BUILDING TEAM COLLABORATION IN THE VIRTUAL CLASSROOM

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The benefits of collaboration and team skills have long been recognized in business and academic settings. In a study of business professionals, Maier (1967) concluded that teams have a distinct advantage over individuals in that they have a greater pool of knowledge, receive more input and solutions to problems, and encourage a better collective acceptance and understanding of group decisions. A more recent study (Rooney, 2000) of student teams found that team projects develop individual collaborative skills, strengthen individual and group commitment to teamwork and prepare students for the 21st century workplace.

Research on online collaborative learning situations, however, suggests that team assignments can often frustrate and annoy students (Bowen, 1998). Teams must deal with new expectations, attitudes, boundaries, and responsibilities, all of which can cause disharmony and conflict (Joinson, 1999). Indeed, since the tendency of online learners leans toward self-direction, students have a natural resistance to projects in which the outcomes rely upon the input and involvement of others (Ko & Rossen, 2001).

In this article, the authors describe a study of a web-based, teambuilding instructional module that included activities designed to improve collaboration skills among team members conducting online projects. This module was formatively evaluated using 24 graduate students who were enrolled in an online course that assigned two online team projects during the Fall 2000 semester.

Both quantitative and qualitative data indicated that students were satisfied with the teambuilding instruction and their virtual team experiences, gained online collaboration skills and indicated they would apply these skills to future online collaborative projects. These findings imply that educators who teach online courses and assign online team projects should consider integrating online teambuilding instruction into their coursework and study the value of this instructional approach for their students.

Online Teambuilding Instructional Module

The online teambuilding instructional module consisted of an online PowerPoint presentation and an activity worksheet. It provided practical information and practice with elements found in successful online teamwork, such as information on receiving organizational or instructor support, becoming acquainted with team members, establishing effective communication, building trust, and developing effective online organization strategies. The instructional module created for this study followed a modified version of Dick and Carey's (1996) Instructional System Design Model. The module was web-based and was accessible to learners via a virtual teambuilding (VTB) web site designed by the investigators. Learners who did not have high-speed Internet access were provided with a duplicate version of the teambuilding PowerPoint presentation that was downloadable to their computer desktop.

The web site housing the module also included a Pre-Course Survey and Post-Teamwork Survey. These surveys measured satisfaction of learners with their team projects, and the skills they gained following the instruction they would receive from the module for conducting online collaboration. Data on prior experience with relevant online collaborative technologies was also gathered using these surveys and was used to group subjects into teams.

Objectives

There were four objectives of this study. The first objective was to determine whether or not online learners valued the VTB instruction they received as a preparation for online team projects. This information was gained from online learner satisfaction with the two components that comprised the instruction: an online PowerPoint presentation on virtual teambuilding and a teambuilding activity worksheet, and online learner perceptions of instruction that contributed to their individual personal growth as learners and educators.

The second objective was to explore how online learners perceived their actual collaborative experiences as members of a virtual team, after receiving specific instruction on online teambuilding. Evidence was derived from learner satisfaction with individual team experiences of activities characteristic of successful online teams such as receiving support, getting acquainted, building trust, building communication, and getting organized.

The third objective aimed to identify the collaboration skills that online learners gained after they had completed the module. This objective was achieved by comparing results from individual pre-course surveys with post-teamwork surveys. Specific questions on the post-teamwork survey focused on knowledge and skills levels in working in online collaborative teams.

The fourth objective was to determine whether learners believed that they would use the online teamwork skills and knowledge they gained from the instructional module in future online collaborative teams. This information was elicited from responses to the post-teamwork survey given by students concerning their attitudes toward using the online team skills they developed in future online collaborative situations.

Target Audience

Adult learners who are engaged in online collaborative projects as part of a virtual team are the target audience for the teambuilding instructional module. The ultimate purpose is to make the module available to any person who has Internet access at anytime and at any location. In addition, though the module is written in English, the overall theme, language, and graphics are specifically designed to be inclusive and to be intelligible to other cultures.

