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Few studies look critically at the processes in a teacher education course in which students are asked to practice the very teaching approach they study. Using a constructivist framework, this article examines written statements from students working collaboratively in a graduate-level class on cooperative learning. The study asks to what extent constructivist theory, particularly the concept of the zone of proximal development (ZPD), explains interactions that occurred spontaneously during group work on the final project. Content analysis was used to examine three types of writings: (a) dialogue journals, (b) self-reports on the group process, and (c) self-reports on each student's role in the group. Key findings address division of labor, role taking and switching, desire for challenge, power relationships, the languages used to express these concerns, and the need for social interaction to actualize constructivist claims.

MOST APPLICATIONS OF SOCIAL CONstructivist theory address the way children learn through social interaction as delineated by the zone of proximal development (ZPD) and the way language mediates these processes. In the areas of second language and general education research, extrapolations of these theoretical tenets are made to adolescent and adult learners but tend to be speculative. Little is written about how adults from different cultures achieve the benefits proposed in constructivist approaches to social and cognitive development.[1] In the current study, we investigate to what extent the ZPD was developed in each of three collaborative groups of international students in a graduate teacher education class where the term paper was written collaboratively.[2]

For this purpose, we looked at instances of self-regulation in three kinds of written statements: (a) dialogue journals, (b) self-reports about the group process, and (c) self-reports about each student's role in the group. Evidence of variables cited in constructivist theory such as self-regulation, the ZPD, use of language as a mediational tool, problem solving, scaffolding, and application of critical thinking skills were identified through content analysis of these documents. Statements about how participants molded their dominant, cooperative, and subordinate interactions with respect to perceived social roles in each group were noted. The language of self-regulation of social roles is presented in the students' own words.

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CONCEPTUAL BACKGROUND

Contrasts between Cognitive and Social Constructivism

The theories of cognitive and social constructivism are based on a somewhat similar epistemology but differ in the degree to which social interaction is seen as influencing individual cognitive development.[3] Piaget, representing the cognitive constructivist view, highlighted individual construction of knowledge in response to interaction in the physical world, but stressed the

primacy of individual cognitive development as a relatively solitary act apart from the social context (Russell, 1993). On the other hand, social constructivists, such as Vygotsky (1978) and later Bruffee (1986) and Wertsch (1991), emphasized the primacy of social interaction as the driving force and prerequisite to individuals' cognitive development through internalization of ideas encountered in the sociocultural realm.

Social interaction for Piaget is characterized as "the imposition of adult functions on biologically determined stages of cognitive development" (Russell, 1993, p. 189). This suggests that it is important for formal instruction to be paced so that students receive the right assistance at the particular stage when they need it. Students must arrive at a developmental stage at which they can accommodate and assimilate information of a given level of sophistication. By contrast, social constructivists do not view learning as occurring in stages; instead they describe

> a constant reinterpretation, a constant reweaving of the "web of meaning" (Vygotsky), a constant "reconstruction of experience" (Dewey) as human beings consciously . . . evolve new social practices . . . to meet human needs, to adapt to and transform their environments. (Russell, 1993, p. 179)

Moving in the opposite direction from Piaget, social constructivists maintain that interaction in the collective is a necessary precondition for engaging in self-regulation. Self-regulation as a process is achieved when individuals are able to find their authentic voice during problem solving by using the mediational tool of language. Vygotsky (1978) believed that isolated learning cannot lead to cognitive development. He firmly maintained that social interaction is a prerequisite to learning and cognitive development. That is, knowledge is coconstructed and learning always involves more than one person. Vygotsky situated learning in the ZPD, which he posited as being the

> distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers. (p. 86)

It is clear that Vygotsky believed that interaction with others and with the cultural environment contributes to human cognitive development if the interaction takes place within the zone of one's potential development. Current theory posits that language students and future language teachers can obtain opportunities to develop their cognition by actively communicating with others who are more proficient, and thereby expand each other's conceptual potential. Thus, within the ZPD (i.e., each individual's zone of potential learning) more capable students can provide peers with new information and ways of thinking so that all parties can create new means of understanding. This mutually beneficial social process can also lead more experienced students to discover missing information, gain new insights through interactions, and develop a qualitatively different way of understanding.

