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Heng-Yu Ku
University of Northern Colorado

Hungwei Tseng
Jacksonville State University

Chatchada Akarasriworn
Srinakharinwirot University

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Collaboration Factors, Teamwork Satisfaction, and Student Attitudes
toward Online Collaborative Learning

Heng-Yu Ku ^a

University of Northern Colorado

Hung Wei Tseng ^{b*}

Jacksonville State University

Chatchada Akarasriworn^c

Srinakharinwirot University

^a Department of Educational Technology, College of Education and Behavioral Sciences at the University of Northern Colorado, Greeley, CO 80639. Tel: 1-970-351-2935; Fax: 1-970-351-1622; Email: heng-yu.ku@unco.edu

^b Office of Distance Education, Jacksonville State University, 700 Pelham Rd. N, 212A Self Hall, Jacksonville, AL 36265-1602
Tel: 1-256-782-8172; Fax: 1-256-782-8128; Email: htseng@jsu.edu

^c College of Social Communication Innovation, Srinakharinwirot University, Bangkok, Thailand.
Email: chatchada@swu.ac.th

Abstract

This study examined online courses with collaborative learning components from 197 graduate students across three consecutive academic years. A student attitude survey containing 20 items and a student teamwork satisfaction scale containing 10 items on a 5-point Likert-type scale with three open-ended questions regarding their online collaborating experiences were collected during the final week of each semester. Results revealed that the three extracted online collaboration factors (team dynamics, team acquaintance, and instructor support) from the student attitude survey had moderate to high degrees of correlation with teamwork satisfaction. Results also revealed that the three collaboration factors accounted for 53% of the variance in online teamwork satisfaction. In addition, results from both surveys and open-ended questions revealed students favored working collaboratively in an online environment.

Keywords: distance education; online collaborative learning; team dynamics; teamwork satisfaction; teaching/learning strategies

Collaboration Factors, Teamwork Satisfaction, and Student Attitudes toward Online Collaborative Learning

1. Introduction

Distance education in the United States has greatly increased in recent years and this enormous growth has generated interest in defining quality for online learning. In addition, online enrollments have been increasing more rapidly than on campus enrollment (Allen & Seaman, 2010). As our society moves forward, the ability for learners to work as part of a team and to coordinate the efforts of a team is becoming more and more important to the advancement of knowledge and the success of any job (Johnson & Johnson, 2004).

Collaborative learning is not a new teaching strategy and research on collaborative learning in the classroom can be dated back to the early 1970s (Dillenbourg, Baker, Blaye, & O'Malley, 1996). One important aspect of Vygotsky's socio-cultural theory is the "Zone of Proximal Development" which argues that a learner cannot achieve an understanding of a new idea or concept unless he/she acquires help or feedback from a teacher or a peer (Vygotsky, 1978). In Vygotsky's view, peer interaction is an important way to facilitate individual cognitive growth and knowledge acquisition, and the peer collaboration can help learners in problem solving.

Prince (2004) stated that the collaborative learning is an instructional method where students work together in small groups to pursue a common goal. The distinction between collaborative learning and cooperative learning is "the emphasis on student interactions rather than on learning as an individual or private activity" (Prince, 2004, p. 1). In collaborative learning, students engage in their own knowledge construction by integrating new information and knowledge networks into the learning community. Several researchers (Johnson & Chung,

1999; Mergendoller, Bellisimo, & Maxwell, 2000) examining the effect of collaboration on problem solving found that collaboration improved learner performance regarding higher-order thinking activities when learners discussed the problem and suggested potential solutions to the problem.