Participants

The research project studied a group of graduate students who were enrolled in an online course at the University of Hawai'i at Mānoa (UHM) during Fall 2000 Semester. The course instructor had extensive experience with the content of the course and with distance learning. Course content, schedules, and feedback were given via an online university network called Web Course Tools (WebCT). We chose this class because it represented the target population–a mix of male and female adults from various ethnic groups who were involved in online collaborative projects.

A total of 27 students were enrolled in the course—10 male and 17 female. The students were drawn from diverse set of cultural backgrounds and included Americans of Chinese, Swedish, Hispanic, Japanese, and Filipino ancestry. The module was administered to 24 of the 27 enrolled students. Two students opted not to participate. The other student was one of the authors of the study.

Procedures

The module was administered to all students enrolled in the Fall 2000 online class. Before the class began, the instructor and an investigator, who also served as a teaching assistant, sent out a surface mail letter and an email to prospective students to provide them with general course information and a description of the VTB web site with instructions on how to access it.

The online teambuilding module was incorporate into the introductory unit by the instructor and completion of it was the first graded assignments of the course. Grading provided an incentive for the students to complete the teamwork unit and other online team projects. The first teambuilding session asked students to attend a virtual meeting in an online (WebCT) chat room with the instructor and the teaching assistant. Students were required to participate, but they had the option of meeting in either a morning or evening session. No other mandatory online meetings were scheduled.

A few days before class actually began students were permitted access to the course site, which contained a link to the VTB web site. The VTB site outlined six steps that students would need to follow in order to complete the teambuilding process.

The first step was to fill out an electronic Pre-Course Survey form. A link was provided to the survey. The survey contained items concerning demographics, types of computer and Internet connections, student online experience levels, and experience levels of students with virtual teams.

Although students were required to participate in the Pre-Course Survey, several items on the survey were optional. At the bottom of the survey form, students were notified that information from their survey responses would be used in the teambuilding study. Besides investigative purposes, the information from the surveys was also used to establish heterogeneous teams. For example, to provide students with a greater chance of success when placed on teams, the investigators used the Pre-Course Survey data to optimize the placement of students onto teams in the following ways: 1) to equip the online teams with the optimum number of three people (Stadtlander, 1998), team assignments were planned that way; 2) to facilitate transferring data among team members, students were matched according to computer types, that is, PC or Macintosh; 3) to provide a range of experience levels and genders, student teams were deliberately mixed.

After completing the Pre-Course Survey, students were instructed to view the twenty-minute PowerPoint presentation entitled, "Recipes for Satisfying and Successful Virtual Teams," that was developed by the investigators. It was listed as Step 2 of the teambuilding process. At the end of the presentation, students were given an opportunity to print a copy of the presentation for future use.

In keeping with the cooking theme of the presentation, the elements of satisfying and successful teams were broken down into "ingredients." Haywood (1998), and Berry, Avergun, and Russ-Eft (1993) established "support" as the most essential ingredient for satisfying team experiences, so a checklist was developed for the instructor to go through with the class in a virtual chatroom describing how she would support the teams. This online class chat was labeled Step 3 of the teambuilding process. The checklist provided a general topic outline for the instructor to follow as she talked with the students. The instructor committed to support the teams by being available to act as an arbitrator, providing key information, and helping to guide teams toward the project goals. She also pledged to be available when called upon for assistance, but not to exert undue influence on the creativity or bonding of team members. At the end of the chat session, students were provided with a list of their teammates for the two assignments requiring teams.

Step 4 of the teambuilding process involved students making arrangements with their teammates to meet in a virtual chatroom to engage in teambuilding activities together using the worksheet as a guide. They were encour-

aged to do this as soon as possible because they only had one week to complete the activities. The activities were provided to the students as a printable activity worksheet available from the VTB web site. Students were directed to read through the activities before meeting with their teammates so that they would become familiar with what each of the activities involved and have some time to reflect on the questions. It was anticipated that these directions would facilitate the first online team meeting and make it as productive as possible.

Step 5 of the teambuilding process involved students posting individual results of their online team meeting including reflections, comments, and questions they had regarding the teambuilding activities and the teambuilding process in general in an online Teambuilding Forum.

