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Team development and group processes of virtual learning teams

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Abstract

This study describes the community building process of virtual learning teams as they form, establish roles and group norms, and address conflict. Students enrolled in an HRD masters program taught entirely online were studied to determine (1) how virtual learning teams develop their group process, and (2) what process and strategies they use as they work through the stages of group development. Both quantitative and qualitative methods of inquiry were used to capture the dynamic interaction within groups and the underlying factors that guided group process and decision-making. The results show that virtual learning groups can collaborate effectively from a distance to accomplish group tasks. The development of virtual learning teams is closely connected to the timeline for their class projects. Virtual teams are also similar in terms of their task process and the use of communication technologies. In contrast to face-to-face teams, the leadership role of virtual teams is shared among team members. Recommendations are discussed in order to facilitate peak integration of virtual learning teams into Internet-based training courses.

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1. Introduction

In the 21st century, organizations face many challenges from increased globalization and rapidly changing technologies. While technological advancements in the workplace continue to be the primary factor in maintaining a competitive advantage, organizations also recognize the

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need to address the technical knowledge and skills of the workforce. This has led to an increased emphasis on the role of learning in organizations, where individuals must view learning as a major component of their work responsibility within the organization (Marsick & Watkins, 1993). The nature of work within organizations is also changing from individual assignments to team-based activities. The change toward increased team-based responsibilities has paralleled the growth of communication technologies that can be used to support work teams. Teams are now able to communicate, collaborate, and perform irrespective of time and space (Cantu, 1999).

The role of teams is not confined to the workplace. Today's workforce and education providers are realizing the benefits of collaborative teams in the learning process. Researchers who study groups working on tasks or work teams also use the term "group" as a unit of analysis (Hackman, 1990; Sundstorm, DeMeuse, & Futrell, 1990). In this study, the terms "group" and "team" are used interchangeably. Researchers have demonstrated that learning is most effective when students work in groups, verbalize their thoughts, challenge the ideas of others, and collaborate to achieve group solutions to problems (Deutsch, 1962; Johnson & Johnson, 1989, 1994). While the benefits of collaborative learning have been established for face-to-face teams (Means, Schlager, & Poirier, 1994), the impact of distance and time on virtual team roles, functions, and processes have received little attention. Working in a virtual team is unique because of the physical separation of the group, yet little is understood about how distance and time affects their ability to make plans, communicate, and work to accomplish team goals.

The purpose of this study was to describe the team development and group process of virtual learning teams as they form, establish roles and group norms, and address conflict. The goal of this study was to generate recommendations for integrating successful virtual learning teams into Internet-based training courses. This study was guided by the following research questions:

1. How do virtual learning teams develop and determine their group process?
2. What processes and strategies do virtual learning teams use as they carry out their team tasks?

2. Theoretical framework

Understanding teams, collaborative learning, and team environments is becoming more important because advances in technology, globalization, and organizations are moving toward utilizing more network structures and team-based functions (Lipnack & Stamps, 1997). The term "virtual team" is becoming more prevalent as teams move from being primarily "co-located," where team members are located in one physical location, to "virtual," where team members are geographically unrestricted.

Virtual teams are groups of individuals who interact through various communication technologies to accomplish its common goals. Virtual learning teams are being used in education as well as corporate training programs in an attempt to enhance collaboration and cooperative learning experiences. In the expanding market of virtual universities and online degree programs, virtual learning teams are being used to increase collaboration, communication, and ultimately student

learning (Bailey & Luetkehans, 1998). These virtual teams rely on Internet technologies such as videoconferencing and chat rooms to interact and become functional work groups. Virtual learning teams allow instructors of online courses to assemble effective teams in a short period of time, enhance the utilization of external resources, and increase team member interaction and collaboration (Townsend, DeMarie, & Hendrickson, 1996). Using virtual teams also promotes knowledge sharing and enhances the application of knowledge and skills (Horvath & Tobin, 1999).