Online collaboration is the computer-mediated version of the traditional in-class collaborative learning. With the possibility and accessibility of multilevel interaction, resource sharing, and higher order thinking activities, online learning environments provide students to develop competencies in real-world situation (Oliveira, Tinoca, & Pereira, 2011). Under the benefits of technologies, students are the co-creators of the learning content and their own agents on learning (Froyd & Simpson, 2008). In addition, the extendable online environment can let students create their own learning spaces of interaction and collaboration. The encouragement of active and constructive learning, deep processing of information, critical thinking, and goal-based learning (Bernard, Rojo de Rubalcava, & St-Pierre, 2000; Law, 2011; Nam & Zellner, 2011) are believed to remain valid in online collaborative learning environments, just as they do in traditional collaborative settings (Chou & Chen, 2008; Graham & Misanchuk, 2004).

In order to understand how and why teams or groups can progress to evolve norms and achieve goals mutually, researchers have focused their studies on group dynamics (Greenlee & Karanxha, 2010; Johnson & Johnson, 2003; Williams, Duray, & Reddy, 2006) and group behaviors. Group dynamics can be conceptualized as falling into the following categories: participation, communication, collaboration, trust, and cohesion (Greenlee & Karanxha, 2010). Those categories are interrelated and are highly correlated to each others. Frequency and quality of communication can encourage team members to exchange information and

experiences that can promote team cohesiveness, decision-making, and trust. Sarker, Ahuja, Saker, and Kirkeby (2011) found that communication leads to performance through trust.

In terms of group behaviors, higher team member familiarity led to more positive perceptions of teamwork communication and collaboration (Janssen, Erkens, Kirschner, & Kanselaar, 2009; Stark and Bierly, 2009). The familiarity that members develop within their teams helps them to predict others' learning behaviors, communication patterns, and strengths. Thus, they could move more quickly through the team forming stage by developing team norms and reaching mutual agreements.

Teamwork satisfaction involves understanding the team's interaction and process from the perspective of the team participants themselves. Wall and his colleagues (Wall & Galanes, 1986; Wall, Galanes, & Love, 1987) have studied satisfaction which has focused specifically on individual team member satisfaction regarding team interaction. Jonassen (1999) stated that students are satisfied in an online classroom when the technology is transparent and functions both reliably and conveniently, the course is specifically designed to support learner-centered instructional strategies, the instructor's role is that of a facilitator and coach, and there is a reasonable level of flexibility. Connolly, Jessup, and Valacich's (1990) study evaluated the effects of anonymity and evaluative tone on computer-mediated group. The results revealed that participants were more satisfied with the group's process and outcomes when the evaluative tone was supportive than critical. However, one of the purposes of the current study was to investigate the levels of team members' satisfaction in an online collaborative learning environment.

In addition, Johnson, Aragon, Shaik, and Palma-Rivas (2000) argued that the notion of learner satisfaction must be explored through a multidimensional analysis of a wide variety of critical variables to provide effective measures that guide improvements in online instructional

design. Another example of a validated approach to assessing a deeper degree of members' satisfaction has been provided by Ocker (2002) who identified five aspects of satisfaction: solution satisfaction, solution confidence, interaction process satisfaction, perceived decision quality, and level of teamwork. Witteman (1991) also categorized member satisfaction into three different factors: member satisfaction with the decision-making activities and procedures in the group, communication in the group, and leadership. In this study, teamwork satisfaction was defined generally as a positive "affective response that members have to some element pertaining to a small group" (Witteman, 1991, p. 31).

Furthermore, Tseng, Wang, Ku, and Sun (2009) investigated the relationship between online collaboration factors and teamwork satisfaction among 46 students. Their findings revealed that "trust among teammates" and "organization practices" were effective factors to explain online collaborative satisfaction. However, they concluded that the sample size was not large enough for standard regressions based on Green's (1991) rule of thumb for determining regression sample sizes. The present study was conducted to extend Tseng et al.'s (2009) prior research by collecting a much larger sample size to examine the degree of relationship between teamwork satisfaction and online collaboration factors. In addition, students' attitudes toward online collaborative learning experiences were also investigated. The following research questions were addressed:

1. What are the factors that underlie online collaborative learning components as measured by the student attitude survey?
2. Is teamwork satisfaction related to the extracted online collaboration factors?
3. How much of the variance in teamwork satisfaction can be explained by the extracted online collaboration factors?