Once the two required collaborative projects were completed, students were directed to go to the VTB web site to take a Post-Teamwork Survey. This was labeled Step 6 of the teambuilding process. The survey was used to explore student perceptions of their team experiences, the role of the module in their perceptions of their team experiences, the role of the module in increasing their online collaboration skills, the likelihood that they would apply the skills they learned in future online teams. Finally, at the end of the Post-Teamwork Survey, a comment section was provided. Students were urged to provide feedback about the teambuilding instruction and activities, the personal experiences they had in the assigned online teams, and their satisfaction with their team experiences.

Data Analysis and Results

There were 24 students who took part in the study. Ten of them were male and 14 were female. The category of age was divided into those under 30 and those over 30. The category was divided in this manner because it was assumed that those under 30 had significantly less career experience than those over 30, and that they were perhaps more accustomed to working online. All of the students resided in Hawai'i and almost half of them had some type of Asian/Hawaiian background. Three research instruments were used to gather demographic data and to measure student satisfaction and skill levels. These included a Pre-Course Survey, Post-Teamwork Survey, and electronic postings to an online Teambuilding Forum where students discussed team experiences in general as well as their experiences with the online instructional module. The main objective of the Pre-Course Survey was to collect data that would enable the investigators to divide the students into heterogeneous teams of three.

Data generated by two online surveys, arranged chat sessions, and electronic Teambuilding Forum postings were used to obtain data relating to skills gained and satisfaction levels of students who developed online team projects.

Students released these data for the purposes of this study. Additionally, for purposes of confidentiality and analysis, the electronic postings were condensed to comments related specifically to student perceptions about the module and team experiences.

Four objectives were measured for this study using quantitative and qualitative data. Multiple-choice questions were used to measure quantitative data and were collected from two surveys: the pre-course survey and the post-teamwork survey. Comments from the online learners were used to provide qualitative data and were collected from chat sessions and the electronic Teambuilding Forum postings.

Prior to the start of the course that included the online teamwork module, students were given a Pre-Course Survey.

Survey Questions

The first objective was to explore whether or not students valued the VTB instruction they received as preparation for online team projects. Overall, responses indicated that this objective was met in terms of student satisfaction with the two components that comprised the instructional module, and student perceptions of instruction as contributing to their individual personal growth as learners and educators. Twenty-three out of the twenty-four students indicated that they valued the VTB instructional module.

The second objective was to explore how students who received specific instruction on online teambuilding perceived their actual collaborative experiences as members of a virtual team. An overwhelming majority of the student responses indicated that they were satisfied with individual team experiences encompassing elements found in successful online teams: receiving support, getting acquainted, building trust, building communication, and getting organized.

The third objective was to determine the online collaboration skills students gained after they had completed the module. This objective was measured by data collected from results of the skills test section on the post-teamwork survey and comparisons between online teamwork skill levels collected from both the pre-course and post-teamwork surveys (see Figure 1). The results from each data set were then compared with qualitative data.

Skills Test

Figure 1 illustrates the results of eight multiple-choice questions contained in the skills test section. Each of the twenty-four students responded correctly to the question of building trust, indicating that they understood the skills necessary to establish trust with their online teammates. The majority of them ($n = 23$) also responded correctly to

questions about team leadership and workflow, indicating that they understood the elements for working in an organized manner with their virtual teammates. Twenty-one of the students correctly answered the question about support systems, which illustrated that the majority learned about the important role an instructor plays in facilitating online teams. There were 20 students who responded correctly to the question about conflict resolution. This indicated that most of the students grasped the type of skills needed to work through issues with their online teammates.

The item that received the fewest number of correct responses was about communicating via telephone. Only 13 students out of 24 answered that question correctly.

Online Teamwork Skills

The investigators compared data about participant online teamwork skills from both the Pre- and Post-Teamwork Surveys in order to evaluate whether or not students believed that they had gained the skills after they had engaged in the module and had opportunities to apply them while working with their teammates. Students responded with a "yes" to indicate that they felt they possessed the particular skills pertinent to the question or a "no" to indicate that they felt they were lacking the particular skills in question. There was a notable difference between the Pre- and Post-Teamwork Survey responses indicating a major increase in individual participant online teamwork skills and confidence levels after teambuilding instruction. To illustrate, for conflict resolution, there was a unanimous positive response on the Post-Teamwork Survey as opposed to only six positive responses on the Pre-Course Survey; for building

trust, it was 23 to six; for getting organized, it was 22 to six; and, for culture, it was 23 to five.