Even though various studies of groups using computer-mediated communication have contributed to an increased understanding of both face-to-face and virtual teams, the results are inconclusive (McGrath & Hollingshead, 1994). Most studies comparing face-to-face groups and groups using communication technology suggest that face-to-face teams are more effective. McGrath and Hollingshead (1994) examined fifty studies on computer-assisted group performance and found that computer-mediated groups tend to have fewer interactions and less information exchange among members than face-to-face groups. Virtual team members can exchange verbal information as efficiently as a face-to-face team, but their ability to handle non-verbal exchange is severely limited, which can contribute to increased misunderstanding among members (Warkentin, Sayeed, & Hightower, 1997). In another study, face-to-face teams were found to have better internal leadership and coordination than virtual teams (Burke & Chidambaram, 1994; Eveland & Bikon, 1989).

Collaboration studies have shown that cooperative learning situations promote student achievement within problem solving settings as well as higher productivity, greater social skill development, and increased self-esteem (Johnson & Johnson, 1989, 1994). Teams can be defined as “interdependent collections of individuals who share responsibility for specific outcomes for their organization” (Sundstrom et al., 1990, p. 120). A definable set of characteristics common to all collaborative work groups includes: (1) a definable membership, (2) awareness of one’s membership, (3) a shared sense of purpose, (4) member interaction, and (5) ability to act as an individual unit as well as a unit of individuals (Knowles & Knowles, 1959).

Many researchers have studied how groups develop into functional teams and select group processes to accomplish their tasks (Fisher, 1970; Gersick, 1988, 1989; Poole & Roth, 1989a, 1989b; Tuckman, 1965). Tuckman’s (1965) model highlights the four sequential stages of forming, storming, norming, and performing. Forming refers to a period in which members try to determine their positions in the group, procedures to follow, and the rules of the group. The second stage, storming, starts when conflict arises as team members resist the influence of the group and rebel against accomplishment of the task. The norming stage begins when the group establishes cohesiveness and commitment to its tasks, finds new ways to work together to accomplish the tasks, and sets norms for appropriate behaviors. The final stage, performing, occurs when the group shows proficiency in working together to achieve its goals and becomes more flexible in following their procedures for working together. Each stage of Tuckman’s model is an essential step for a team and, much like other linear models, if the first step is not accomplished, the latter stages will not be successful. Other linear progression models are very similar to the Tuckman’s model in that group members engage in get-to-know activities and experience tension between the self and the demand of tasks at the beginning, tend to deal with emerging conflicts in the next phase, develop task or social structures in the following phase, and reinforce working patterns to complete the task (Fisher, 1970; Tubbs, 1995).

Another contemporary framework of group development is called Punctuated Equilibrium (Gersick, 1988, 1989). This framework suggests that regardless of group structure, tasks, or deadline, groups work on their tasks in the same temporal pattern. Gersick found that internal group processes focused primarily on the time frame set for a team project. Five time segments characterize her framework: three brief transition periods at the beginning, mid-point, and the end, and two long work periods between the transition points. The first transition point starts when the group has its first meeting and immediately establishes its strategies and approaches to accomplish its tasks during the first long work period. Then, at the midpoint of the group project time, the group goes through the second transition that sets the direction for the second long work period. The mid-point transition involves the reexamination of group strategies, procedures, and goals. The second long work period is similar to Tuckman's Performing stage, where the outcome becomes the focus of attention as teams develop and interact. The last transition point is the completion period where the group finishes its tasks and adjourns. It is clear that the effectiveness and outcome attainment of teams is dependent upon the resolution of conflict, developing roles within the team for working together, and supporting one another as individual learners.

McGrath's (1991) Time, Interaction, and Performance (TIP) model suggests an alternative view of group development by maintaining that the group development process is multi-functional rather than sequential. The TIP model claimed that groups perform three distinct functions: production, well-being, and member support. According to this model, group members simultaneously engage in and maneuver to one of four functional modes: (a) inception, (b) problem solving, (c) conflict resolution, and (d) execution.

Theory development and empirical research are needed to better understand and respond to the challenges that virtual teams face (Furst, Blackburn, & Rosen, 1999). Although there have been several related studies in this area, few research efforts have focused on the virtual learning team within the formal online education context. Online learning teams are usually more diverse than those created in more traditional educational settings. Often these students are working professionals who have a limited history of working together, and few prospects of working together in the future. Thus, further understanding group formation and team dynamics in virtual environments is critical to the integration, creation, and support of online learning teams.