Possibility of a Group ZPD

Before we consider additional components of contemporary versions of constructivist theory, we raise some queries. If we accept that students in collaborative groups have an individual range of potential growth when working in close collaboration with an adult or more knowledgeable peer, then we must ask the question of how we should view the ZPD when individuals work together in a group. Within a group, each person has an individual zone of potential. However, in a dynamic interrelationship of ideas and views, this potential may grow or be stymied, depending on various group conditions that may or may not be conducive to learning and social growth. Can we posit a zone of potential growth for the group as a whole, at a point where each individual's zone intersects and is expanded as a result of this collaborative interaction? Although this question is open to debate, we explore here this notion of a *group zone.* Although we accept that each group member also maintains an individual ZPD, our proposed group ZPD may allow an exponential growth due to the social mediation allowed by multiple discussions, points of view, and creative problem solving. John-Steiner and Tatter (1983), Donato (1988), and Aljaafreh and Lantolf (1994) offer the possibility of a larger, expanded notion of a group zone, that is, a zone that could be extended to a group situation. Most interpretations of the ZPD restrict the zone to each individual, thereby discounting the broader social phenomenon of growth as a cohesive thought collective.

Crucial to the growth of thought during any collaborative group project is that members arrive at a mutual understanding of the topic. Vygotsky assumes that language learners' development occurs as "the result of joint problem-solving activities" (Schinke-Llano, 1993). Through this joint activity, *intersubjectivity* can be attained. Tudge (1992) explains intersubjectivity from a Vygotskian perspective:

> [I]ndividuals come to a task, problem, or conversation with their own subjective ways of making sense of

> it. If they then discuss their differing viewpoints, shared understanding may be attained. . . . [I]n the course of communication, participants may arrive at some mutually agreed-upon, or intersubjective, understanding. (p. 1365)

Thus, through collaboration within each person's zone of potential understanding, the knower and the learner may reach intersubjectivity or a shared understanding. Two processes—cognitive apprenticeship and critical thinking—help intersubjectivity to flourish.

Cognitive Apprenticeship

Pedagogy asks the question of how intersubjectivity can be attained in academic work. One concrete application is offered through cognitive apprenticeship. Cognitive apprenticeship (CA) is the most frequently applied model of recent social constructivist approaches and provides concrete steps for how thinking can be modeled (Brown, Collins, & Duguid, 1989; Collins, 1991). The term cognitive in "cognitive apprenticeship" emphasizes the role of thinking with particular emphasis on metacognitive, reflective thinking rather than on physical adroitness in traditional apprenticeships. During CA in collaborative learning, students are encouraged to monitor their performance in the context of the task, to compare their performance to the experts' ways, and to move between the roles of knower and learner to stimulate use of multiple perspectives which, in turn, stimulate different types of cognitive activities in order to expand their perspectives. Cognitively speaking, there is much similarity between CA and "scaffolding," but the relationship between the knowledgeable person and the learner differs in terms of responsibility. In CA the responsibility for learning is primarily on the learner/apprentice, whereas in scaffolding the more knowledgeable person assumes the responsibility of offering the learner support to facilitate learning. As the learner acquires the requisite ways of reasoning and performing a task, the support or the scaffolding is slowly removed. However, in collaboration it is assumed that, ideally, all parties share these responsibilities.

In cognitive apprenticeships, knowledge is situated and developed in the context of communities whose ways of thinking, logic, and reasoning are progressively appropriated by group members. These conditions have particular relevance to the present study, which was situated in the context of a graduate course. In this study, students came from different cultural and academic traditions with their own modes of thinking, understanding, and working.

Indeed, observation and social context are fundamental aspects of cognitive apprenticeships (Collins, Brown, & Holum, 1991) and may offer an unobtrusive mode for students from different cultural backgrounds to internalize and understand the roles and modes of interaction expected of them in a collaborative academic setting. When CA is mutually applied in groups of international students or teachers working together, different ways of thinking can be modeled, considered, and appropriated by group members.

It is also critical to acknowledge the inherent power relationships between the knower and the learner—or in traditional apprenticeship terms, between the master (here, a teacher or more experienced student) and the apprentice (or less experienced learner). In the ideal apprenticeship, the apprentice continues to build personal empowerment through increasing participation in communities of practice. Because power relationships are embedded in any form of social interaction, particularly in apprenticeship, Driscoll (1994) cautions that power-sharing and mutual understanding (i.e., intersubjectivity) are required for the ZPD to function:

> It is not enough . . . for the partners to simply work together or for one partner to dominate and demonstrate solutions to the other. They must co-construct the solution to a problem or share in joint decision-making about the activities to be coordinated in solving the problem. (p. 236)

Thus, if social interaction takes place between an individual who continually dominates learning and a student who always follows, coconstruction of knowledge may not occur. More knowledgeable persons must continually be aware of the learners' ranges of potential growth and must calibrate the power balance for mutual understanding. In Kreisberg's (1992) interpretation of power structures, this approach, which he terms "power with" as opposed to "power over," requires mutual and reciprocal assertion of ideas and opinions. These must be balanced with critical awareness, implying that members explore their topic from various angles, share opinions, and justify their analyses in order to make joint decisions. For learning to be mutually beneficial, especially among adults, all parties must engage in critical thinking.