Once students had completed the module and team activities, only seven indicated that they used acronyms while communicating with their teammates compared to 11 who used acronyms on the Pre-Course Survey. This reduced use of acronyms could indicate that they did not find the need to use acronyms while working in their online teams.

Note: The rating levels on both surveys for questions about online teamwork skills included "N/A, " "yes," and "no." The option to select "N/A" was provided only on the Pre-Course Survey since it was believed that many students might have never experienced working as part of an online team prior to this study. Once data was compiled, the category of "N/A" was collapsed into "no" responses.

Applicability of Online Collaboration Skills

To meet the fourth objective of the survey, students were asked specifically to "agree" or "disagree" with statements designed to measure whether they believed they would use the online teamwork skills and knowledge they learned from the instructional module in future online collaborative teams.

Students responded positively to each of the seven questions indicating that they agreed that the online collaboration skills they gained from the module would be useful for their future virtual teamwork. As shown in Figure 3, this was especially true with regards to several items, including: communication where 23 agreed, collaboration in which 22 agreed, organization where 22 agreed and building trust in which 22 agreed. These positive results implied that
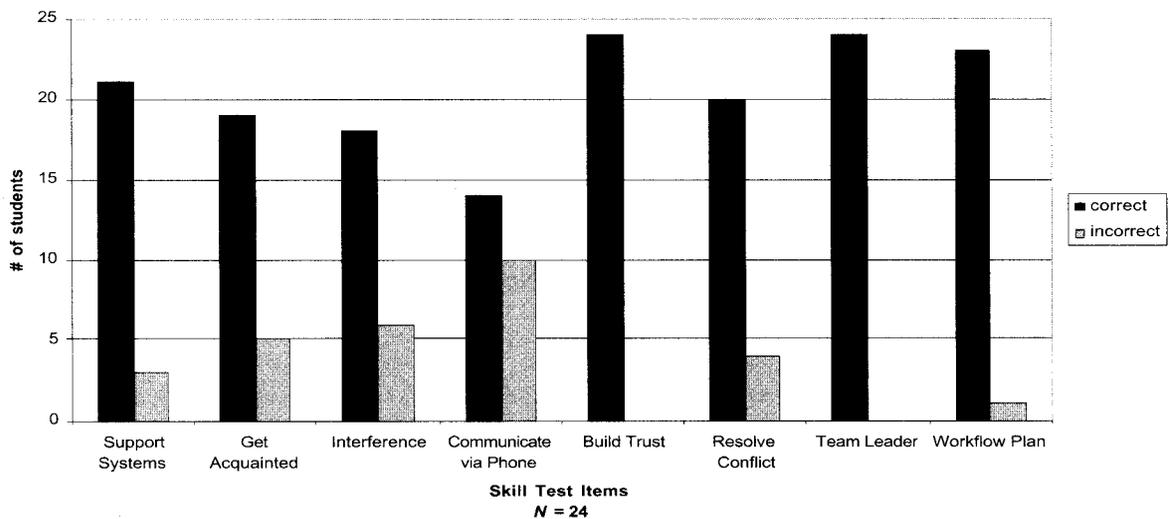

