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Technical Projects: Understanding Teamwork Satisfaction In an Introductory IS Course

Nannette P. Napier
Georgia State University
Computer Information Systems
Atlanta, GA 30302-4015 USA
nnapier1@gsu.edu

Roy D. Johnson
University of Pretoria
Department of Informatics
IT building 5-95
Pretoria 0002, South Africa

ABSTRACT

Information Systems (IS) projects are increasingly staffed by cross-functional teams working together to solve complex tasks. To better prepare students for this business reality, higher education institutions need to integrate team projects within their courses. Despite good intentions, these team projects do not always have the desired outcomes. Often times, the resulting product does not necessarily benefit from the contributions of all team members, and students express frustration when having to work with other team members. Using a combination of qualitative and quantitative methods, we examined factors that might influence teamwork satisfaction on a group database project in an undergraduate IS course. The top three factors found to enhance perceptions of teamwork satisfaction were team spirit, work ethic, and equal team member contributions. The top three factors that serve as barriers to teamwork satisfaction were lack of participation in teams, inadequate technical skills, and poor communication among team members. The quantitative analysis confirmed findings that students in high-collaboration teams were more satisfied than students in low-collaboration teams. Recommendations on structuring satisfying team experiences for students are provided.

Key Words: collaboration, cooperative learning, teamwork satisfaction, student attitudes, group projects

1. INTRODUCTION

Information Systems (IS) projects are often staffed by cross-functional teams working together to solve complex tasks in "internet time" (Ramesh, Pries-Heje, and Baskerville, 2002). Accordingly, companies seek technical candidates with strong communication, interpersonal, and problem solving skills (Lee, 2005) in a diverse workforce. To better prepare students for this business reality, college educators have integrated team projects across the curriculum. Despite good intentions, these team projects do not always have the desired outcomes of encouraging peer learning, increasing students' social skills, and enhancing student achievement. Although the education literature provides several examples of cooperative learning usefulness (Johnson, Johnson, and Smith, 1998; Newmann and Thompson, 1987; Springer, Stanne, and Donovan, 1999), studies of IS student teams have not found a significant relationship between the use of cooperative learning and better student learning outcomes (Fellers, 1996; Ryan, Bordoloi, and Harrison, 2000; Wehrs, 2002). Furthermore, small group research has acknowledged that task type and organizational context influence group effectiveness (Guzzo and Dickson, 1996; McGrath, 1984). These findings suggest that while we can learn from reference disciplines, additional research on student teams that perform information systems development tasks is required.

Therefore, the objective of this study was to examine and determine which factors influence student satisfaction in technical group projects. Studies have identified a variety of factors that impact student team performance such as personality styles (Gorla and Lam, 2004); team structure, team process, team spirit, and social support (Werner and Lester, 2001); and whether team membership was assigned versus self-selected (Brabston and Street, 2005). In this research, we sought to extend this work within the context of IS student teams by examining the role of teamwork expectations, demographic diversity (i.e., gender, country of

origin), and collaboration on team effectiveness as measured by the student's satisfaction with the group.

The overall research question is: *What factors influence teamwork satisfaction?*

We approached this question both from a quantitative perspective by testing developed hypotheses and from a qualitative perspective by examining student feedback on their team experiences. We studied interdisciplinary student teams within an Introduction to Computer-based Information Systems (CIS) course for undergraduate business majors in a large urban university in the southeastern United States. Each team of three students was asked to design and develop database tables, reports, and forms using Microsoft Access to met the given business requirements. Prior to beginning the project, each team member completed surveys providing demographic data and information about teamwork preferences. After the project, each team member completed an additional survey regarding the team experience and a team evaluation.

The paper is organized as follows: First, previous research into team effectiveness is presented and associated hypotheses are developed. Second, the research methodology is described, including participant demographics, data collection strategy, and data analysis technique. Finally, the research results are presented and implications for teaching and research are discussed.

2. BACKGROUND

In this section, we develop hypotheses for the impact of teamwork expectations, demographic diversity (specifically, gender and country of origin), and collaborative behavior on teamwork satisfaction (Figure 1).