4. What are student attitudes toward working collaboratively in an online setting?

2. Method

2.1. Subjects

Participants were 197 mid-western graduate students enrolled in online courses in Instructional Design across three consecutive academic years. One hundred and thirty-eight of those students were females (70%) and 59 were males (30%). Seventy percent of the students were majoring in Educational Technology or School Library Education.

2.2. Online course structure

The same instructor taught these courses using a web-based course management system called Blackboard. During the first two weeks, the instructor asked students to post a short biography and a picture of themselves in Blackboard. During the third week, the instructor randomly assigned three or four students to form a group using the “Groups” function. Under the “Groups” function, group members had access to tools for sending email to their group members, posting messages under the group discussion board, and submitting their assignments via file exchange. Each group then brainstormed ideas, reached agreements, and decided on a topic to create a design document and self-paced lesson for that topic throughout the semester. The design document included seven components of 1) needs, learner, and contextual analyses, 2) task analysis, 3) instructional objectives, 4) questions and feedback, 5) instructional sequencing, 6) instructional strategies, and 7) message design.

During the weeks of four to 10, each group was required to work on the seven components of the design document. Each group worked on drafts together, provided feedback to and received feedback from its group members, revised drafts based on the peer feedback, and posted the final drafts via file exchange under the “Groups” function before the due dates.

Following the posting of these drafts, the instructor reviewed the final draft of these design components and provided feedback to each group. Each group then modified its drafts based on the instructor's feedback.

After all components of the design process were completed, students had two weeks to develop a draft of a self-paced lesson based on the design document. During the weeks of 13 and 14, students conducted a formative evaluation to test the draft of the self-paced lesson to three of the learners. They then used the evaluation results to revise their self-paced lessons. Finally, students submitted the final design document and self-paced lesson during the last week of the semester.

2.3. Instrument

2.3.1. Student attitude survey

The student attitude survey contains a total of 20 items that was developed based on Waters and Napier's (2002) five collaboration factors model. These survey questions probed the participants' attitudes about doing collaborative work and about their confidence in collaborating with others in problem solving. Items were posed as statements, with possible responses on a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). Sample survey items were "Getting to know one another in my team allows me to interact with teammates more efficiently," "My team sets clear goals and establishes working norm," and "My team members clearly know their roles during the collaboration." The main purpose of this data source was to evaluate participants' attitudes toward collaboration in general after working on online group projects. The Cronbach's alpha reliability for the survey was .95.

2.3.2. Teamwork satisfaction scale

A self-evaluation questionnaire was used for assessing members' satisfaction on teamwork learning environment and perceptions on peer interaction. The 10-item teamwork satisfaction scale was developed by Tseng et al. (2009) and all items were measured on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Johnson, Aragon, Shaik, and Palma-Rivas (2000) argued that studies of learner satisfaction are typically limited to one-dimensional post-training perceptions of learners. Hence, for this teamwork satisfaction scale, learners' satisfaction involves three perspectives: satisfaction with online collaborative learning environment, satisfaction with teamwork learning process, and satisfaction with the benefits from peer interactions.

Sample questions in the teamwork satisfaction scale included "My team members are sharing knowledge during the teamwork processes," "I like solving problems with my team members in group projects," and "I gain online collaboration skills from the teamwork processes." Exploratory factor analysis by principal component extraction indicated that only one factor had an Eigenvalue equal or greater than 1.0, with a total of 70% variance explained in the current study. The teamwork satisfaction scale has been shown to demonstrate desirable factorial validity and internal consistency with the selected graduate student population (Tseng et al., 2009). The Cronbach's alpha reliability for the teamwork satisfaction scale was .95.