Critical Thinking

As seen in Vygotsky's ZPD and Piaget's stages of cognitive development, social and cognitive constructivists understand that through interac-

tion with others or their context "learners must individually discover and transform complex information if they are to make it their own" (Slavin, 1994, p. 225). In other words, learners need to think critically, that is, from different points of view, acknowledging bias when solving given problems. During joint social-interaction activities, cognitive development emerges through accommodation of new ideas or points of view into one's own present cognitive framework. Although it can be argued that collaborative activities demand convergent thinking, a necessary step for construction of new understandings is to first engage in the process of divergent problem posing—taking on opposing points of view before a new consensus can be achieved.

Because of the multiple thought processes involved in knowledge construction, it is useful to look more closely at critical thinking. This is "the process of determining the authenticity, accuracy, and worth of knowledge claims" (Beyer, 1985, p. 276). Critical thinking contains two elements: (a) a frame of mind that allows examination of multiple viewpoints and (b) a number of specific mental operations, such as determining reliability of a source, distinguishing relevance, detecting bias, identifying assumptions, and recognizing inconsistencies or fallacies (Beyer, 1985). In this process, divergent thinking plays an important role in guiding attention and achieving newer understandings during knowledge construction.

A key aspect in critical thinking, and one which is closely allied with "frame of mind," is dialogical thinking or "the ability to see any issue from many points of view and realize that people can address an issue constructively without necessarily agreeing with each other" (Pugh, 1996, p. 2). As social constructivists advocate, one needs to consider multiple realities when working collaboratively toward intersubjectivity for a common goal such as giving a group report, writing a term paper, or presenting information responsibly. Paul (1987) offered useful steps for thinking dialogically:

1. We must imagine ourselves in a given frame of reference.
2. We must imaginatively construct some reasons to support it.
3. We must step outside the framework of those acts and imagine ourselves responding to those reasons from an opposing point of view.
4. We must imagine ourselves back in the first point of view to create a response to the opposition we just created.
5. We must change roles again and create a further response. (p. 143)

According to Paul, to think critically is to think creatively. Thinking involves language, the conceptual strand to be discussed next.

Language

Both Piaget and Vygotsky agreed that language plays a crucial role in thought development. Vygotsky (1978) claimed that language is a mediational tool for thought:

> Signs and words serve children [or learners] first and foremost as a means of social contact with other people. The cognitive and communicative functions of language then become the basis for a new and superior form of activity in children [or learners]. (pp. 28–29)

It is clear that social interaction or discussion can further encourage higher mental functions, such as critical thinking skills. In Vygotskian perspectives, social interactions result in the continued development of language and cognition (Roy, 1989; Schinke-Llano, 1993; Vygotsky, 1986). The mediational role of language can be found in the notion of inner speech, where language acts as "an instrument of thought . . . as it aids the individual in seeking and planning a solution to a problem" (Vygotsky, 1986, p. 30). McCafferty (1994) noted that self-regulatory private speech arises at times of cognitive stress; here we posit an analogous social (thus, affective) stress that arises when learning collaboratively. John-Steiner and Tatter (1983) suggested that "descriptions of one's own activities, self-guiding comments and expressions of relief and pleasure" (p. 92) are also functions of private speech. Similarly, a self-regulatory function can be found in the reflective discourse recorded in journal entries or other writings as adults struggle to come to terms with new ideas and interpersonal situations. In the present study, the language used by the graduate students to describe their group's processes (as recorded in their dialogue journals and self-reports) reflects their ongoing and developing cognition and social interactions.

THE STUDY

In this investigation, 16 graduate students were enrolled in a teacher education course on cooperative learning. Course activities included extensive readings of cooperative learning studies done in native language (L1) and second language (L2) settings, paired simulations, and paired presentations of readings in order to build a sense of cooperation from the beginning

of the course. Three weeks into the course all participants were asked to write a "sense of urgency" paper in which they were to identify a collaborative-learning issue that they felt a sense of urgency to investigate. These papers were written individually, and areas of interest were then compared to others in class. On the basis of common interests cited in the sense of urgency paper, initial collaborative discussion groups were established. At the end of the first month these groups were asked to formulate their chosen paper topics on collaborative learning.

Research Questions

The present study addresses these research questions: (a) To what extent does constructivist theory address the kinds of interactions that occurred spontaneously in group work on the final project? (b) To what degree do students function in an individual or group ZPD in each of three collaborative, mixed-cultural groups? and (c) What factors influence students' self-regulation as found in their written discourse?

Method

Participants. Course participants were 16 graduate students from Foreign Language Education and Applied Linguistics programs at Indiana University. From this class we chose 3 groups of 3 students each for closer study to ascertain various degrees to which the ZPD and other requisite factors cited by constructivists were noted in the writings of these groups about their group's collaborative process.

