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Infusing a Collaborative Learning Curriculum to Enhance Active College Learning

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Abstract

The results of a college collaborative learning curriculum in Taiwan indicated satisfaction with the collaborative project resulting from familiarity with group members. Students asked more questions and they expressed more in class. The behaviors of feeling respected by group members, learning about self-expression and diverse opinions, as well as having fewer conflicts indicated positive collaborative outcomes. The students' previous lack of experience in presentation, and knowing the instructor's contact information (interpreted as a sign of a high motivation to learn) was also correlated with the acquisition of collaborative skills. In summary, this experience fostered positive self-concept and the development of active learning skills.

Background of the Study

The Cultural Influence on Education in Taiwan

Like many other Asian countries, Taiwan, with its Chinese ancestral root, is deeply influenced by the Chinese culture at all levels of its society. As Chan (1999) stated, Chinese culture was centered on "self-effacement," which originated from Confucianism. Confucianism has a profound and direct impact on The Chinese cultures of China, Taiwan, Singapore, Malaysia and many other East Asian cultures (Barron & Arcodia, 2002). The Confucian approaches emphasized the role of the teacher (Barron & Arcodia, 2002) and the maintenance of harmony (Chan, 1999). According to Jarrah (1998), individuals from the cultures influenced by the Confucian philosophy are likely to prefer strong direction and stability. For those who are under this influence, challenging others and expressing opinions can be difficult. The learning preferences of many Asian students influenced by the cultural values of collectivity and harmony result in their hesitation in expressing themselves and asking questions in the classroom.

Some researchers who observed the learning behaviors of Asian students concluded that many of them lacked the ability to apply their knowledge to practical situations (Watkins, Reghi, & Astilla, 1991). The fear of "losing face" for inadequate performance subtly encourages classroom behaviors which prevent shame (Chan, 1999). In the Asian cultural context, students rely heavily on teachers for guidance. According to Chow (1995), teachers in many Asian countries are expected to give rigid, highly-structured lectures which

focus on the transmission of knowledge to large groups of students. There are limited classroom activities and discussions, because the students prefer not to reveal their opinions in public (Chan, 1999). There is also evidence about Asian learners' preference for rote learning when compared to their Western counterparts (Rodrigues, 2005). Chow (1995) described the attempt of soliciting open discussions from Asian students as the "cold floor," where teachers were perceived as authority figures. The challenge in inducing interactive discussions is even more challenging when most of the classes are large, such as those in Taiwan.

The Learning Behaviors of Taiwanese Students

Like many Asian students, the students in Taiwan are known to lack critical thinking skills (Huang, 1996). When Berberoglu and Hei (2003) compared the learning approaches of university students between Turkey and Taiwan, they found that Taiwanese students had a lower performance on tasks requiring high-level cognitive skills. Chan (1999), in her study on Chinese learners, confirmed other researchers' viewpoints that the Chinese students lacked originality in their thinking. When advocating the use of alternative assessments in secondary schools and universities in Taiwan, Liu, Zhou, and Yuan (2004) argued that the conventional methods of assessment failed to assess students' ability in higher-order thinking. Alternatively, some researchers indicated that the nature of the curricula and the teaching environments explained more of the perceived Asian students' surface learning approach than was explained by the cultural characteristics of the students (Barron & Arcodia, 2002).

According to Chow (1995), the pedagogy adopted by many Asian instructors has led to the students' passive approach in acquiring knowledge. Because of this, active participation is often missing in the traditional learning environment. Taiwanese students generally do not respond favorably to classroom discussions. The stiff, uncomfortable resistance to participating in the classroom and the inhibition in the expression of feelings and opinions described by Chow (1995) are observed frequently in Taiwanese classrooms. The classroom atmosphere in Taiwan is similar to what Chan (1999) described as contrasting the good practices of instruction valued in the West. Obviously, working with others, solving practical problems, and creativity are seldom emphasized in the Eastern educational system.