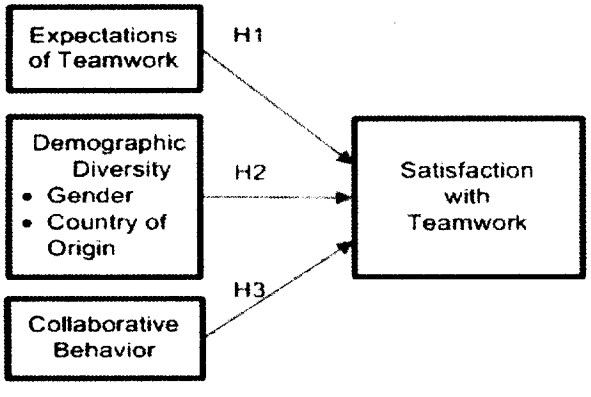

Figure 1: Teamwork Satisfaction Model

2.1 Expectations of Teamwork

Expectations can be defined as beliefs regarding future performance (Olson and Dover, 1979; Spreng, MacKenzie, and Olshavsky, 1996). Many students begin college courses with strong negative or positive expectations related to teamwork. One reason for negative experiences within student teams is free riding, also known as social loafing, in which one team member does not contribute yet reaps the benefit of the team grade (Ashraf, 2004; Bartlett, 1995; Brooks and Ammons, 2003). Free riding could be caused by a team member's lack of motivation, inability to perform required tasks, or feeling like an outsider on the team.

On the other hand, students may also have positive feelings toward working on student teams. Students may look forward to the group project as an opportunity to socialize and meet others within the class. Students may appreciate the benefits of creating a product that is better than what they could have generated on their own. This may be especially true if students have had positive team work experiences in the past or if they have a learning style that benefits from verbal interaction (Kolb, 1984; Krause, 2000).

In either case, student's expectations regarding team projects are likely to influence the student's teamwork satisfaction. Social judgment theory suggests that expectations can strongly influence overall perceptions of performance (Sherif and Hovland, 1961; Spreng, MacKenzie, and Olshavsky, 1996). In particular, positive expectations regarding teamwork would lead students to perceive higher levels of teamwork satisfaction unless there was contradictory evidence. We form the following hypothesis regarding the relationship between student's expectations and satisfaction with team projects:

> *Hypothesis 1: Students' positive expectations about teamwork will be positively related to their satisfaction with teamwork.*

2.2 Demographic Diversity

In our study, we look at two forms of team demographic diversity – gender and country of origin. The impact of team diversity on project performance has frequently been studied within management, education, and psychology; however, these studies have not yielded conclusive results (Williams and O'Reilly III, 1998). The information/decision-making perspective predicts that diversity will have a positive impact on teams. According to this perspective, diverse team members are likely to have distinct, non-overlapping skill sets and viewpoints; combining these varied perspectives can yield more creative and innovative solutions (Ancona and Caldwell, 1992; Bantel and Jackson, 1989; van Knippenberg, De Dreu, and Homan, 2004). This suggests that heterogeneous groups will have higher group performance, and empirical pedagogical studies have supported this perspective (Fellers, 1996).

In contrast to these studies, the social categorization perspective suggests that diversity would cause a negative impact. Specifically, the social categorization perspective states that people will classify others as either being similar to themselves or dissimilar based upon observable characteristics such as gender, age, and ethnicity (Williams and O'Reilly III, 1998). When participating in groups with others that are like themselves, trust is increased, commitment is increased, and fewer conflicts are experienced; however, over time, the negative effect of heterogeneity diminishes (Jehn, Northcraft, and Neale, 1999; Riordan and Shore, 1997; van Knippenberg, De Dreu, and Homan, 2004). This perspective would explain the tendency for students to flock toward others that are like themselves when allowed to self-select their teams. This also suggests that homogenous teams would have higher satisfaction in the group and be more likely to collaborate. Many empirical

studies have shown behavior consistent with this perspective when looking at team performance. For example, Baer (2003) found that grouping students homogeneously surpassed the performance of heterogeneous groups. Shaw (2004) claims that student experiences in diverse teams are more difficult than those for homogenous teams.