We chose these groups because they each demonstrated rather large degrees of difference in the collaborative process of their groups as portrayed in written reports. The criteria for selection to these groups were that (a) groups were composed of the same number of students, (b) groups were of mixed cultural backgrounds, and (c) each group illustrated a different degree of actualizing a group ZPD. The groups selected for close analysis were from five different cultures: Japanese, Malay, North American, Korean, and Hispanic (in all, two males and seven females). Participant characteristics are shown in Table 1.

Factors such as teaching backgrounds and time in the U.S. had implications for the amount of academic and cultural experience each member brought to the collaborative group work in the present study. Four of the nine participants selected for close scrutiny had taught for 1 to 4 years in their home countries or in the U.S., and of these, two were currently teaching as graduate teaching assistants in their language. Of the nine selected participants (pseudonyms follow), Hitoshi had just arrived, Eriko had been here for one semester, and Maria and Noritah had returned after several years at home but had received master's degrees in the U.S. Jin-Ki and Tomoko were both doctoral students and had been in the U.S. for at least 3 years. Kiyoko had been here for just over 2 years, and the North American, Gloria, had spent 1 year in Japan. Hence, each participant had had some academic (graduate level) and cultural exposure to another country.

Data Collection. Data were collected from students' statements in three types of written assignments: (a) a dialogue journal, (b) a self-report on the group process, and (c) a self-report on each student's individual role in the group. Collecting data through written reports offered the least obtrusive and most accessible view of the

TABLE 1
Characteristics of Participants

Group	Participant	Nationality	Gender	Degree Program
1	Hitoshi	Japanese	Male	M.A.
	Tomoko	Japanese	Female	Ph.D.*
	Jin-Ki	Korean	Male	Ph.D.
2	Eriko	Japanese	Female	M.A.
	Maria	Puerto Rican	Female	Ph.D.*
	Noritah	Malay	Female	Ph.D.*
3	Yumiko	Japanese	Female	M.A.
	Kiyoko	Japanese	Female	Ph.D.
	Gloria	North American	Female	M.A.*

Note. * = teaching experience.

factors in constructivist theory that we investigate here. When the social interactions put students into situations to which they had to adjust, new information and ways of interacting had to be assimilated, and writing provided a medium to achieve this. Writing allowed students to work through problems and make adjustments. In this way, language used in writing provided a means for self-regulation of emotions and thoughts about their group collaborative process.

Dialogue journals were part of the overall participation grade in the class; weekly entries were ungraded but mandatory. Students were invited to share their thoughts about (a) what was discussed in class, (b) readings for the class, and (c) in- and out-of-class events that related to the collaborative process in their groups. Based on experience with students in three former courses on cooperative learning, the professor (who is the first author of this article) had decided that collaborative work must be accompanied by dialogue journals, which would serve as an outlet for frustrations and concerns.

In most cases, dialogue journals served as a pressure valve during the writing of the collaborative term paper. Early and continuing problems as well as feelings toward other group members were clearly and honestly expressed, giving the professor a chance to write back, acknowledging problems or successes and offering ways to deal with the situations.[4] However, some students were not used to writing journals. In addition, some group members chose to write objectively, making it difficult for the professor to discover the issues a group was dealing with at any given time in the semester.

The two self-reports were designed to foster accountability among members for the overall group process and for their own role within their group. Individually written reports on the group process were to specify how the group was formed, how tasks were agreed on, if students had any problems, and how they worked out such problems. This one-time report was assigned to students at the mid-term. Group process reports were a primary source of information about how groups were progressing in writing their term papers on the topic of cooperative teaching. A drawback was that most of these reports were written in very objective styles with minimal reference to students' individual roles in the group. For this reason, the professor chose to have each student write an additional paper on his or her own role in the group. The second report provided more detailed information, which included some affective and cultural issues. This assignment also gave the professor a clear view of how each student perceived the other group members. Because this assignment was given 3 weeks prior to the end of the term, little could be done to help rectify any negative situations described by some group members.

Data Analysis. Content analysis as described in Berg (1995) was used to analyze the writings described above. Themes selected for analysis were based on constructs taken from constructivist theoreticians cited here. Content analysis was chosen due to its unobtrusive nature, allowing for comparisons of views expressed by each group member in written reports about the group process. Content analysis of written data also provided a way to track the dynamics of continued engagement in the collaborative group. Glaser and Strauss (1967, in Berg) suggested "an analytic procedure of constant comparison . . . analysis of data after coding and . . . the integration of data and theory" (p. 102). We identified emerging themes by coding patterns in the written statements and repeatedly comparing them to theory, thereby verifying theoretical relationships.