3. Methodology

This study was guided by an inductive analysis to understand the dynamics of virtual learning teams. Both quantitative and qualitative methods of inquiry were used to capture the dynamic interaction within groups and the underlying factors that guide group process and decision-making. The analysis was aimed at discovering the critical elements that emerged during team development and an analysis of factors that affected the selection and use of communication technologies.

3.1. Participants

The participants in this study were students enrolled in an online master's degree program offered through the University of Illinois in the United States. Thirty-six graduate students were

enrolled in the first course in a nine-course sequence. They were geographically dispersed across ten different states in the USA and two countries. Because the program was offered entirely online, there was no requirement for the students to ever visit the campus. The class was divided into seven virtual teams comprised of five or six team members. The groups were formed based on geographical location to reduce the impact of different time zones on group interaction. The exception to this was a group comprised of two Koreans, two students from Florida, and one student from Connecticut.

3.2. Technologies for virtual team support

The University of Illinois offers an online master's degree in Global Human Resource Development (HRD); an innovative instructional program that uses the Internet and a variety of web-based technologies to provide a quality learning and collaboration environment. The program is designed to provide both individual and group interaction with the instructor and places a strong emphasis on self-directed learning. The nine-course sequence is designed for individuals currently working in or aspiring to HRD positions in either the private or public sector. Course topics focus on employee training and development, organization development, and the use of information and technology to improve individual and organizational performance. Emphasis is placed on HRD leadership in both domestic and international settings. A Master's of Education (Ed. M.) degree is awarded upon completion of the program.

Students begin the program in a cohort of approximately 30 students. They complete one 12-week course each semester over a 3-year time period. Each online course is divided into multiple modules that serve as the organizing structure for the course. On average, one main topic or module is introduced and covered each week. Each module begins with an overview of the topic followed by an assignment related to the application of the content. Course content is delivered through pre-recorded streamed audio lectures, PowerPoint presentations that are synchronized with the streamed lecture, online readings, and traditional textbooks. After the students have reviewed the content in a module, they typically complete one or more "application" assignments. These application assignments require the students to apply what they have learned by posting information on a discussion board, interacting with the instructor and students in chat sessions, and completing course projects. About one-half of the assignments are to be completed by the "virtual teams." At the start of each class, the students are assigned to a virtual team of 4–5 members and they interact using various communication technologies. The Internet-based technologies used in the online program were specifically selected to support communication and collaboration of the virtual teams. The online course supported the direct use of e-mail, a collaborative web forum (WebBoard™), synchronous text chat, and Internet pagers (e.g. Instant Messenger™). The instructor facilitates the discussion on WebBoard™ where the students were encouraged to raise questions, issues, comments, and concerns that will help them better understand the topic.

A unique aspect of the online courses is the requirement that all students participate in a weekly synchronous class session. These 1-h weekly synchronous sessions consist of a live streaming audio broadcast from the instructor that is accompanied by real time text chat among the students. During each live session, the students gather virtually in the chat room using mIRC and listen to a live audio broadcast from the instructor. The students use mIRC to ask questions,

respond to the instructor's questions, and participate in discussion with the class since the entire class can see all the text submitted to the chat room. Separate chat rooms are also used by the students for small group work during breakout sessions. The live lectures and text chat messages are all archived for later use by the students and these archives are also used for research purposes.

3.3. Instrumentation

Several established instruments were used to assess virtual team development and process. Lurey's (1998) *Virtual Team Survey* was used to obtain information on the team's process, leadership, technology use, and perceptions regarding overall team performance and individual satisfaction with the team. Nemiro's (1998) *Background Survey of Virtual Team Members* was used to assess the team member's feelings about working in a virtual team and to identify the typical types of interactions that occurred. The online versions of these instruments were identical to the paper versions in both format and content. In addition to these administered instruments, electronic logs of interactions among the team members were captured and analyzed. These included the archived logs from group chats, e-mails, and discussion board postings. An interview guide was developed to ensure consistency during the follow-up interviews of the team members.

3.4. Procedures

Data were collected over a 3-month period following the completion of the first 6-weeks of the online course. Virtual team members were sent an e-mail message that asked them to complete the instruments within a set time frame. The subjects completed the forms online and submitted their results electronically. All instrument data were entered into a statistical analysis package for analysis.