Figure 1. Online collaboration skills test from post-teamwork survey.
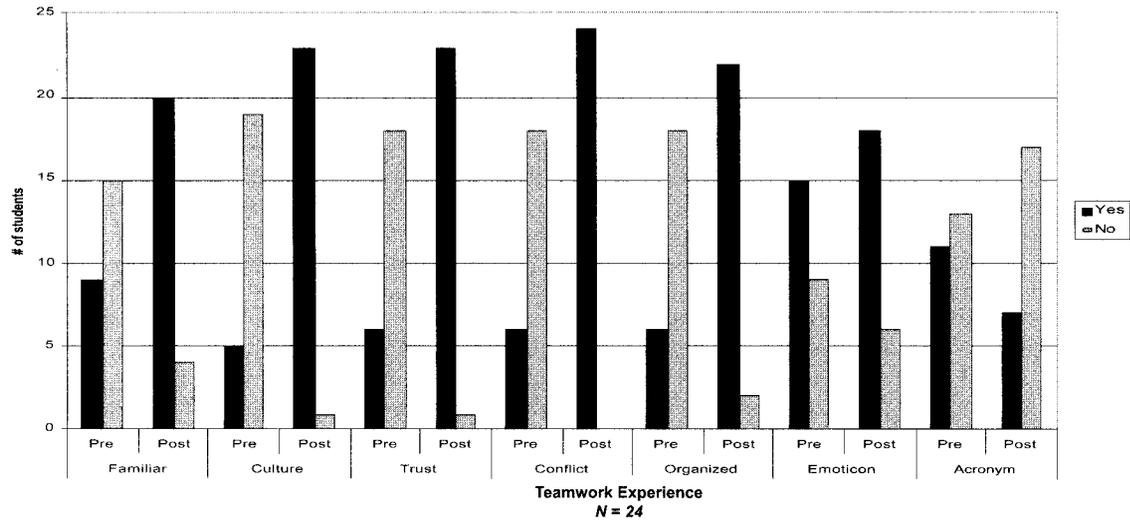
Figure 2. Online teamwork skills.

when students would be involved in virtual team projects they would use the skills they gained from the module to help them effectively work in collaboration with their online teammates.

The one area that received noticeably fewer positive responses – *creativity* – possibly indicated that students did not believe that the online team skills they gained applied to their ability to be creative in a team environment. On the other hand, lack of responses may also be attributable to students not understanding the meaning of the question.

Student Comments

To substantiate some of the numerical data gathered, the investigators asked students to comment on various aspects of the module and their online team experiences. The following themes emerged from the data: *receiving support, getting acquainted, establishing communication, building trust, getting organized, teambuilding presentation, teambuilding activities, teambuilding module, overall team experience* and *future applicability of online collaborative skills.*
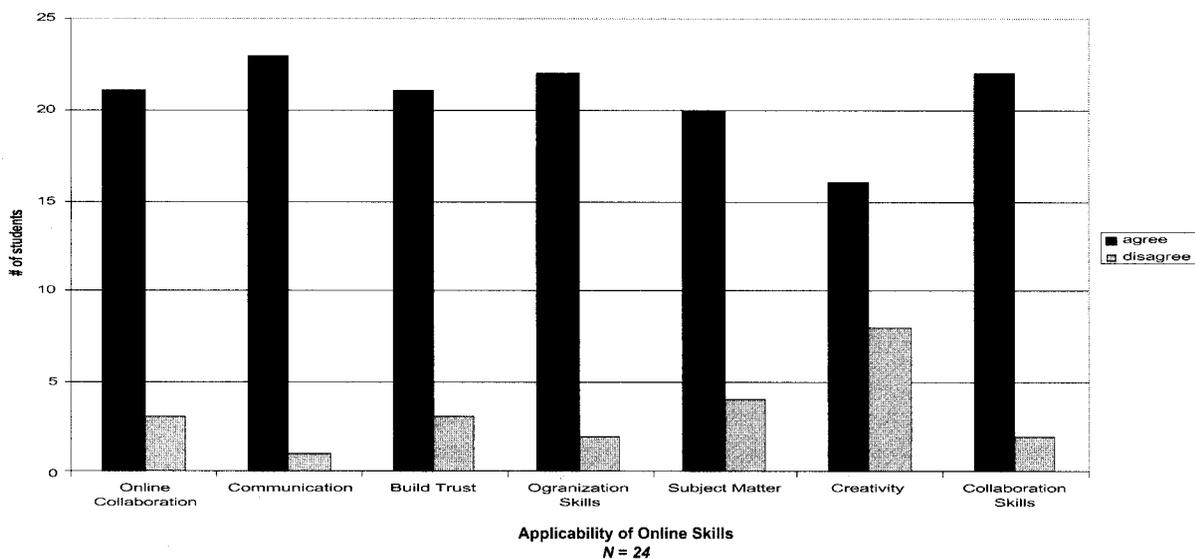

Figure 3. Applicability of online collaboration skills.

