teachers is to facilitate learning, not to direct the classroom using one-sided methodology. The ultimate goal of teaching is independent learning; the stage where learners can realize the meaning of new things without guidance from their teacher. (Statement of Teaching Philosophy, 2005)

As discussed in this section, CMC provided the participants opportunities to ask peer questions about citations, learn from peers’ experiences, and correct misunderstanding and malpractices in academic citation practices. The scaffolding between peers enabled the participants to effectively learn the necessary disciplinary knowledge on citation practices and apply that knowledge to their own writing.

DISCUSSION

Our study aimed at examining the role of CMC in the academic literacy development of a group of L2 graduate students in applied linguistics. Results of our analysis indicate that CMC scaffolded the participants’ understanding of writing tasks and identification of the appropriate focus for the writing assignments. CMC also provided ample opportunities for the participants to build on their own and peers’ texts, to offer feedback and suggestions for revision, and to learn academic citation practices in applied linguistics. CMC provided students extensive opportunities for scaffolding on academic literacy practices and, through collective scaffolding, promoted the development of academic literacy in the participants.

Our findings show that CMC provided favorable conditions for scaffolding among L2 students and peers and that L2 students not only benefited tremendously from scaffolded guidance from peers but were also able to share their expertise with others in the areas in which they had obtained some disciplinary knowledge. Unlike oral interactions in face-to-face discussions in which the message is lost if not caught the first time, CMC allows L2 students to refer back to the messages multiple times for thorough understanding. Also, as indicated in Park’s comments during the interviews, delayed production offered by asynchronous communication makes it possible for L2 students to serve as providers of scaffolded assistance, a role they sometimes are not able to perform in face-to-face class meetings due to the rapid turn exchanges occurring in oral interactions. This suggests that with access to computer-mediated discussion forums, L2 students have more opportunities to engage in meaningful collaborative dialogues with NS as well as NNS peers in their local discourse communities and play a more active role in their own and their peers’ learning.

One point that merits discussion is that computer-mediated scaffolding observed in our study was not unidirectional, but rather bidirectional. One-way scaffolding is very common in expert novice interaction (Ohta, 2000; Lee, 2008; Li, 2006). Passive reception of expert scaffolding, however, may lead to much delayed or limited internalization of the scaffolded assistance. In the computer-mediated scaffolding observed in this study, L2 students served not merely as the recipients of scaffolded assistance, but also as active providers of scaffolding for NS and NNS peers completing the same assignments. When in the recipient position, L2 graduate students did not simply wait for or accept scaffolded guidance but actively elicited peer guidance, acted upon peer suggestions, and created further opportunities for scaffolded help by initiating additional interactions. Blanca’s interaction with her group members on the literature review was a case in point. When in the provider position, the L2 participants, taken as a group, actively scaffolded each other and other peers in class on various aspects of academic writing relating to writing focus, structure, and citation practices. By sharing their knowledge and expertise in certain aspects of disciplinary literacy, the L2 participants helped their peers in performing disciplinary writing tasks.
It is also worth noting that L2 graduate students switched between recipient and provider roles on different tasks. For example, Pinky sought scaffolded help in the discussion board when she attempted to complete the observation report for the MTESE class but provided scaffolding for Park on the microteaching report. No participant in the study served solely as recipient or provider of scaffolded help; rather, each participant assumed different roles under varying circumstances depending on their disciplinary knowledge in the specific areas. This indicates that students’ competence in a specific task does not imply that they can perform all types of tasks independently (Aljaafreh & Lantolf, 1994; Lee, 2008).

CMC facilitated the participants’ learning of genres and conventions required by the field of applied linguistics. Through collaborative dialogues and collective scaffolding afforded by CMC, the L2 participants acquired and/or enhanced their knowledge of several genres and writing conventions in applied linguistics. In our study, the curriculum project, observation report, microteaching report, and statement of teaching philosophy represented new genres for the participants, and the participants’ learning and performing of these new genres was greatly assisted through collective scaffolding. As students engaged in computer-mediated activities to communicate about and interact with each other on discipline-required genres, they exchanged knowledge of various aspects of the new genres and negotiated with peers on the revision of their writing. CMC enabled constant and dynamic collaborative dialogues among peers, which supported the students’ academic literacy development. For example, Blanca’s learning of the literature review for the curriculum project was greatly assisted by computer-mediated collective scaffolding. Our findings suggest that computer-mediated scaffolding assists the students to “acquire and strategically deploy genre knowledge as they participate in their field’s or profession’s knowledge-producing activities (Berkenkotter & Huckin, 1995, p. 3).