2.3.3. Open-ended questions

The student teamwork satisfaction scale also consisted of three open-ended questions dealing with student perceptions toward working on group projects in an online learning environment and suggestions on the important elements that a successful online collaborative setting should comprise. These three questions were: 1. Did you like or dislike working

collaboratively as a group in an online environment? Why or why not? 2. Do you think you would have learned more in this class if you had done your project alone? Why or why not?, and 3. In your opinion, what elements should be embedded in a successful online collaborative setting?

2.4. Procedure

The student attitude survey and teamwork satisfaction scale were distributed as an email attachment to students during the final week of each semester. Data were collected during the final week of each class across three consecutive academic years. All participants completed both surveys and then sent their responses as an email attachment to their instructor by the last day of the semester.

2.5. Data analysis

The data analysis in this study involved exploratory factor analysis (research question 1), multivariate correlational analysis (research question 2), and multiple regression analysis (research question 3). To respond to the last research question, the data collected from the student attitude survey and student teamwork satisfaction scale was calculated by using descriptive statistics. In addition, for each of the three open-ended questions, the recurring responses were categorized and counted. Exploratory factor analysis (EFA) was conducted to uncover the underlying structure of a relatively large set of variables of the student attitude survey and to identify the underlying relationships between measured variables. Eigenvalue ≥ 1 , Cattell's scree plot, and salient loadings of $\geq .35$ were used as the criteria to determine how many factors to be extracted. Next, a multivariate correlational analysis was performance to test the degree of the relationship between the extracted factors and a multiple regression analysis

was conducted to investigate the extent to which those extracted factors explain the online teamwork satisfaction.

3. Results

3.1. Student attitude survey

Research question one investigated the factors that underlie online collaborative learning components as measured by the student attitude survey. Exploratory factor analysis by maximum likelihood extraction and promax rotation was used to examine factors underlying collaborative learning components as measured by the student attitude survey. The results revealed that three factors were extracted. First, the 12 items loaded onto Factor 1 related to team's own patterns to participate in team projects, communicate with other members, and establish team cohesion. This factor was labeled as "Team Dynamics". Second, the four items loaded onto Factor 2 related to team's familiarity with members' learning styles, personal beliefs, and professional backgrounds. This factor was labeled as "Team Acquaintance". Finally, the three items loaded onto Factor 3 related to the support from the instructor that guides students to achieve learning objectives and encourage peer interaction. This factor was labeled as "Instructor Support". Item 13 was deleted because it was double-loaded on the extracted factors or was not well interpreted by the factor solution. Please see Table 1 for factor loadings.

In addition, the internal consistency of each collaboration attitude factor was estimated by Cronbach's reliability alpha. The results revealed that the internal consistency was acceptable for three factors, having Cronbach's alphas of .95 (Team Dynamics), .89 (Team Acquaintance), .67 (Instructor Support), respectively.

Table 1

Collaboration Factor Loading of the Student Attitude Survey

Survey Items	F1	F2	F3
17 My team develops clear collaborative patterns to increase team learning efficiency.	.987		
16 My team trusts each other and works toward the same goal.	.918		
20 My team members clearly know their roles during the collaboration.	.890		
18 My team sets clear goals and establishes working norm.	.889		
14 My team members reply to all responses in a timely manner.	.841		
9 My team members communicate with each other frequently.	.779		
15 I trust each team member can complete his/her work on time.	.779		
19 My team has an efficient way to track the edition of documents.	.724		
4 My team is receiving feedback from each other.	.721		
11 Communicating with team members regularly helps me to understand the team project better.	.573		
12 My team members encourage open communication with each other.	.446		
10 My team members communicate in a courteous tone.	.380		
5 My team members share culture information to know each other better.		.880	
6 My team members share personal information to know each other better.		.697	
8 Getting to know one another in my team allows me to interact with teammates more efficiently.		.628	
7 My team members share their professional expertise.		.591	
3 The support from the instructor helps my team to reduce anxiety among team members.			.809
2 The instructor acts as a referee when our members cannot seem to resolve differences.			.587
1 My team is receiving guidance on the group project from the instructor.			.586
Eigenvalues	10.35	1.62	1.23
Variance explained	51.7%	8.0%	6.2%