Results

In this section, student statements are explained in light of overarching themes in constructivist theory. These key concepts help illustrate the extent to which we perceive that the three groups achieved some degree of working within the ZPD. The following list represents a broadened view of the interdependent elements that must be present for the ZPD to function either for the individual or for the group with adult learners:

1. Social interaction as a necessary factor for functioning in the ZPD.
2. Cognitive development as a means of constructing new understanding through problem solving and critical thinking.
3. Self-regulation as a response to power relationships and affective factors.
4. Language as a tool to mediate these factors.

The ZPD is not extended by merely forming well-intentioned groups with a common goal. It is argued here that the processes operative in collaborative groups may counteract the possibility that such a group ZPD is actualized. To analyze the varying degrees to which the group ZPD was functional, we purposely chose three groups to illustrate differing degrees of achieving the ideal.

As seen below, the division of labor strongly in-

fluenced each group's evolution as a work-oriented, socially oriented, or cognitively oriented collective. These generalized orientations were linked to additional factors, such as degree of cognitive scaffolding, types of social interactions, writing and work styles, and power relationships, as discussed in the following sections.

Division of Labor. The two aspects most influential to how the groups functioned were: (a) the formation of groups through their chosen topics in the sense of urgency paper and (b) each group's division of labor. Self-selection assured motivation and common interest to explore the topic collaboratively. The division of labor exerted a powerful influence on both the social and cognitive functioning of the group. Group 1 first divided their work into logical portions dictated by academic papers such as "statement of purpose" and "literature review" as shown in Jin-Ki's self-report on the group process:

> At the first group meeting, we . . . reach[ed] an agreement that we should divide a whole paper into two parts: The first part which contains sections such as Rationale, Problem Statement, and Literature Review should be done by the due date of the first draft. The second one which includes sections of Data Collection and Analysis, Results and Discussion and Application . . . needed to be completed around 20 April (Jin-Ki/gp/G1).[5]

Group 1's choice to divide its work in terms of the paper set the goal-directed tone for the group.

In Group 2, two members had originally planned to collaborate on a project applying technology to cooperative learning; however the professor requested that they include in their group a less experienced master's degree student (Eriko), who was interested in anxiety (a topic which is not clearly related). In her dialogue journal, Maria noted

> originally, Noritah and I had talked outside of class and we decided we could work together . . . and [the professor] suggested we look for another person to join our group. It became clear to us both that we were very interested in Eriko's [topic]. (Maria/jrnl/G2)

According to Yumiko, Group 3 divided tasks based on members' individual interests:

> We started our project by dividing up the main topics into individual work, according to the interest of each one. We also decided that after we discussed the content of the whole text and the summary, each of the group members would write the introduction individually and revise them all into one text. I think we were quite successful in this [editing] procedure. (Yumiko/gp/G3)

Within each group there was strong concurrence as to how tasks were divided, so we have selected only representative excerpts above.

Cognitive Apprenticeship, Scaffolding, and Social Interaction. The division of labor determined the approach each group took regarding how members would deal with tasks, knowledge construction, and mutual support. Social interaction is a condition indispensable for the functioning of apprenticeship and scaffolding, yet the degree of apprenticeship and scaffolding varied among the groups. Groups 2 and 3 met at least once a week, whereas Group 1 only met when each member was ready with a section, as reported by Hitoshi:

> As for our group project, we did not have so much time for it. We have had a few meetings, but we did not spend a long time to discuss the topic at those times. Moreover, after we submitted our first draft, we have never met except after our Monday class . . . Therefore, we divided the project's work amongst group members and decided to complete the individual works into the final project. I feel this is not good style for cooperative learning. I think we do not actually cooperate. (Hitoshi/jrnl/G1)

Group 1 rarely showed evidence of providing any scaffolding for the less experienced student. Therefore, there was little coconstruction of knowledge. The chosen term paper topic and the subsequent division of tasks—where members worked independently—did not allow for cognitive apprenticeship, making it difficult for the group ZPD to develop. Also the ZPD was not extended for the more experienced student (Tomoko) because she did not receive feedback from the other members:

> As for the partnership, I guess we have a good relationship but I wonder if we really have a good communication. My opinions/suggestions have been accepted by my partners without any modification or suggestion. . . . I always receive feedback such as "O.K.," "Good idea," etc. (Tomoko/jrnl/G1)

Tomoko's justified sense of disappointment stemmed from her expectation that her ideas would be challenged through constructive, critical conversation.