Based upon these arguments and given the short term nature of the assignment, we argue that differences in gender and country of origin within a team will have a negative impact on the student's satisfaction with the team experience.

Hypothesis 2a: Students on teams that are diverse with respect to country of origin will have lower satisfaction with teamwork.

Hypothesis 2b: Students on teams that are diverse with respect to gender will have lower satisfaction with teamwork.

2.3 Collaborative Behavior

Collaborative behavior is a coordinated, synchronous activity designed to solve a common problem; whereas, cooperative behavior is a form of asynchronous interaction (Du and Johnson, 2004; Roschelle and Teasley, 1995). One can distinguish cooperation as each team member working separately or independently from the other team members on previously defined parts of the project while collaborative team members work together.

Studies involving both collaborative and cooperative learning have shown that teamwork increases student achievement over individual work (Hertz-Lazarowitz, 1992; Johnson, 1989). The benefits of collaboration have been described in both the pedagogical and business literature. For example, cooperative learning or "the instructional use of small groups so that students work together to maximize their own and each other's learning" (Johnson, Johnson, and Smith, 1991, p. 3) has been shown in the educational literature to be an effective method for enhancing student learning outcomes. Hoegl et al. (2001) found that teamwork quality was composed of six factors: 1) communication, 2) coordination, 3) balance of member contributions, 4) mutual support, 5) effort, and 6) cohesion. Each of the six factors is enhanced when team members work together and interact. Business research has shown a positive relationship between teamwork quality and team outcomes, including satisfaction (Hoegl and Gemuenden, 2001).

Based upon these arguments and given the positive relationship between teamwork quality and team satisfaction, we argue that teams with collaborative behaviors exhibit higher student satisfaction with the team experience

Hypothesis 3: Students on teams that engage in collaborative behaviors will have higher levels of satisfaction with teamwork.

2.4 Satisfaction with Teamwork

Team effectiveness can be measured in many ways, including goal achievement, perceived performance by team members, individual learning, objective performance measures (e.g., grade), and team member satisfaction (Hackman, 1987; Sundstrom, De Meuse, and Futrell, 1990). Many of the studies in the IS pedagogical research have focused on grades of the team product as an outcome measure (Wehrs, 2002). In this study, we choose to focus on student's satisfaction with the team experience. Satisfaction with teamwork is important for at least two reasons. First, teachers recognize the necessity of teamwork skills in business settings and desire that students begin building teamwork skills prior to graduating. Second, satisfaction with teamwork has been shown to be positively related to teamwork quality and, ultimately, product quality (Campion, Papper, and Medsker, 1996; Hoegl and Gemuenden, 2001).

3. METHODOLOGY

We study student teams in the Introduction to Computer Information Systems course in the business school of a large urban university in the southeastern United States. This standardized course covers topics suggested by the "Fundamentals of Information Systems" course in the model curriculum (Gorgone et al., 2002) and is required of all undergraduate business majors. Based upon a specific set of business requirements, the first group assignment requires a team of three students to create a database. To prepare students for this task, students were given classroom instruction on database design, an individual assignment with detailed instructions on creating a database, and a test on the database material. Students were expected to form teams and complete the assignment within a two week period. Nominal class time (10-15 minutes) was given for student teams to meet and develop an initial project plan. Students were then expected to complete the assignment outside of the scheduled class time. The following sections of this paper describe the details of this methodology.

3.1 Data Collection Procedures

Students were surveyed from eight sections of the Introduction to Computer-based Information Systems course during Spring and Fall semesters of 2005. Each section contained up to 45 students. Only two of these sections were taught by the same instructor. In accordance with Institutional Review Board (IRB) policy, students were given an option of participating in this research study by completing the surveys or taking content-based quizzes. Either option offered course credit equaling 1% of the final grade. In the Phase 1 of the data collection, a total of 251 individuals responded to one or more of the three surveys. Awarding course credit was not always enough of an incentive for students to complete all aspects of the survey within the required deadlines. In other cases, students that had taken the first survey during the early part of the semester decided to withdraw from the course. Therefore, complete data from the three surveys were available from 66 individuals representing 22 teams. In Phase 2 of the data collection, 146 students completed a qualitative evaluation of team members, discussing factors that contributed to positive or negative teamwork experiences (described in Section 4.2).