Collaborative Learning and Critical Thinking

According to Gokhale (1995), collaborative learning enables the students to work in groups toward a common academic goal, and critical thinking inspires the synthesis and evaluation of concepts. Wong (2004) stated that the Taiwanese students focused more on the recall of factual knowledge, with little emphasis on critical thinking. However, Asian students seem to adapt to group work and a student-centered learning style well when provided with such an opportunity (Wong, 2004). Gokhale (1995) proved that students who participated in collaborative learning performed better on the critical-thinking projects than students who learned individually. He also suggested

that group interactions helped students learn from one another's experiences and skills. Barber (2003) also found that teamwork and discussions helped avoid embarrassment. With collaborative learning, students share responsibilities which can reduce the anxiety associated with problem-solving (Gokhale, 1995).

Hargrove (2005) defined critical thinking as the ability to make decisions, defend choices, reason from evidence, examine quality and make improvements reinforced by instructors' feedback. Critical thinking also includes the skills to think reflectively and evaluate assumptions (Ivie, 2001). Asking questions is one of the eight characteristics of critical thinking identified by Wade (1995). According to Yehudit and Orit (1999), fostering students' ability in posing questions improves their problem-solving ability, which is essentially an indicator for critical thinking. In generating students' critical thinking skills, Jessop (2002) reasoned that training students to ask questions was a requirement.

In a cross-cultural collaboration between the U.S. and Taiwanese students, Cifuentes and Shih (2001) discovered that through social interactions, students were transformed into independent thinkers. King (1995) adopted an inquiry-based instruction in a collaborative learning context ,and found that it enhanced her students' abilities in critical thinking. Similarly, the cooperative goals promoted innovation in student groups in China (Chen & Tjosvold, 2002).

Purpose of the Study

Taiwanese college students are often inactive in classes. It is not unusual to experience difficulty in initiating group discussions and implementing collaborative projects. In many Taiwanese universities and colleges, students showed low adaptability to interactive teaching strategies and little creativity in solving academic problems. Ngeow (1998) emphasized the importance of critical thinking as it allowed the learners to reflect and improve on their own learning. Unfortunately, critical thinking is rarely observed especially among the Taiwanese college freshmen and sophomores. These students seldom ask or respond to questions in or after classes. When asked to express their opinions, many of them either resort to reticence or copying ideas from textbooks and other readily available resources. As effective collaboration and participatory learning have not been stressed enough in Taiwanese classrooms to inspire the development of critical thinking skills, working and discussing in groups can be difficult for the students.

The aim of the study was four-fold: 1) to find out if the students, after being exposed to a semester's collaborative learning curriculum which emphasized the expression of opinions and group work strategies, showed any indications of making inquiries as a characteristic of critical thinking; 2) to identify what would predict the students' satisfaction with the group project; 3) to identify the predictors for the acquisition of collaborative learning skills; and 4) to correlate collaborative learning outcomes with students' course preparation behaviors.

Participants

One hundred and fifty two students from the Introduction to Social Behaviors and Personal Growth classes at Central Taiwan University of Science and Technology in Taiwan participated in this study in the fall semester of 2005. The Introduction to Social Behaviors was a general education requirement and Personal Growth was an elective course. The students in the Introduction to Social Behaviors classes were 122 freshmen in their first semester in college, and the students in the Personal Growth class were 30 sophomores in their third college semester. Out of the 153 participants, 71 were males and 82 were females, accounting for 46.4 and 53.6 % respectively of the sample. Both courses offered two semester units which require a 2-hour class meeting each week.

The students in this institution take classes in cohorts based on their academic majors. Students can also take elective general education courses for non-major requirements. Thus, the Personal Growth class was made up of students of different majors and the students taking the Introduction to Social Behaviors were from two class cohorts of the Medical Biotechnology and one cohort of the Health and Safety majors.

The Collaborative Learning Curriculum

Small Group Discussions

Students in all four classes were randomly divided into groups of five. Some of the groups had fewer members but no groups were larger than six members. For most of the class periods, students were asked to discuss the assigned topics in groups, using a structured discussion format. The topics assigned were either from the lecture of that day or an extension of home assignments. There were role assignments for each group. The leader monitored the sequence of the members' presentations, the timer keeper was responsible for reminding the group of the time allotted for each discussion; the recorder took notes from the members, and the presenter presented the discussion outcomes to the class. Group members rotated to take on different roles for each discussion. Depending on the nature of the discussions, the groups were sometimes asked to elect an evaluator whose responsibility was to comment on the group process.