Social interaction is a critical part of constructivist theory and lies at the heart of the ZPD. However, Group 1's written reports showed that its active involvement was largely academic, focusing on the structure of the paper while giving social interaction little attention. The least experienced group member (Hitoshi) received the task of forming the topic through the problem statement:

> As a result [of the division of labor on the term paper], there was no section left for Hitoshi, but I and

> Tomoko asked him to work on the problem statement section. With these assigned roles, each of us worked individually for about one week, and got together in order to review the sections. (Jin-Ki/gp/G1)

By contrast to this product-driven approach, Group 2's overridingly social approach to their interactions was demonstrated by the strong mutual support of group members and a clear sense of shared responsibility:

> There is genuine feeling of sharing—not only in terms of the responsibilities of this project but also in terms of caring for the well-being of each member of the group. . . . We have taken every opportunity to make our meetings outside the campus [or at Maria's home] . . . and getting together for cookies and refreshments. (Noritah/mr/G2)

Noritah further noted:

> we have always managed to share the responsibility of choosing . . . and deciding on the important issues in the project. (Noritah/mr/G2)

Maria's comment underscored the interdependence of their group:

> Our collaboration has been very successful because we respect each other and we can depend on each one to fulfil her obligations. (Maria/mr/G2)

The least experienced member, Eriko, received much nurturing and was constantly involved in all discussions:

> I have difficulties with my English. Although before we started our projects I seldom had confidence to complete it well because of my competence, my group members encouraged me many times and inspired me a lot. (Eriko/mr/G2)

With the group's continuing scaffolding and support, Eriko's confidence and contributions changed dramatically, as noted by Noritah:

> The group is working well together and I think the evidence can be seen in Eriko. She had really come out of her shell and it is not surprising to have her telling us that we are mistaken. . . . And we respect her views because they are often valid and well-supported. (Noritah/mr/G2)

It is clear that Group 2 successfully applied many components of constructivist approaches. Eriko became empowered by assuming the critical role of questioner and challenger to her more advanced peers, whose thinking she continued to push.

> I asked them many times to say again what they said. Asking such kind of things and reconfirming it seemed to be a large part of my role. (Eriko/mr/G2)

Meanwhile, in Group 3, Yumiko also discovered power in the role of questioner.

> I found out, in the end, that questions that I raised in the group discussion, helped the other members in my group have a deeper consideration about the topics and develop the discussion. (Yumiko/mr/G3)

These roles contrast with Hitoshi's (G1) more acquiescent and silent role, as noted earlier in terms of Tomoko being unchallenged in her own learning process.

Writing and Work Styles. In contrast to the work orientation of Group 1 and the social mediation of Group 2, Group 3 was the group most actively involved with both the social and cognitive features cited in constructivist theory. Each member made longer reference to lengthy discussion of the group's chosen topic. Many of these discussions were cognitive in nature, wrestling with each member's understanding of the themes:

> We actively exchanged our opinions on what should be deleted/added/paraphrased on each other's papers. On the other hand, we all valued the writers' opinions, since we all understood that everything in the paper had its rationale. (Kiyoko/mr/G3)

Attempts at problem solving, which related to the cognitive features of the group paper, were found most frequently in reference to writing and work styles:

> Because of the difference in writing styles, putting our individual works together into one paper took a long time. It was especially difficult to make coherent cultural factors and CL [cooperative learning] activities . . . to complete our second draft. (Kiyoko/gp/G3)

For Gloria, differences in associated writing style also raised the issue of cross-cultural factors in work modes.

> By far the most difficult part of the process was the peer editing which took about six weeks. During that stage I felt very frustrated with the trouble we had communicating and with our differing views on what we should be spending our time on. We would often get bogged down in discussion of what I considered minutiae, and I would become impatient and try to bring the discussion back to what I saw as the more important issues. (Gloria/gp/G3)

The peer interaction also involved affective aspects that needed to be addressed, as shown in Gloria's statement:

> Last week one of my peers told me that she had been really upset by all the changes I had made in her writing style. She felt like she had lost her "voice" and that they were no longer her ideas. Because of my focus on the task, I didn't realize that the changes I made would be so upsetting to her on a personal level. I assumed that she knew her English wasn't perfect and that she would want the finished product to be written in as sophisticated and consistent a style as we

could manage given the time constraints. (Gloria/gp/G3)

From Yumiko's comment, and as seen later in her role switching, this affective issue was ongoing but not voiced until later:

Two of the Japanese in the group have rarely had argument alone in discussion. I often feel that we, both of the nonnative speakers, are talking mostly addressing only to Gloria in discussing or presenting opinions. In other words, I feel that we are always talking through the native-English speaker who functions as a filter for our rough languages. This sometimes makes me feel galled because it seems to me that I am required to go through this filter whenever I present my opinion, even when I make some point about the writing of the other Japanese. (Yumiko/mr/G3)

From the group's (G3) other writings it was clear that Yumiko's outspokenness led the group to consider critically the issues of writing and voice. Through these discussions they reached positive, reflective resolution of these issues:

Looking back on the group work up to this point, I believe that regardless of student nationalities or language proficiency levels, respecting their group member opinions greatly influences the success of group work. (Kiyoko/mr/G3)

We had lots of frustrating meetings but many stress-relieving laughs, and we came out of it with a decent paper and two new friends. . . . The biggest lesson I learned is that it's not enough to just get the job done, that I also have to be sensitive to the feelings of my peers. (Gloria/gp/G3)

Power Relationships and Role Taking. Responses to various problems with respect to social and cognitive roles as well as affective factors were seen in statements on self-regulation or adaptation. Roles taken by mature adult students working in a constructivist framework were interpreted in our analysis as responses to power relationships arising from the greater academic and linguistic experience of some group members:

I took an initiative in discussing the structure of our paper. . . . Although sometimes I feel I lead the group discussion a lot and I take initiatives a lot, I do not think that I am dominating our group process. . . . I will try not to dominate the group process from now on. However, I would like to take initiatives as much as possible since I have background in our topic (Tomoko/mr/G1).

Tomoko's clear recognition of her own expertise caused some inner conflict about how assertive a role she should take. In general in this study, when the less experienced students were trying to adjust to group members' expertise, their writings reflected this accommodation in deference to the experienced members, as seen later in Group 3 and here in Hitoshi's statement:

I play the role of observer. . . . Moreover, because my partners know a great deal concerning [the linguistic topic]. . . . I again play the role of the observer. I think this project is for them. (Hitoshi/jrnl/G1)

Several interrelated conditions must operate for adequate functioning of the group ZPD. This includes willing peer interaction that is social in nature but primarily aimed at mutual cognitive development or coconstructions of knowledge. This mutual support should outweigh concerns for conventional academic success. As cited above, Group 1's focus appeared to be on academic success when they chose to shape their paper to conform to the conventional structure of an academic paper. Group 1's various self-reports rarely cited issues relating to their linguistic topic or to interpersonal functioning in the group. By working individually, the two academically experienced members in Group 1 showed scant awareness of the less experienced student's affective and knowledge needs and thus provided little scaffolding. Tomoko and Jin-Ki left the least experienced master's degree student with the challenging task of framing the key issues in their theoretical paper. By asking Hitoshi to read their portions, they were possibly hoping that this process would scaffold his understanding of linguistic issues:

As a result, there was no section left for Hitoshi, but I and Tomoko asked him to work on the Problem statement section. (Jin-Ki/gp/G1) [also cited above]

Hitoshi's reaction to this task distribution demonstrated that this objective was not achieved:

I think our project is very complex. I did not expect this. I thought that the instruction of some [linguistic topic] would be the main point of this paper. However, what we wrote finally was a paper on genuine [names two linguistic theories]. (Hitoshi/Jrnl/G1)

It is clear that for the inexperienced beginning master's degree student, there was little demonstrated social support on the topic, and thus we found no evidence for cognitive apprenticeship or intersubjectivity.

There was no evidence of asymmetrical power relationships in Group 2, possibly due to the positive attitudes found in each member's writings. On the other hand, the power relationship in Group 3 was different because the group was composed of three "experts:"

We started working on our assigned sections/subsections individually. This "jigsaw process"—exchanging information to complete a paper after individual research—allowed us as graduate students to have free-

> dom to work using our own individual methods, and consequently to eliminate the frustration of having to adapt to other working styles. At this early stage, my group role was one of three "experts" on the subsections. (Kiyoko/mr/G3)

The initial division of labor for Kiyoko's group became problematic when group members needed to synthesize their individual ideas in order to complete the second draft. This switch from individual work to collaboration also led to changes in member roles:

> At this stage, my role in the group changed to the "cutter" (as my group members called me) who deleted unnecessary information and made sentences more succinct, while Gloria was the "chief editor" and "grammar checker," and Yumiko the "section-connector" who made the contents of the entire sections relevant. (Kiyoko/mr/G3)

Role taking led to both self-regulation and to potentially asymmetrical power relationships. Yumiko's report on her role in the group (G3) yielded an interesting portrayal of her continued need to shift roles in response to (a) her changing levels of graduate experience in collaborative interactions, and (b) an evolving sense of self-regulation needed to accommodate the group's strengths in relation to hers:

> I see my role in my group in a little different way from the type of the role that I used to take in group projects before . . . when I work with Japanese classmates, I have a tendency to take the role of leading in planning the procedure, conducting the task, and presenting the major ideas that would be represented in the project . . . [M]y role in the group projects or collaborative learning has changed . . . which has been rather a drastic change for me . . . As I became used to life and study at [this university], I slightly changed my role in group projects in my second semester. I was functioning more as questioner. . . Finally in this semester. . . I see my role as encourager, partly because . . . I try to give suggestions about the correlation between my part and the parts of the others. (Yumiko/mr/G3)