CONCLUSION

Our study sought to expand the literature on academic literacy and CMC by focusing on the role of CMC in L2 graduate students’ development of academic literacy. Serving as the primary participants of the investigation, three NNS graduate students in the field of applied linguistics demonstrated that they benefited from assuming the roles of both recipients and providers of computer-mediated scaffolded assistance. CMC provided favorable conditions for collaborative dialogue and collective scaffolding with minimal teacher intervention. The study, however, did not intend to de-emphasize the expert role that supervisors, professors, or even gatekeepers play in learners’ process of academic literacy development. Instead, it took a somewhat overlooked perspective and documented the manifestations and importance of two-way computer-mediated collective scaffolding between L2 students and their peers in their immediate social network.

From a pedagogical point of view, findings of the study suggest the following. First, it is beneficial for instructors to encourage and create opportunities for CMC in content area classes. The benefits of such communication for students’ academic literacy development are revealed in this study. When opportunities for collective scaffolding are limited during regular class sessions, it is advisable for instructors to utilize other channels such as CMC to enhance interaction among students. Second, it is important for instructors to create appropriate topics for interaction and communication which can maximize collective scaffolding among peers. The two instructors associated with this study demonstrated expertise in this aspect by breaking down the writing assignments into several online discussion forums in which students could rehearse, discuss, and exchange ideas and feedback on writing. Several other forums were also available for the students but received much less attention with minimal or no contri-
bution from the students because they were not related to any specific tasks students were required to perform. In order to promote academic literacy development, instructors need to build discussion forums into the curriculum and connect the forums to what students need to learn/do through writing rather than simply treating the forums as extra work for students to do.

The findings of the study provide new insights into the role of CMC in L2 students’ development of academic literacy in one discipline. Additional studies are needed to explore its long-term effect and its role in different disciplines, students’ perceptions of their roles in computer-mediated scaffolding, as well as factors that influence student participation in the scaffolding process. Scaffolding in other types of CMC such as email exchange or online synchronous collaboration is also worth exploration. Investigation of these issues will contribute to a deeper understanding of the impact of CMC on L2 students’ academic literacy development.

REFERENCES


APPENDIX A
Background Information Questionnaire

This questionnaire was designed to obtain information about yourself and your background knowledge of academic writing in English and computers. Your responses will help the researcher have a better understanding of the subjects being studied. Please answer all the questions below.

PERSONAL INFORMATION:
First Name: __________
Gender: MALE _____ FEMALE _____
Age Range: 20-25____ 26-30____ 31-35____ 36-40____
Department: ____________________________
Program: ______________________________
Level: MASTER_______ PH.D_______
How long have you been in the program? __________________
What is your country of nationality? ____________
What is your native language? ________________
What other language(s) do you master? (List all) _______________
What language(s) do you speak when you are with your family? ____________
If English is not your native language or you were not born in the Untied States, Where did you study English? (List all the places) _________________
How many years of English study experience did you have? _______ YEARS
How long have you been in the United States? ____________

ACADEMIC WRITING
What is your previous degree and area of study?
______________________________________________
______________________________________________
What kind of writing did you most frequently do in your previous degree?
______________________________________________
______________________________________________
What kind of writing do you most frequently do in your native language?

__________________________________________________________

Do you think general composition and academic writing require the same skills? Explain?

__________________________________________________________

What kind of writing do you most frequently do in your current program?

__________________________________________________________

Do you think academic writing is difficult? Why or why not?

__________________________________________________________

What kinds of academic writing do you have experience with? (e.g. research proposal, book review, research critique, annotated bibliography, lesson plan, etc.)

__________________________________________________________

Among all the academic writing types that you have done before, which do you think is(are) most difficult and why?

__________________________________________________________

What do you think will help you to succeed in academic writing?

__________________________________________________________
**COMPUTERS**

Do you have easy access to computers with internet? YES / NO

Where do you have the access? _______________

What is your level of expertise with the following software and computer applications?

1. No Experience
2. Novice
3. Intermediate
4. Very Experienced
   ____ Blackboard
   ____ Sending emails
   ____ Attaching files
   ____ Searching the Internet
   ____ Using Discussion Boards
   ____ Using Chatting
   ____ Using word processing

**APPENDIX B**

Coding data sheet of changes between drafts and final papers

<table>
<thead>
<tr>
<th>Participants</th>
<th>Assignments</th>
<th>Total Number of Changes</th>
<th>Changes initiated by discussion board</th>
<th>Changes initiated by self or other sources</th>
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<td>Observation reports</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Microteaching report</td>
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<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Statement of teaching philosophy</td>
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<td>15</td>
<td>9</td>
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<tr>
<td>Pinky</td>
<td>Observation reports</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Microteaching report</td>
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<td>0</td>
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<td></td>
<td>Statement of teaching philosophy</td>
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<td>10</td>
<td>8</td>
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<tr>
<td>Blanca</td>
<td>Curriculum project</td>
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<td>11</td>
<td>4</td>
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</table>
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