At the beginning of the semester, students were informed of the functions and duties of the roles in the group. During the discussions, the instructor circulated throughout the classroom to facilitate group activities by answering questions and clarifying requirements. All groups were required to stop the discussions when the time was up. After that, students were given time to formulate group presentation ideas based on the results of the discussions. If time allowed, groups were instructed to provide feedback for other groups on their presentation content and formats. The instructor made sure that the roles in the groups were rotated in each discussion, allowing each student to experience the duties and responsibilities associated with different roles. Researchers who had used similar techniques reported it to be effective (Liang, 2004).

Class Participation

King (1995) said that providing thought-provoking questions was the best way to teach critical thinking. To encourage students' class participation, the instructors provided extra credits for those who answered questions and shared personal opinions on selected topics. Basically, an inquiry-based instruction was adopted in this project in which students were motivated to be expressive and reflective about their own learning. Students were encouraged to process their viewpoints with their group members before volunteering to answer questions from the instructor. Thus, students were offered an incentive to engage students in critical thinking and communication.

Working in Teams to Teach

Chickering and Gamson (1987) said that involving students in teaching courses can encourage active learning. Each group was assigned to teach a topic after the mid-term week. Students worked together in teams to design the presentation content and interactive activities. Students were encouraged to engage the audience while teaching. Each group received a critique from the instructor and other groups after they taught.

The Final Group Project

At the third week of the semester, a library research session was given by a senior university librarian to students in the Introduction to Social Behaviors classes. During this session, the information and techniques of utilizing the university's library database system were introduced. Along with the basic research methods for social sciences taught during the first week of school, the students were required to incorporate these techniques and methods in their final group projects.

The final project for students in the Personal Growth class emphasized the application of theories learned and topics discussed in the class. Students in each group role-played the story of a group member's self-exploration journey with a focus on problem-solving for life situations.

For the group project, students in the Introduction to Social Behaviors classes worked with their group members to decide on the topics of interest that were related to human behaviors in the social context. The drafts of the group timelines were scheduled to be turned in by the 8th week of the semester. The timelines included the tasks, the dates of the completions of tasks, the roles of the group members, and at least one rehearsal before the final presentations. The instructor reviewed the drafts and asked for revisions based on her feedback. Two class meetings, scheduled in the fourth week and the week before the presentations, were designated as "working sessions" for this group project. For the first meeting, the students selected group topics and brainstormed creative methods of presentation; in the second meeting, an outline for their presentation with a written report was finalized. Besides these two in-class meetings, students were encouraged to meet outside of the classes

as necessary.

Performance Evaluation

The students were evaluated for their performance in the groups. This and other assignments counted for 30% of their semester grade. Based on the records from each group discussion, the students were given a grade based on the frequency and content of their participation in group activities. A portion of the grade for the final project was from peer evaluations. Each student was evaluated by the group members on their level of cooperation, preparedness, contribution, activity in group discussions, and time on task. Using these criteria, the students evaluated their peers in the last class meeting.

Measuring the Outcomes

In addition to gathering written responses from students about their course taking experience, a questionnaire was administered at the end of the semester to survey the participants' collaborative learning outcomes, pre-course collaborative learning experiences, perceptions of the course and its instructional methods, as well as course preparation behaviors. The students completed the survey anonymously. The survey included four demographic questions related to each student's gender, years in college, major, and high school attendance. Apart from two open-ended questions, the questions were four-point Likert scales ranging from strongly disagree to strongly agree. The results were analyzed in terms of the students' satisfaction with the group report, the behavior of asking questions in classes, how they learned about group work, and discussions related to their course preparation behaviors and the collaborative process.

The statements investigating the students' perception on the collaborative learning outcomes included the following:

- I am better at expressing myself after taking this course.
- I have learned about group collaboration and discussion.
- I felt the group discussions were effective.
- I felt respected by my group members.
- I felt respected by my instructor.
- I felt that I had more opportunities to express my opinions in this class than in others.
- The projects in this course were thought-provoking.
- I have developed different thinking strategies by taking this course.
- I have asked more questions as a result of taking this course.
- I have learned from my group members.
- I have become more familiar with my group members than with others in the class.
- We had conflicts in our group.
- I learned how to collaborate in achieving our common goals.
- I am satisfied with our group report.