As shown in Table 1, participants in the quantitative survey were almost equally divided between women and men and represented a fairly diverse background in terms of major, ethnicity, and country of origin for the university population.

Major	Respondents
Accounting	9
Actuarial Science	1
Computer Information Systems	4
Economics	1
Finance	7
Hospitality Administration	0
Management	22
Marketing	14
Real Estate	0
Risk Management & Insurance	2
Other	3
Undecided	3
Total	**66**
Ethnicity	
White	28
Black/African-American	25
Hispanic	1
Native American	0
Asian/Pacific Islander	6
Multiracial	5
Other	1
Total	**66**
Sex	
Female	31
Male	35
Total	**66**
Country of Origin	
United States of America	54
Non-USA	12
Total	**66**

Table 1: Demographic Information

Students were asked to complete three online surveys: Demographic Survey, Survey A (pre-teamwork survey), and Survey B (post-teamwork survey). They also completed a Team Evaluation. The demographic survey gathered data used to measure demographic diversity such as student's gender, ethnicity, country of origin, and age. Students could complete this survey anytime during the first half of the 15-week semester. Survey A was administered just before the database project began and measured teamwork expectations. Students completed Survey B within a week of completing their database team project. Survey B measured teamwork satisfaction and collaborative behaviors (amount of work completed individually versus as a team). The Team Evaluation was used to detect whether there was conflict in teams and sources of the conflict.

3.2 Measures

Teamwork Expectation and Teamwork Satisfaction: The questionnaire items measuring Teamwork Expectations and Teamwork Satisfaction were adapted from previously validated instruments (Fellers, 1996). The relevant questionnaire items are shown in Table 2.

Demographic Diversity: In this study, there were 12 teams with all members of US origin and 10 teams with a mixture of US and non-US origin members. If all team members indicated that they were of US origin, the difference of origin indicator was set to be zero; otherwise, it was set to be one. Another variable was created to indicate the number of female students within the team of three. There were 7 teams with one female, 11 teams with two females, and 4 teams with either male or female members only.

Construct	ID	Questionnaire items
Teamwork Expectation	1	"I like to participate in groups."
	2	"I have had positive experiences thus far working in groups in the school's program."
	3	"As a student, I would rather work in teams than on my own."
Teamwork Satisfaction	4	"I believe that working on a team has been a valuable learning experience for me."
	5	"I would like to participate as a team member in future classes in the school's program."
	6	"Over the course of the project, we had little problem with conflict within our team."

Table 2: Questionnaire Items

Collaborative Behavior: Collaborative behaviors represent the extent to which the group completed tasks together (Roschelle and Teasley, 1995). These interactions could take place virtually (e.g., e-mail, instant messaging, telephone) or face-to-face (e.g., hallway, library, lab). In Survey B, participants were asked, "What percentage of work done by your team was completed working together as a team?" Respondents entered a number from 0 to 100%. (Mean = 65.75, standard deviation = 30). As shown in Table 3, the individual values were then converted into three categories of collaboration. We ran descriptive statistics and segregated the collaboration levels based upon percentile scores. This lead to the following cut-off values: Low (0-49%), Medium (50-79%), or High (80-100%).

Collaboration Level	*Time spent working together*	*N = Individuals*
Low	0-49%	16
Medium	50-79%	20
High	80-100%	28
Not reported		2
	Total	**66**

Table 3: Collaborative Behavior Variable

Qualitative Evaluation: In addition to the quantitative methods, students were asked to evaluate their team members (Team Evaluation). They were given a hypothetic bonus of $10,000 dollars to divide amongst the other two team members. If they divided the amount unequally, students had to provide a rationale for doing so. In this way, we were able to detect teams that had conflict as well as the source of this conflict.