Note. F1: Team Dynamics. F2: Team Acquaintance. F3: Instructor Support

3.2. Student teamwork satisfaction scale

Research question two examined whether teamwork satisfaction is related to the extracted collaboration factors. The results revealed that all three collaboration factors were

positively correlated with each other and all three collaboration factors were significantly correlated with teamwork satisfaction. The highest correlation was found between team dynamics and team acquaintance ($r = .76$), followed by team dynamics and instructor support ($r = .48$), and team acquaintance and instructor support ($r = .42$). In addition, the highest correlation was found between teamwork satisfaction and team dynamics ($r = .75$), followed by teamwork satisfaction and team acquaintance ($r = .65$), and teamwork satisfaction and instructor support ($r = .50$). Table 2 illustrates the bivariate correlations between teamwork satisfaction and the collaboration factors.

Table 2

Intercorrelations of the Collaboration Factors with Teamwork Satisfaction

Scale	F1 Team Dynamics	F2 Team Acquaintance	F3 Instructor Support
F1. Team Dynamics	--		
F2. Team Acquaintance	.76**	--	
F3. Instructor Support	.48**	.42**	--
Teamwork Satisfaction	.75**	.65**	.50**

Note. ** $p < .01$

Research question three used multiple regression analysis to explore the explanation of teamwork satisfaction through the online collaboration factors. The results revealed that three collaboration factors (team dynamics, team acquaintance, and instructor support) contributed significantly to the explanation of teamwork satisfaction and accounted for 53% of the variance, $R^2 = .53$, $F(3, 169) = 64.29$, $p < .05$. In addition, it was found that team dynamics ($\beta = .48$, $p < .05$) significantly predicted teamwork satisfaction, as did team acquaintance ($\beta = .22$, $p < .05$)

and instructor support ($\beta = .18, p < .05$). Table 3 shows the summary of regression analysis for three variables explaining teamwork satisfaction.

Table 3

Summary of Regression Analysis for Variables Explaining Teamwork Satisfaction

Variable	Unstandardized Coefficients <i>B</i>	Unstandardized Standard Error <i>SE B</i>	Standardized Coefficients β
F1. Team Dynamics	.47	.08	.48*
F2. Team Acquaintance	.22	.08	.22*
F3. Instructor Support	.22	.07	.18*

* $p < .05$

3.3. Student attitudes toward online collaboration

3.3.1 Student attitude survey

The mean scores and standard deviations of 20 attitude survey items collected from the participants were tabulated and ranked as shown in Table 4. In terms of students' attitudes toward this course and online collaboration, the overall mean score across the 20-item student attitude survey was 3.98, a rating indicating positive agreement about their collaborative learning experiences.

The three highest-rated statements on the survey were "Communicating with team members regularly helps me to understand the team project." ($M = 4.43$) and "My team members communicate in a courteous tone." ($M = 4.32$), "My team is receiving guidance of the group project from the instructor." ($M = 4.29$), and "My team is receiving feedback from each other." ($M = 4.29$). On the other hand, the three lowest-rated statements were "The instructor acts as a referee when our members cannot seem to resolve differences." ($M = 3.24$), "My team members

share culture information (i.e. personal beliefs, values, assumptions, and opinions etc.) to know each other better.” (M = 3.29), and “My team members share personal information (i.e. interests, hobbies, hours of availability, etc.) to know each other better.” (M = 3.62).