The sample statements for the students' pre-course collaborative learning experience were "the instructors from other

courses encourage small group discussions," and "I rarely present in class."

The sample statements for the students' perceptions on the course and instructional method were "the discussions are different from what I have experienced in other courses," and "the instructor of this course taught differently."

The sample statements for students' course preparation attitudes were "when I don't understand something in a course, I try to solve the problem," and "I know the requirements for the final project."

The two open-ended questions were, "what are some different attitudes which you have developed as a result of taking this course?" and "what have you learned from this curriculum that you can apply to other courses, professional settings or real life situations?"

In addition to the post-course survey, the students from the Introduction to Social Behaviors classes were asked to share what they had learned from this curriculum briefly in writing, as part of a quiz. The students from the Personal Growth class shared this information verbally in the last class meeting.

Findings

When surveyed on their previous class experience in a post-course questionnaire, about 80% of the participants indicated that they had previously participated in group projects. Many of the students (79%) agreed that the group project required from this instructor (the researcher) was different from what they had done before in other classes. Almost 90% of them thought that the group discussions were set up differently from what they had experienced previously. Over half (53%) of the sample reported that they had rarely presented in class while many of them (57%) disagreed that presenting was difficult. Ninety seven percent of the students felt that this course was instructed differently, and 89% of them felt stressed over the instructional method in this course.

To understand how the students felt about their final group project and how their perception of it was related to their group activities, multiple regressions were performed. The variables that were highly correlated were not used for the analyses to avoid the collinearity problems. These highly inter-correlated pairs of variables were: Learning to achieve common goals and learning about group work and discussions, $r(146) = .52$, $p < .01$; feeling respected by group members and by the instructor, $r(146) = .53$, $p < .01$; developing different thinking strategies and feeling respected by the instructor, $r(146) = .55$, $p < .01$; developing different thinking strategies and that the course was intellectually stimulating, $r(146) = .69$, $p < .01$; developing different thinking strategies and learning different viewpoints from group members, $r(146) = .51$, $p < .01$; and finally, learning to achieve common goals and learning about different viewpoints from group members, $r(146) = .60$, $p < .01$.

Students' Satisfaction with the Final Group Report

When the following variables: knowing group members better than with others in the classes, having conflicts within the group, learning to expressing oneself through the courses, having more opportunities in expressing oneself, learning different viewpoints from the group, asking more questions in class, the gender of the students, and the year in college were entered simultaneously into the regression equation, knowing group members better than others in the class (Beta = .254, p = .004), was found to significantly predict the students' satisfaction with the final group report (R = .43; adjusted R^2 = .14) when these other variables were considered. Variance predicted from a combination of these variables was 14%, r = .37, which was a medium effect (Cohen, 1988). Table 1 presents this finding.

Table 1
Multiple Regression on the Measure of Students' Satisfaction with the Outcomes of the Final Group Report[a]

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std.Error	Beta	t	Sig.
1	(Constant)	1.101	.439		2.505	.013
	knew group members better than others in class	.259	.088	.254	2.939	.004
	had conflicts	-.058	.072	-.063	-.800	.425
	learned to express self through this course	.178	.101	.159	1.764	.080
	more oppor. in expressing oneself	-.007	.114	-.005	-.058	.954
	learned different viewpoints from the group	.039	.115	.028	.337	.737
	gender of student	.061	.122	.040	.498	.619
	year in college	.061	.122	.040	.498	.619
	asking more questions	.184	.106	.163	1.736	.085

[a]. Dependent variable: Satisfaction with the outcomes of the group report.

Asking More Questions as a Result of Taking the Course

The result of a multiple regression analysis indicated that the combination of the two variables, learning about self-expression (Beta = .269, p = .001) and having more opportunities to express oneself

through the courses (Beta = .241, p = .003) significantly predicted the students' behavior in asking more questions in class when six other variables were considered together in the analysis. These six other variables were: knowing group members better than with others in the classes, having conflicts with group members, learning about self-expression through the courses, having more opportunities in expressing oneself, learning different viewpoints from the group, the gender of the students, and the year in college. This regression model accounted for 32% of the variance in students' behavior of asking more questions in class (R = .60; adjusted R^2 = .32). The effect size was large (r = .57), according to Cohen (1988). Table 2 summarizes this result.