4. RESULTS

4.1 Phase 1: Hypothesis Testing

H1: Impact of Teamwork Expectations: We found support for Hypothesis 1 which predicted that teamwork satisfaction is positively related to an individual's pre-existing positive attitudes toward teamwork (Table 4).

Pre- and Post-Teamwork Survey Items (see **Table 2**)	Correlation	Sig.
Question #1 & Question #5	.491**	.000
Question #3 & Question #5	.377**	.002
Question #2 & Question #4	.418**	.000

** Significant at the 0.01 level.

Table 4: Pearson Correlations between Teamwork Expectations and Teamwork Satisfaction

As shown in Table 4, Question #1 from pre-teamwork survey, Survey A ("I like to participate in groups") was positively and significantly correlated with Question #5 from post-teamwork survey, Survey B ("I would like to participate as a team member in the future"). Similarly, Questions # 2 and #3 from Survey A ("I have had positive experiences thus far working in groups in the school's program." and "As a student, I would rather work in teams than on my own.") were positively and significantly correlated to Questions #4 and #5 from Survey B ("I believe that working on a team has been a valuable learning experience for me." And "I would like to participate as a team member in future."), respectively. Those findings indicate that an individual that had a positive attitude toward working on teams had a significantly more satisfying teamwork experience.

H2: Impact of Demographic Diversity: To look at the impact of demographic diversity, a series of One-Way ANOVA comparisons were run against Question 4 from Survey B ("I believe that working on a team has been a valuable learning experience for me."). With respect to gender diversity, we found that all-male teams reported the highest amount of teamwork satisfaction (mean=1.33, where 1 indicates 'Strongly Agree'). Teams that consisted of one male with two females reported the least amount of teamwork satisfaction (mean=2.62). The difference in means between these two groups was statistically significant (p=0.012) (Table 5).

With respect to country of origin, teams consisting of all U.S. students reported the highest amount of teamwork satisfaction (mean=1.64, where 1 indicates 'Strongly Agree'). Teams that consisted of one non-U.S. student with two U.S. students had lower amounts of teamwork satisfaction (mean=2.67, significant at the 0.01 level) (see Table 6).

H3: Impact of Collaboration: To test the third hypothesis, we looked at the mean satisfaction levels to see if they differed depending upon whether there was a low, medium, or high amount of collaboration. Students that were in groups that worked on the project together described the team experience as valuable.

Gender Comp (I).	Gender Comp. (J)	Mean Dif. (I-J)	Std. Error	Sig.
All-male (N=6)	Single Female (N=21)	-0.788	.289	0.088
	Single Male (N=33)	-1.286*	.370	0.012
	All-Female (N=6)	0.000	.298	1.000

Dependent Variable: Satisfaction

* The mean difference is significant at the .05 level.

(1: Strongly Agree to 5: Strongly Disagree)

Table 5: Gender Composition Impact on Satisfaction

US Comp (I).	US Comp. (J)	Mean Dif. (I-J)	Std. Error	Sig.
All-US (N= 36)	Single US (N=6)	-1.361	.698	.281
	Single Non-US (N=24)	-1.028**	.291	.003

** The mean difference is significant at the .01 level.

Table 6: Country of Origin Impact on Satisfaction

Teamwork Satisfaction Measure *(See Table 2)*	***Low Mean (std. dev.)***	***High Mean (std. dev.)***	***Mean Diff. (Low-High)***	***Sig.***
Q#4 Value	3.00 (0.966)	2.36 (0.951)	0.643	0.117
Q#5 Future	3.56 (1.153)	2.61 (1.100)	1.188*	0.014
Q#6 Conflict	2.19 (1.167)	2.11 (1.227)	0.080	0.998

(Note: Choices for each of the Teamwork Satisfaction Measuring items ranged from 1: Strongly Agree to 5: Strongly Disagree)

Table 7: Collaboration Impact on Teamwork Satisfaction

4.2 Phase 2: Qualitative Analysis

To further identify factors influencing teamwork satisfaction, in Phase 2 of our study we performed a content analysis (Lacity and Janson, 1994) of student comments from the team evaluation forms using a qualitative analysis tool (Atlas.ti). There were 146 students that wrote qualitative statements describing their team experience on the team evaluation form. Before coding began, we identified each noun-verb combination as a unit of analysis, yielding a total of 301 statements.