3.3.2 Student teamwork satisfaction scale

The mean scores and standard deviations of the 10-item teamwork satisfaction scale collected from the participants are tabulated and ranked as shown in Table 5. The overall mean score across the 10-item teamwork satisfaction scale was 3.88, a rating indicating positive agreement about their teamwork satisfaction with their team members. The three highest-rated statements on the survey were “I have benefited from my teammates’ feedback.” (M = 4.14) and “My team members are sharing knowledge during the teamwork processes.” (M = 4.14), and “I gain online collaboration skills from the teamwork processes.” (M = 4.14). In contrast, the three lowest-rated statements were “Online teamwork promotes creativity.” (M = 3.53), “Working with my team helps me produce better project quality than working individually.” (M = 3.60), and “I really like working in a collaborative group with my teammates.” (M = 3.63).

3.3.3 Student responses to three open-ended questions

When students were asked whether they liked or disliked working collaboratively as a group in an online environment, 118 students (60%) liked it, 26 students (13%) had mixed feelings, and 53 students (27%) disliked it.

Some positive comments from students included the following:

- *Yes, I liked working with a group. The main advantage is to learn from your classmates or teammates and be able to communicate and exchange ideas with them. I believe working in a group will improve the quality of work because each step of the ID process is verified and corrected by group members.*
- *I liked learning in an online collaborative setting. By working together, we were able to discuss and understand each other perspective of the reading materials, and what is needed to complete the assignment. It helped me analyze my own*

communication patterns and style, and think more broadly about how to build upon each other's strengths for the advantage of the "greater good".

- *I liked working in a collaborative setting, which surprised me a bit. I enjoyed it because I had a very dedicated team. I never had to worry that other team members would not do their part to contribute to the completion of the assignments. I feel like our final documents would not have been nearly as complete if I had worked on my own. Getting feedback from the group and incorporating everyone's ideas really made a difference for this project. In addition, working with a team kept me on top of completing my assigned readings and work. I wanted to be prepared to contribute at our group meetings and for completing our work. The last thing I enjoyed about working with my team was getting to know my teammates personally.*
- *I liked learning in a collaborative setting because of two reasons: One, the final product was better than if I had created alone. Our ideas build on each other's and the perspective and constructive criticism of others refined the quality of the work. And two, I was introduced to ideas, gifts and abilities of others that brought energy and life to the lesson taking it in directions that I didn't expect. Team members brought their uniqueness to the task and because we had to make a product together, we each experienced each other abilities more fully.*

Students with mixed feelings regarding working collaboratively as a group in an online environment shared these comments:

- *I have mixed feelings about collaborative online learning. I felt that, as a group, we were able to accomplish more in a shorter amount of time than an individual would be able to. We also did a great job of checking each other's work and making constructive suggestions for improvement. I believe this helped us all to do higher quality work. Certainly, we all saved a tremendous amount of time by not having to attend class in person. In sum, I like the efficiency and effectiveness of collaboration. On the other hand, I was sometimes frustrated by not being in control of the whole process and the final product. I compromised some things to keep relationships positive and to keep the process moving forward.*
- *The online collaboration sometimes went smoothly and sometimes was frustrating. I liked learning from the others, but not when the discussions turned emotional.*
- *I like working in an online setting but there were some things I did not like. The things that I disliked the most working in this type of setting are the lack of face-to-face contact and the scheduling issues. Trying to coordinate four different and busy schedules was not always the easiest task to accomplish. I really enjoyed the collaborative part of this class, however. I always enjoy hearing other people's ideas and being able to bounce my own ideas off other people.*

Some negative comments from students included the following:

- *I did not enjoy the collaborative portion of this course due to the makeup of the group - individual strengths and weaknesses that we could not seem to overcome. Our work often went undone for one reason or another. It seemed to be difficult for our group to come together. We all had busy schedules; diverse experiences and backgrounds; language differences; as well as different ideas as to how to complete assignments.*
- *I find working collaboratively online much more difficult than in real life. I believe that collaboration is preferable when I can meet face-to-face. I prefer to be given assignments and just get the work done on my own in online classes, because it is so much less cumbersome. Trying to communicate with all members in a timely fashion is extra work, and if you have a weak member of a team, you feel both angry and responsible, because it feels like you have to include that person (responsible) but if they do not do the work you feel angry that you have to work so hard to include them.*
- *Overall I don't like learning online. I prefer to meet my peers and instructors face to face. I feel I learn better when in a traditional classroom setting. Sometimes the information can become confusing and if that happens we can stop the instructor right then and there to clear up the situation. If we are working on group projects I believe it helps if we can meet face to face to work on our project. By just relying on email or blackboard to communicate can sometimes slow the feedback time down. If we could meet, we would set a time to meet, be there and finish the task.*

3.3.4. Attitudes toward online collaborated learning

When asked whether students would have learned more in this class if they had done their project alone, 144 students (73%) said “No,” 28 students (14%) had mixed feelings, and 25 students (13%) indicated “Yes”.

Some comments from students who stated that they would have not learned more if they had done their project alone included the following:

- *There is no way that I would have learned as much if I had completed this project on my own. Two of the team members have great knowledge and strengths in sharing their knowledge and helping to pass that knowledge on to others.*
- *Each team member brought a unique strength to the group that helped make our project successful. Also, the feedback from the team on each assignment really*

helped to polish up each piece of the project. I gained a new perspective from my teammates.

- *I think I learned more. I collaborate a lot with teachers but never in this type of setting. I learned how to effectively collaborate online and I wouldn't have done that if I had worked alone. Also, by collaborating with others I think my final project is much better. I heard a lot of new ideas and suggestions and was able to bring that to my project. Working alone, I would not have been able to do that. I was also able to bounce my ideas off other people and get their input, which is always helpful.*
- *I think I learned more having the group to share ideas with. When you work alone, you can get too focused on just your perspective and especially with instruction, it is important to be able to see things from other points of view so your product is usable to a wide variety of people.*

Students with mixed feelings regarding their learning related to working collaboratively as a group in an online environment shared these comments:

- *I may have learned more about each section of the subject matter working alone. However, I learned much more about communication and teamwork working in a group. It is a bit of a trade-off.*
- *Not necessarily. This was a pretty big project with a lot of new information to implement. The group effort helped me to finish the project and understand it. But smaller assignments on my own leading up to the big project might have helped.*
- *Doing the project alone may able to help me learn more in this class, but then I will never have a chance to know how good others are and not able to learn about communicate...*

In contrast, students who stated that they would have learned more if they had done their project alone included the following comments:

- *Yes, I feel that relying on others in the group to get stuff done affected my performance adversely. When on my own, I always get assignments done on time.*
- *I would have learned more because instead of spending time focusing on team management, I could have spent more time on reading and doing the project.*
- *I think I would have learned more because I would have had to do more. We broke up work into sections and so for the sections that I didn't do, I am obviously not as familiar as I would have otherwise. I did read everything, even parts that I wasn't accountable for, but the main focus was on my delegated section.*

3.3.5. Critical elements in an online collaborative setting

When asked about what students considered as critical elements in a successful online collaborative setting, their comments in the order of importance included: 1) instructor support and encouragement, 2) team commitment, 3) clear objectives and goals, 4) clear communication, 5) timely resources, 6) frequent Communication, 7) use of interactive software, 8) synchronous meetings, 9) opportunities to access and view examples, and 10) well-defined and well-organized instruction.

4. Discussion

The results revealed that the three extracted online collaboration factors (team dynamics, team acquaintance, and instructor support) from the student attitude survey had moderate to high degrees of correlation with teamwork satisfaction. The results also revealed that all three factors contributed significantly to the explanation of teamwork satisfaction and accounted for 53% of the variance.