Table 2
Multiple Regression Analysis on the Measure of Asking More Questions in Class[a]

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std.Error	Beta	t	Sig.
1	(Constant)	.274	.355		.772	.441
	knew group members better than others in class	.042	.072	.046	.582	.561
	had conflicts	.031	.057	.038	.539	.591
	learned to express self through this course	.233	.068	.269	3.438	.001
	more oppor. in expressing oneself	.240	.078	.241	3.073	.003
	learned different viewpoints from the group	.170	.089	.150	1.909	.058
	gender of student	.093	.091	.074	1.015	.312
	year in college	-.122	.096	-.090	-1.269	.207
	satisfied with group report	.115	.066	.130	1.736	.085

[a]. Dependent variable: Asking more questions in class

Learning to Work and Discuss in Groups

Nine variables were used to identify the predictors for the behavior of learning to work and discuss in groups. These variables were: feeling respected by group members, feeling that the courses were intellectually stimulating, learning about self-expression through the courses, learning different viewpoints from the group members,

having conflicts with group members, knowing group members better than with others in the classes, having more opportunities in expressing oneself in class, the gender of the student, and the year in college. Feeling respected by group members (Beta = .205, p = .004), learning about self-expression through the courses (Beta = .227, p = .002), learning different viewpoints from the group members (Beta = .155, p = .046), having conflicts with group members (Beta =.-137, p = .038), and having more opportunities in expressing oneself (Beta = .295, p < .001) combined to predict the outcome of learning to work and discuss in groups (R = .69; adjusted R^2 = .45). The variance in the behavior of learning to work and discuss in groups predicted from this regression model was 45% (r = .67), with a large effect size (Cohen, 1988). The results of the analysis are shown in Table 3.

Table 3
Multiple Regression on the Measure of Learning about Group Work and Discussions[a]

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std.Error	Beta	t	Sig.
1	(Constant)	.391	.341		1.149	.253
	felt respected by group members	.249	.085	.205	2.925	.004
	intellectual stimulating	.095	.068	.110	1.398	.164
	learned to express self through this course	.174	.055	.227	3.188	.002
	learned different viewpoints from the group	.155	.077	.155	2.014	.046
	had conflicts	-.099	.047	-.137	-2.093	.038
	knew group members better than others in class	.049	.057	.060	.862	.390
	gender of student	-.010	.073	-.009	-.140	.889
	year in college	.018	.079	.015	.224	.823
	more oppor. in expressing oneself	.260	.064	.295	4.060	.000

[a]. Dependent variable: Learning about group work and discussions

Students' Course Preparation Attitudes and Learning to Work and Discuss in Groups

Twelve of the students' course preparation attitudes were examined for their predictability of the collaborative outcome in learning to work and discuss in groups. The result of the analysis showed that the combination of the following two course preparation attitudes: rarely participating in presentations (Beta = 2.142, p = .034) and knowing how to contact the instructor (Beta = 2.791, p = .006) significantly predicted learning to work and discuss in groups (R = .45; adjusted R^2 = .13). The variables in this regression equation accounted for 13% (r = .36) of the variance in learning to work and discuss in groups. The effect size was medium (Cohen, 1988). These results are presented in Table 4.

Table 4
Predicting the Outcome of Learning about Group Work and Discussions from Students' Course Preparation Behaviors[a]

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std.Error	Beta	t	Sig.
1	(Constant)	.881	.491		1.794	.075
	teachers encourage speaking	.132	.087	.132	1.521	.131
	teachers encourage discussion	.107	.075	.128	1.428	.156
	have done group report	.013	.066	.018	.203	.839
	rarely participated in presentation	.114	.053	.172	2.142	.034
	no follow up with questions	.054	.078	.059	.703	.484
	discuss with classmates about questions	.019	.082	.019	.230	.819
	know how to contact instructor	.161	.058	.233	2.791	.006
	have a note book for each course	.005	.061	.007	.081	.935
	know grading criteria for this course	.184	.093	.207	1.963	.052
	know grading criteria for all course	-.056	.078	-.070	-.720	.473
	know the content of the final project	.035	.077	.039	.455	.650

	don't understand requirement for assignments	.037	.062	.048	.593	.554

Qualitative Measures of the Outcomes

In the written and oral responses collected in one of the class sessions, students reported learning about teamwork, group communication, presentations, interacting with group members and the instructor, interpersonal relationships, self-expression, and critiquing. Some said they had acquired new knowledge that had not been taught in other courses; some said they had built up confidence in being independent thinkers, respecting others, collaborating, conducting effective group discussions and practicing time management, while analytical skills, active learning, self-regulation, and planning for success were highlighted by many others. In addition, conflict resolution, organizational, and note-taking skills were reported as the most rewarding experiences from taking these courses.