The coding occurred in three rounds. During the first round, the first author used open coding to acknowledge themes that appeared to be reasons for satisfaction or dissatisfaction with teamwork. The two authors then met and refined the list of codes and in some cases combined codes, or in other cases, clarified definitions. During the second round, each author applied this revised list of codes to the data set. After independent coding was completed, the two authors again met to discuss ambiguities and restructure the

codes. In the third round, the finalized coding list was again applied by each of the coders to the data set. There were 201 statements indicating positive factors that contributed to high teamwork quality, 81 statements indicating barriers to success, and 19 neutral comments. Inter-rater reliability during the final round of coding was at 80%, that is, there were 61 statements that were not coded exactly the same between the two raters. The raters discussed each of the remaining statements to reach consensus on the most appropriate code.

We identified nine factors that enhanced perceptions of satisfaction with teamwork: 1) team spirit, 2) work ethic, 3) equal contributions of team members, 4) communication, 5) exceptional team contributions, 6) technical skills, 7) project management skills, 8) participation, and 9) technical resources (see Appendix A). The most frequently mentioned positive factors were a sense of team spirit, strong work ethic, and equal contributions of all team members.

We found seven factors contributing to dissatisfaction with teamwork: 1) lack of participation, 2) inferior technical skills, 3) poor communication, 4) unbalanced contributions, 5) lack of team spirit, 6) poor work ethic, and 7) inadequate technical resources (see Appendix B).

5. DISCUSSION

In the next sections, we reiterate the findings, discuss implications for teaching, provide suggestions for addressing these issues, and assess the study's limitations.

5.1 Findings on Teaching

The quantitative analysis of our study supports the three hypotheses. First, teamwork satisfaction is positively related to an individual's pre-existing favorable attitudes toward teamwork. Second, we found that the gender makeup of the teams impacted satisfaction. The all-male teams experienced significantly less conflict than female dominant teams. Third, teams that demonstrated low-collaboration found the experience less valuable than high-collaboration teams. The qualitative analysis identified nine positive factors of which the top three mentioned were team spirit, strong work ethic, and equal contributions of all team members. The most frequently mentioned factors contributing to dissatisfaction with teamwork were missed group meetings, non-responsiveness to email messages and lack of concern shown for the project.

5.2 Suggested Instructional Strategies

Based upon these results, we find that there were predictable factors that impacted teamwork satisfaction on the database project. Key findings are discussed below along with implications for teaching and suggestions for addressing these issues:

1. Student's initial perceptions about teamwork color their opinions about team outcomes: This study suggests students will have a more satisfactory teamwork experience if faculty can counter students' negative perceptions about teamwork prior to beginning group projects. Faculty may use any or all of the following suggestions to enhance student satisfaction: 1) faculty should stress that teams need to work together for the best team outcome, 2) faculty may reinforce the importance that business places on having interpersonal and communication skills and working well in teams (Leitheiser, 1992), and 3) faculty may also expect that undergraduate students will need help in developing these skills. Therefore, they may talk about what constitutes successful teams and hold all team members accountable for participating and creating a quality outcome.

2. High collaborating groups are more satisfied: Students in groups that collaborated more on the project reported the highest levels of satisfaction and felt that the project was a valuable learning experience. One way faculty can encourage collaboration is to provide team building exercises within the classroom to build cohesion. For example, Dunphy and Whisenand (2006) recommend having students solve a puzzle by themselves first and then using a team so they can experience firsthand the benefits of multiple perspectives. Other examples include asking teams to create a group name, logo, or slogan and having students introduce themselves to a group based upon two items taken from their pockets or purses (Newstrom and Scannell, 1998).