Receiving Support

There was only one comment that related specifically to student perceptions of the online support they received and it was positive: "I enjoyed this course and appreciate the hard work and dedication of the teaching assistant and the instructor."

Getting Acquainted

A total of 11 comments related specifically to student perceptions of how well their team became acquainted. Again, these comments were all positive ranging from, "[I] felt very fortunate to have two good teammates" to "GO TEAM!"

Establishing Communication

There were a total of nine student comments concerning communication. One student wrote, "Our backup communication plan is [first] external email and then by telephone." Other student comments were somewhat more revealing of their attitudes toward communication. For example, a student commented on the value of communication to the team, "We ended our chat by talking about the importance of keeping communication lines open by checking email daily and to call each other if necessary." Finally, since the module presented instruction on how to communicate more efficiently using acronyms and more expressively using emoticons, many students commented on how they felt about the instruction in these terms. Two typical comments included: "We introduced some clever and amusing emoticons and acronyms" and "Our 'favorite' emoticons and acronyms: ;-) LOL :o) :Q TTYL BRB :-) AKK."

Building Trust

There were a total of three comments relating specifically to perceptions of trust developed in teams and all were positive. A typical comment was, "…everyone was reliable and committed to the team."

Getting Organized

Eleven students commented on their perceptions of team organization. A few comments indicated a feeling that students were satisfied with how their team organized their work. For example, one student wrote, "We were able to work well together." The majority of the comments, however, were neutral, indicating methods of team organization only: "[We used] a sequential order and our editing path was determined," and "Whenever we get any files from any teammates, we will send a quick reply to inform of our receiving."

Teambuilding Presentation

A total of nine students commented on their perceptions of the PowerPoint Teambuilding Presentation. The majority of comments were positive: "All agreed that the teambuilding PowerPoint Presentation was well designed, had excellent tips, and would serve as a great reference for upcoming team projects." "The PowerPoint Presentation is a helpful guide for teambuilding. It was well organized and informative." There was one slightly negative comment, however, concerning the length of the presentation: "The presentation is pretty long, but it is really useful."

Teambuilding Activities

There were a total of 11 comments that related specifically to student perceptions of the teambuilding activities. Of all the comments made by students, this particular set of comments was the most revealing of student attitudes. The majority of comments were positive, with only one comment being neutral. Typical comments included: "I really enjoyed our teambuilding chat" and "The [teambuilding] exercises worked well to get us going."

Complete Module

There was only one student comment related to the complete module and it was positive: "The whole presentation is really easy to understand."

Overall Team Experience

Only one comment was related to student perceptions of the overall team experience and it was exceedingly positive: "The overall team experience definitely built my confidence to participate in similar activities in the future."

Future Applicability of Online Collaborative Skills

Two comments collected from qualitative data indicated the usefulness of the module for future online teamwork: "The overall team experience definitely built my confidence to participate in similar activities in the future;" and, "I do think online team building experience is helpful, and it's good that we learned some guidelines prior to projects."

Discussion

From student responses relating to satisfaction with the entire module and its specific components, overall student attitudes toward the instructional module were favorable. The PowerPoint presentation component received a slightly better rating than the Teambuilding Activity Worksheet component.

The responses of the students relating to their individual personal growth as learners and educators demonstrated the value of the module. Overall, their opinions indicated that they felt their personal learning increased and their personal collaboration skills improved after receiving teambuilding instruction from the module and participating in online teams for the team projects. The comments from students describing their enthusiasm going into their teamwork included specific language and ideas taken from the teambuilding module they had just completed. For example, students commented on specific file naming systems they would use, types of editing paths they would implement, and ways they would communicate and build trust. It is evident that students had clear intentions derived from the module of what would make their online teamwork more satisfying and successful going into the team projects.

The students' satisfaction with the instruction of the online teambuilding module combined with their reports of increased learning, increased creativity, and improved collaboration skills help to strengthen the finding of Pascarella et al. (1998) that student satisfaction with instruction ultimately leads to success. Although Pascarella's study involved only face-to-face instruction, this positive relationship between student satisfaction with instruction and their subsequent success appears to apply as well in online courses using any type of instruction.