The two open-ended questions in the end-of-the-semester survey were given to investigate the students' attitudinal change to learning as a result of taking these courses, and the skills learned that are applicable to life, professional and other educational situations. In regards to the changes in the attitudes toward learning, the students felt that they had become better at problem-solving, asking questions, observing, adapting to different teaching styles and being perceptive. Many of them used the words "engage," "participate," and "motivated" which were indicators of the development of active learning behaviors. Some examples of these behaviors were "previewing the course materials, setting aside the time for home assignments, thinking about what has been learned, being attentive, paying attention to details, engaging in deeper levels of analysis, taking thoughtful notes, and actively seeking opportunities for group discussions." Several qualities such as learning to collaborate, sharing viewpoints with group members, respecting others, making group decisions, listening to and communicating with group members were the positive outcomes of the collaborative learning experience. As well, the statements such as "I know who I am," "I understand myself better," and "I have more confidence now" showed the development of positive self-concept resulted from taking these courses.

Transferable skills identified by the majority of students as having been gained from this experience included public speaking, being objective, researching, report writing, and taking responsibility. There were quite a few students who said that the new experience was enjoyable, and that they had less fear of learning new knowledge and asking for help.

The genders of the students and the year they were with the college did not predict any of the phenomena explored in this study.

Discussion

The analyses showed that the students' satisfaction with the final group projects could be predicted from knowing their group members better than others in the classes. Since the students were randomly divided into groups and were either freshmen in their first semester or sophomores taking a class cross-disciplinarily, developing kinships in attempting to work together toward common goals seemed important. Perhaps with the Chinese cultural emphasis on creating harmony in relationships (Chen & Tjosvold, 2002), the Taiwanese students' need to bond with their group members was critical in creating successful group projects. From a social cohesion perspective, the cohesiveness of a group is important for group success (Slavin, 1995). This can perhaps explain the association between the students' satisfaction with the outcomes of the group projects and the level of how they were acquainted with one another in the groups. Interestingly, students' learning to express themselves through the curriculum, agreeing that they had more opportunities in expressing themselves from this course, and learning different viewpoints from the group did not contribute significantly to predicting their satisfaction with the group projects when considered simultaneously with the variable of knowing their group members better than others in the classes. Developing familiarities with group members seemed more important than anything else in terms of the students working together to achieve the group goals.

The outcome of students' asking more questions after taking the courses was dependent on their learning about self-expression and having more opportunities to express their opinions through the curriculum. The more the students learned about expressing themselves, the more they asked questions. Similarly, when students felt that they were given more opportunities to express themselves, they asked more questions in class. In this curriculum, the instructors provided an environment for inquiry-based learning and encouraged the students to dialogue while exploring solutions to problems. This result was congruent with Ngeow's (1998) finding that offering dialogically participatory opportunities among the learners supports the inquiry process.

It appears that several behaviors predicted the students' acquisition of collaborative learning skills. The more they felt that they were respected by group members, the better they learned about working and discussing in groups. The more they learned to express their opinions, and the more opportunities they were given to do so through this curriculum, the better they learned to work collaboratively in groups. This result supported Gokhale's (1995) finding that peer support contributed to the collaborative learning process. Wentzel and Watkins (2002) also emphasized that being accepted by peers could motivate students to engage in learning activities. When students felt supported by their group members, they were more likely to engage in group interactions, which also motivated them to learn from one another. The result of students' learning about different viewpoints to enhance group learning mirrored Cohen's (1995) finding that mutual respect and the development of collegiality skills through cooperative learning groups led to the formation of a learning community. She also attested that being open to the viewpoints of others was one of the basic attitudes of cooperation.