Team dynamics found in this study promoted higher teamwork satisfaction. This coincides with the findings of previous research that teamwork trust (Liu, Magjuka, & Lee, 2008), open communication (Miles & Mangold, 2002), and cohesion (Maznevski & Chudoba, 2000) contribute significantly to higher levels of teamwork satisfaction. In the current study, the results from the two highest-rated items from the student attitude survey also indicated that participants communicated with their team members regularly helped them to understand the team project better and they communicated in a courteous tone. Lancellotti and Boyd (2008) stated that through communication, team members can find better ways to work with each other, increase team effectiveness, and lead to greater teamwork satisfaction. To communicate in a

courteous tone and efficient ways, team members become more willing to respond helpfully to each other's wants, needs, and requests (Johnson & Johnson, 2003).

In addition, getting acquainted with teammates by sharing personal beliefs, background, and interests offers opportunities to get to know each other better and build good relationships. Team acquaintance can help team members to develop confidence after they figured that no harm will come to them based on the actions of others. This finding is in concert with previous studies like that of Lurey and Raisinghani (2001) and Adams, Roch, and Ayman (2005), which advocated that team member relations play an important role in promoting teamwork satisfaction. Stark and Bierly (2009) also asserted that familiarity reduces team member uncertainty associated with behavioral and relationship expectations and that familiarity is a significant predictor of team satisfaction.

Furthermore, previous research indicated that instructor support, for instance, a prompt response to students' requests or questions when students encounter problems in an online course, significantly influences learners' satisfaction and benefits to students (Arbaugh, 2002; Thurmond, Wambach, & Connors, 2002). Moreover, the effects of learning activities and students' satisfaction are influenced by instructors' attitudes in supervising learning activities in online courses (Lee, Srinivasan, Trail, Lewis, & Lopez, 2011; Sun, Tsai, Finger, Chen, & Yeh, 2008). According to Simonson (1995), the instructor's role has shifted from a lecturer in a classroom to a co-learner and facilitator in an online collaborative learning environment. Therefore, the instructor should strive to make the experience of the online learner as complete, satisfying, and acceptable as that of the local learner.

In terms of students' attitudes toward online collaborative learning, results from both surveys revealed students favored working collaboratively in an online environment. When

asked whether students liked or disliked working collaboratively as a group in the online environment, 60% of students indicated they liked learning in an online collaborative setting. When asked whether students would have learned more in this class if they had done their projects individually, 73% of participants felt that the collaborative environment produced greater learning. Such findings indicate that collaborative learning is an effective pedagogy to promote students' engagement and learning in the online environment. According to Neo (2003), students engaged in a collaborative learning not only enhanced their critical thinking and problem-solving skills, but also became more active learners in their learning processes. Hew and Cheung (2008) also stated that when learning collaboratively, students should not just passively receive information. They should be encouraged to explore resources, build interpersonal connections and relationships, and construct knowledge when interacting with peers.

In addition, students indicated ten critical elements that were important in a successful online collaborative setting. These ten elements echoed the three collaboration factors (team dynamics, team acquaintance, and instructor support) that were extracted from the student attitude survey. In regard to team dynamics and team acquaintance, establishing team commitment, having clear and frequent communication among team members, using interactive software, and holding synchronous meetings were important from students' perspective. Students also thought that instructors should provide a supportive collaborative learning environment by encouraging learners, having clear objectives and goals, offering timely resources, providing opportunities to view examples, and structuring a well-defined and well-organized instruction. These results also align with Lee et al.'s (2011) findings that student perceived support was significantly related to students' overall satisfaction with the online course.

Finally, Hunter and Leahey (2008) stated that “women are more likely to collaborate, possibly arising out of sex differences in desire to collaborate” (p. 293). In contrast, Kyvik and Teigen (1996) argued that women are less integrated in professional networks and are therefore less likely to engage in collaborative relationships. Since the majority of participants in this study were females (70%), it is worth closely examining the gender differences on learners’ perspectives of online collaborative learning in future studies.

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