Student responses and comments on the Post-Teamwork Survey indicate that they did indeed perceive their online team experiences as satisfying and successful. The students rated their experiences according to the elements found in successful online teams: getting acquainted, receiving support, establishing communication, building trust, and getting organized. Students ranked receiving support as the most important element for their success as online team members. This finding supports the work of Berry, Avergun, and Russ-Eft (1993) and Haywood (1998) who asserted that receiving support was the major factor in team success.

The importance the module placed on forming relationships prior to starting online teamwork was supported by the results obtained from data resulting from the surveys and was further supported by research conducted by Gersick (1988) and Meyerson, et al (1996) who found that a team's behavioral patterns and interrelationships are formed in the first few moments of a group's life.

The data results specifically illustrated that elements of trust, communication, organization (workflow, leadership), and resolving conflict were identified as most important among forming successful online relationships. These were the elements that students most frequently answered correctly on the skills test and found most useful on the applicability section of the Post-Teamwork Survey. Interestingly, these elements paralleled those characteristics found by Jarvenpaa and Leidner (1998) who found that successful teams had established elements of high trust, which included the ability to: communicate effectively, punctually

and socially; deal with conflict and uncertainty; work in an organized manner; and take initiative for tasks and leadership.

Contrary to the expectations of the investigators who assumed that the module would be more rewarding to the students with less online technology experience, *students with more experience* seemed to value the module more than *students with less experience*. One possible explanation for the higher ratings of the students with more experience may be that these students felt more secure using an online instructional module and were able to glean more from it. This explanation lends further support to Sherry's (2000) finding that greater experience with technology reduces anxiety and fosters positive attitudes toward online technology.

Half of the comments from the students spoke directly to the applicability of the module indicating they valued the skills they learned enough to use them in their future roles as educators and collaborators. Additionally, the positive responses students made on the Post Teamwork survey reflected that indeed they would apply their skills towards future situations involving online collaboration. This may substantiate Rooney's (2000) conclusion that online collaboration is a skill necessary for the 21st century workplace.

Implications

The findings of this investigation have several implications: 1) the online teambuilding module used in this study does have an overall positive effect on team attitudes; 2) students who develop online collaborative projects and undergo online teambuilding instruction that includes teambuilding activities have a high satisfaction rate with their online teams; 3) students who learn online teambuilding skills do apply them to their online collaborative work; 4) students value the online teambuilding skills they learned to the extent that they indicated that they would apply to future online collaborative work; 5) instructors who assign online collaborative projects should consider incorporating teamwork instruction in their online classes and 6) the elements found in successful teams, *receiving support, getting acquainted, establishing communication, building trust, and getting organized,* are also elements found in teams satisfied with their online teamwork.

Future Studies

Since a number of the students from this study wrote positive comments about their teammates and their experiences, the investigators believe that this may have implied that the manner in which teams were formed was done successfully. A study of the combination of characteristics used to form the teams could lead to interesting findings. Additionally, as of this writing, the investigators have received a number of inquiries about the module from business entities. These inquiries warrant future research be

conducted beyond the academic environment. Finally, support plays a critical role in the success or failure of a team (Berry, Avergun, & Russ-Eft, 1993; Haywood, 1998). For this particular study, the investigators developed a checklist for the instructor that emphasized the important ways to offer personal support to the online teams. In the future, however, a web-based information guide or pamphlet might be distributed to instructors describing specific ways that they can support online teamwork.

The researchers for this investigative study developed workshops to instruct faculty members at the University of Hawai'i at Mānoa and at Hawai'i Pacific University on how they might support virtual team collaboration for their online courses. Overall, the workshops received positive feedback from the attendees. Evaluations from these workshops and others like it may also contribute to a database for further research.

VTB Sample Web Site Access

The overwhelming positive response from students combined with the enthusiasm of educators and business professionals have led the researchers to currently work towards marketing certain components of their VTB module. You may view the "Recipes for Satisfying and Successful Virtual Teamwork" presentation and access the team-building activities at <http://www.collaborateonline.com>. You may also email the researchers for further information:
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