3. Coordination and communication issues negatively influence team outcomes: The qualitative analysis highlighted the fact that many of our current students have busy schedules due to family and work responsibilities. Therefore, they have limited availability to interact in groups. Realizing this, faculty can facilitate coordination of team meetings and establish communication mechanisms. Other empirical studies of student teams have advocated forming teams based in part on schedules (Bonanno, Jones, and English, 1998; Fellers, 1996). Another consideration is forming teams by availability of technical resources such as hardware, software, and telecommunications; students in our study were hindered when other students had limited access to the Internet or the database program need to complete the assignment. To enhance team communication, faculty need to consider both virtual and face-to-face options. Students in our study appreciated the time allotted in class to setup their teams and then used class attendance to establish further face-to-face communications. Students valued using a variety of communication media (e.g., e-mail, instant messaging, telephone). Faculty may investigate technical options available to facilitate group interaction such as bulletin boards and group support systems.

4. Assess student weaknesses and structure the learning so as to build competencies: To complete the team database project, team members need technical knowledge and project management skills. Students also need to learn how to appreciate different work styles and cultures (Shaw, 2004). Faculty can anticipate that undergraduate students may be deficient in one or more of these areas. Therefore, faculty may assess students to identify abilities and skills in order to educate them. For instance, in our study, students were provided with classroom instruction, a step-by-step tutorial, and testing on database materials prior to team formation. This allowed them to gain technical knowledge; however, the course was not structured to teach project management. Some ideas to facilitate this learning would be to require a

project planning or an outline as part of team deliverables, discuss time management strategies, and talk about workload delegation.

5.3 Limitations

The findings should be cautiously interpreted in the light of the limitations of this research study. First, to be included in Phase 1 of this study, all three team members had to complete all three surveys. Therefore, although 251 individuals completed one or more surveys, our final sample size for the quantitative phase was 66. For Phase 2, all team evaluations provided were analyzed, resulting in a sample size of 146 for the qualitative phase. To overcome this limitation, better incentives for completing research instruments should be provided. Also, class time could be given for completing the instruments rather than having students complete the surveys on their own time.

Second, we had no control over the diversity of the sample or resulting teams. Ethnic groups such as Native Americans and Hispanics are not well represented at the university and, therefore, in our sample. Because of these two limitations, our analysis focused on single group differences (e.g., gender or country of origin) rather than an overall measure of diversity. Because 7 of the 8 sections allowed students to self-select teams, some teams lacked diversity in gender, country of origin, or ethnicity. Collecting data over a longer period of time or having the instructors assign heterogeneous teams could address this issue. Future research in a more diverse setting can further investigate these issues.

Third, the results are limited by the fact that the team project is only two weeks long. As stated in section 2.2, the negative effects of heterogeneous diminish over time (Jehn, Northcraft, and Neale, 1999; Riordan and Shore, 1997; van Knippenberg, De Dreu, and Homan, 2004). Therefore, it is possible that teamwork satisfaction would improve if students worked together over longer periods of time.

Finally, we do not attempt to generalize to all students at all universities for all types of projects. Instructors should consider the extent to which our results would be applicable to the students on their campuses and in their project teams.

6. CONCLUSIONS

The factors that lead to positive team outcomes were initial positive attitudes toward teamwork (H1) and high levels of collaboration (H3). Of the six factors identified as important for teamwork quality (Hoegl and Gemuenden, 2001), the most important factors for these students working on the database project were quality of communication, balance of member contributions, and coordination. Factors that lead to group conflict were poor communication through behaviors such as missed or late arrival at group meetings, non-response to email and voice messages, and absence from class. Teams that were mixed by country of origin were most likely to experience conflict.

Faculty bear some responsibility for assisting students in learning how to manage conflict within teams and learning how to get along with others. This could very well be an assumption in the literature; however, it may not be a practice that is followed by IS educators. Some educators may feel that it is someone else's responsibility to teach conflict management or that students must learn it on their own. By knowing what factors impact team satisfaction levels, instructors can begin to implement effective strategies for combating any negative effects of team projects. Instructors can adopt various techniques for ensuring that student teams are successful so that students will have a more positive teamwork experience where conflict is appropriately managed and students feel that they have learned something of value.