Yumiko's conscious ability to regulate her thoughts and feelings independently with respect to the recognized power structure was shown in this reflective passage:

> I have thought [of] some more reasons for staying as encourager rather than leader in my group project. First of all, it is the matter of differences in the learning styles among group members and, even though I sometimes feel frustrated when the whole project goes with the different style from mine, I believe that it is eventually good for me to learn the variety of learning styles from others. (Yumiko/mr/G3)

Self-regulation or independent problem solving and critical thinking appeared to be the response both to cognitive and social stress problems. However, as seen in role taking, it was not always an optimal response to social conditions where asymmetrical power relationships were perceived.

Discussion

In looking at our three research questions, we note first that the interactions were generally social in nature but often tempered with solitary, reflective problem solving seen in role taking, candid discussions of divergent views of topics, and writing styles. The second research question asked about the degree to which each student or group worked to share in the potential growth of the group. Because we deliberately chose groups with differing approaches toward working for a common goal, we were able to show the varying degrees to which each group jointly engaged in the active coconstruction of knowledge. With respect to the third research question, self-regulation permeated all factors that emerged from the written data about the collaborative group process.

A brief review of group interactions illustrates the importance of social and thus affective support that must be present to foster learning in a group ZPD. In Group 1, the two advanced students tried to help the master's degree student learn by providing cognitive scaffolding, but they did so without additional social support. In Group 2, the two advanced students were successful in supporting their less experienced colleague's knowledge building through initial and sustained social support. At first, the three experienced members of Group 3 approached their learning cognitively and independently, but struggled until they brought their learning into the social realm for problem solving through discussion. Through their social mediation, all achieved a measure of mutual cognitive and social benefit.

Prior research has failed to address fully factors such as affective aspects, power relationships, and role taking, found in this study to be necessary to constructivist approaches to collaborative learning. In each case, the social aspect gave rise to an often ignored affective factor that strongly influenced the degree of potential knowledge growth and accommodation of new ideas and ways of interacting. Without consideration of how social interaction affects the affective side of learning, cognitive development cannot be fully extended in the group ZPD.

CONCLUSION

One primary observation arising from this study is that without a strongly supportive social component, the potential for learning (or ZPD), for both the individual and the group, was radically undermined. Without social support, knowledge construction was diminished to solitary reflective problem solving—reminding us of Piaget's cognitive approach. A positive aspect of role taking through self-regulation was that it allowed the less experienced students to become aware of their equally important roles as questioners when seeking clarification, comprehensible information, and negotiations of meaning. As noted in the writing of more experienced participants, the more expert learners desired to have their thinking challenged by being pushed to provide the kinds of logic and clear support in ways less experienced learners could access. Having access to these ways of thinking, in turn, allowed less experienced students to make discoveries on their own through scaffolded guidance. In this way, the group ZPD had the potential to promote coconstruction of knowledge and to arrive at an elevated but mutual understanding of a topic.

Despite the documented conflicts and subsequent individual self-regulation or joint problem solving, this class on cooperative learning was quite successful in two ways: (a) high evaluations of the class and (b) students' positive rankings of each other's contributions to the group (not discussed in this article). The use of the constructivist lens to discern degrees to which the group ZPD was extended in the selected groups has helped us to focus on several key factors that refine what different constructivist approaches view as necessary for successful knowledge construction.

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NOTES

[1] Some notable exceptions in teacher education are studies by Kaufman and Grennon Brooks (1996); also see Horwitz et al. and Wilhelm, in this issue of the *MLJ*.

[2] We distinguish between cooperative learning and collaboration in the same manner as delineated by Oxford in this *MLJ* Special Issue. Groups in this study had complete freedom to choose their approaches to interaction. They did not follow a set of clearly identifiable classroom techniques, as used in cooperative learning.

[3] We acknowledge that there are many interpretations of constructivist theory. For a thorough overview of the history of and different approaches to constructivism, see Oxford (1997).

[4] The professor's preparation time outside of class actually increased because of the expanded demands of planning and facilitating class interactions. Continuous and careful lesson planning was needed in order to help students be sensitive to their group members' affective and academic needs and to implement notions of cognitive apprenticeship and scaffolding in response to these needs.

[5] The codes used are as follow: *G1*, *G2*, and *G3* are codes for Group 1, Group 2, and Group 3; *jrnl* signifies excerpts from a dialogue journal; *mr* signifies excerpts from a self-report on the student's own role in the group; and *gp* signifies excerpts from a self-report on the group process. After each quote, we note in parentheses the following sequence: participant pseudonym/data source/group number.

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