However, from this study, it also seems that the more conflicts the students had with group members, the less they learned to work and discuss in groups. The finding that the students negatively associated group conflicts with the acquisition of collaboration skills might be related to Asian students' lack of the experience in teamwork (Wong, 2004). Hardy and Phillips (1998) said that a conflict is not necessarily bad; on the contrary, it can be seen as productive in a collaborative process (Looser, 1995). Stevahn, Munger and Keley (2005) also indicated better learning among students when conflict resolution training was implemented.

With respect to how the acquisition of group collaborative skills could be predicted from the students' course preparation behaviors, the students were found to be more likely to learn about group collaboration when they knew how to contact the instructor and when they had little experience in presenting in class. A positive correlation between academic success and motivation has been highlighted by numerous researchers (Hinckley & Alden, 2005; Nonis, Philhours, Syamil & Hudson, 2005); thus, the students' paying attention to the instructor's contact information implied a motivation to learn and succeed academically. Hence, the demonstration of such course participation behavior signified the willingness to collaborate for success in group activities. With the collaborative learning curriculum, the students were required to voice their opinions, provide an analysis for each problem, present to their own groups and the class within a collaborative context. The exposure to these activities might have enabled those with little experience in presenting to learn about group work and discussions.

Conclusion

The fact that the sample contained a much smaller number of sophomore students compared to freshmen limited the interpretability of the variable "year in college." To use this variable for analysis in replicating the study, it would be important to study a sample with approximately equal division among students of different academic levels. A sample divided between the students of lower and upper divisions could probably yield more significant conclusions.

The collaborative learning curriculum in this study corroborated the principles of good practices in undergraduate education (Chickering & Gamson, 1987). First of all, this interactive curriculum fostered reciprocity and cooperation among students. Secondly, the students were encouraged to learn actively by participating in group projects. The findings of this study suggested that the Taiwanese college students' willingness in making inquiries could be enhanced by emphasizing self-expression as one of the course requirements. Also, because the Taiwanese students' lack of autonomous learning can be related to the fear of making mistakes in public and their reluctance to challenge the instructors, collaborative learning offers a platform where peer and instructor support can reduce apprehension about expressing opinions and making inquiries.

This study suggests that skills in teamwork and conducting effective group discussions should continue to be emphasized. In

addition, the study supports the viewpoint of Schaps (1998) that the activities of a collaborative learning curriculum need to be designed effectively to create an environment that fosters the interchange of mutual respect. The role and function of each group member needs to be defined unambiguously (Chan, 1999; Liang, 2004). It is also important to have the students rotate to take on different roles in various discussions (Cohn, 1999; Liang, 2004). It was evident that when equitable participation and structured group discussions were ensured (through the emphasis on respecting diverse viewpoints and the expression of opinions), the students had a better chance to learn about teamwork and achieve the goals of the discussions. Furthermore, the content and length of a group timeline needs to be defined well by an instructor to avoid confusion and to ensure positive collaborative results.

Because cohesiveness is valued by the Taiwanese (Niehoff, Turnley, Yen & Sheu, 2001), dealing with conflict may be difficult for them. Offering class time for students to reflect on their group progress and resolve any conflicts which may have arisen from the collaborative process can be very helpful. If possible, strategies for handling conflicts and communication should be provided. Also, by incorporating peer evaluation into the final grade, individuals can be held accountable; as a result, there is a better chance for accomplishing the group goals with collaborative efforts.

The study confirms that a provision of a collaborative environment where active participation is highlighted can foster the autonomous learning of college students in Taiwan. Particularly, promoting active student-instructor contacts and developing strategies to increase student involvement in presentations can lead to positive results in collaborative projects. In addition, offering activities to facilitate mutual support and familiarity within the groups can add to the students' satisfaction of the collaborative learning outcomes.

The benefits of collaborative learning have been recognized, judging from the trend of many higher education institutions' infusing of teamwork, presentation or communication skills across the curriculum (Donofrio & David, 1997). Christopher (2003) proved that collaborative learning, interactive learning and in-class discussions motivated students to learn in large lecture classes. As many of the Taiwanese college classes are large, collaborative learning can be a viable option for inspiring the students to learn and think reflectively. This study offered not only recommendations for designing college collaborative learning curriculum in Taiwan, but also possible applications of the findings to non-Taiwanese educational settings.

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