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AUTHOR BIOGRAPHIES

Nannette P. Napier is a PhD candidate in Computer Information Systems at the J. Mack Robinson College of Business of Georgia State University. She engages in action research that addresses challenges of software development firms. These concerns include effectively managing software projects, creating and managing software requirements, and using agile development methodologies within a dynamic, fast-paced environment. Napier's research has been presented at several refereed conferences, including *America's Conference on Information Systems (AMCIS), Hawaii International Conference on System Sciences (HICCS),* and *International Conference on Information Systems (ICIS).*

Roy D. Johnson is currently a Fulbright Scholar at the University of Pretoria in South Africa and an Associate Professor in Computer Information Systems at the J. Mack Robinson College of Business of Georgia State University. He engages multiple streams of research with colleagues. Johnson's research has been presented at multiple refereed local, national and international IS conferences and pier reviewed IS journals.

APPENDICES

Appendix A: Factors that Enhance Perceptions of Teamwork Satisfaction

Category	Description and Representative Quotes	Count
Team Spirit	Worked together well as a team. Exhibited concern about the project. Willing to sacrifice individual needs for the team. • We all worked together well, and as a team. • When one of us struggled, we all struggled. When one of us succeeded, we all succeeded.	48
Work Ethic	Exerted consistent effort on project. Worked hard. Kept promises and met deadlines. • [A] was determined to figure out a solution • Very dependable partners	39
Equal Contributions	Perceived that team members contributed equally. • They contributed equally to this project • All members put in an equal amount of work and effort	26
Communicate	Used effective media for communicating with team members (e.g., e-mail, phone, instant messaging). Responsive to team member requests. • We all kept in contact with each other well • She was the key to communicating	21
Unbalanced Contributions	Subset of the team committed larger amounts of time on project. Went above and beyond the call of duty. • [He did] queries, reports and forms which to me was more work • [A] was more into the project than [B]	19
Technical Skills	Possessed necessary knowledge and abilities to complete high quality, technical task in accurate manner. • She has great skills with Access and Excel • [A] helped a lot with the reports and some of the queries	17
Project Management skills	Showed leadership, planning, and initiative with respect to tasks. • [We had a] good plan. We knew what we were doing. • [A] showed great leadership	13
Participate	Attended scheduled group and class meetings on time. Actively engaged in group tasks during these meetings. • Both team mates agreed to meet several times • Always came on-time	14
Technical Resources	Owned required hardware or software to complete task. • She also was the one with the laptop which helped us work better on the project when we didn't have access to a computer	4
	Total positive quotations:	201

Appendix B: Factors that Decrease Perceptions of Teamwork Satisfaction

Category	Description and Representative Quotes	Count
Participation	Absent from class or team meetings. Arrived late to class or team meetings. • He was never in class to help with the project or get together • Very busy schedule and couldn't meet us in person	21
Technical Skills	Lacked technical expertise needed to complete the team task (e.g., normalizing tables, constructing queries, generating reports). Produced low quality work that needed reworking. • Could help out when she understood the project; however, those times were very few and far between • The stuff she managed to do by herself was not correct.	15
Communicate	Delayed response to team members' requests. Unavailable by various means – either face-to-face, email, text messaging, etc. • We called and e-mailed [A] several times with no response • [A] made no communication attempts	13
Unbalanced Contributions	Workload not equally distributed among team members. One team member completed small part of project. Team member physically present but not contributing to the work. • Only completed 1 portion of the entire project • Ended up doing nothing in the project	11
Team Spirit	Showed no concern about the team goals. Cared more about own interests. • He tried to show interest but it just wasn't there. Sometimes he even acted careless • Called when it was something to do with her needs, not the group as a whole	9
Work ethic	Failed to keep promises or meet deadlines. Did not seem to try hard to complete tasks. • Didn't even attempt any of the ER Diagrams, Queries, or Reports	9
Technical resources	Lacked software or hardware needed to complete the task • We were unable to do any work because the files were in her e-mail	3
	Total negative quotations:	81

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