Following the collection of survey and course data, three members from each team were interviewed. Two members of the research team conducted the interviews over the telephone. Having two researchers participate in the interviews facilitated the process of note taking and allowed the interviewers to compare notes and discuss the information obtained following each interview. The identification of strategies and problems that influenced team performance was determined by open ended questions asked of each team member during either phone interviews or follow up personal e-mail exchanges. These open-ended questions focused on team attitudes about communication technology selection, reflections on using each method, and how the communication tools affected the quality of team outcomes.

Data captured electronically using internal data logs from various communication technologies were downloaded and formatted for analysis. Data to analyze the frequency of use of each of the communication technologies were collected by counting the frequency of communication among teams and individual members. Determining the purpose of each of the messages sent using the various technologies involved an initial summarization of the message content followed by a classification based on the purpose of the message. While the set of purposes used to classify the messages were initially organized according the established models of group interaction, the final classification was allowed to emerge from the analysis.

4. Results

Based on the findings from this study, the four stages of Tuckman's group development (1965), forming, storming, norming, and performing, described how the virtual learning teams performed better than the other theoretical models. However, team communication in the virtual environment and the short amount of time that each team had to accomplish assignments (about 2 weeks per assignment) led to rapid movement between each stage with almost no evidence of the storming stage. Therefore, in this study virtual team processes are categorized into an iterative model consisting of three stages: (1) forming, (2) norming, and (3) performing. In addition, when conflict among team members arose, the teams would resolve the conflict and continue the process of forming, norming, and performing (see Fig. 1.)

4.1. Team forming

The students were assigned to a virtual team at the beginning of the course. A web page was posted a week before the class began that showed who was assigned to each team. This listing included the Instant Messenger™ screen name and e-mail address for each team member. No formal guidance was offered to the teams in terms of their formation and development other than a due date for the first team assignment, which was approximately 2 weeks after the online course began. This led to different aspects of development as each virtual learning team evolved and defined their group process. During team formation, there were two main aspects visible among the virtual teams: (1) social interaction, and (2) goal setting role selection.

4.2. Social interaction

One team established contact prior to the beginning of class while the rest of the class members waited until the first formal synchronous class session to begin their social interaction online. The teams initially tried to define their group norms by discussing team purposes and goals and performed some informal team building activities. In the words of one student, this involved getting "acquainted with one another, sharing what we knew about the course, and setting up a tentative schedule/procedure." Although this seems relatively straightforward, these preliminary activities were often the source of much difficulty, as shown by the comments provided during the interviews. "It was tough getting together with the technology. It took awhile to get used to—what

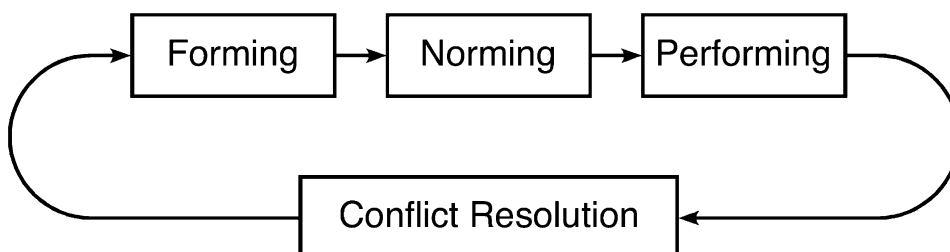


Fig. 1. Stages of virtual team process.

took 10 min face-to-face took an hour online—it was hard to make decisions. Not having non-verbal cues made it harder.”

Verbal and non-verbal cues played a role in the team social interaction. For instance, one team member stated, “We never got too personal—others in the team did not know I was pregnant until the last week of class. This is something that would have been obvious if we were meeting face-to-face, but it just never came up online.” Others, as they began to depend on one another to develop and create deliverables for the course, felt like they could trust their team mates, but one in particular stated that they were “Craving human contact—such as a team member looking me eye to eye and saying ‘I’m going to take care of this.’ As much as I want to trust team members, I don’t know them as well. I have concerns about accomplishing a large team project—especially one that might require a physical product.”

4.3. *Goal setting and role selection*

It was during these first meetings that the majority of the social networking began. This “getting to know you” interaction continued for several team meetings, and gradually diminished over time. Some of the comments made by the students during the interviews regarding team formation included:

- “Talking about a forming or storming phase, we didn’t really go through that, or if we did, it was very rapid.”
- “The first couple of weeks were hit and miss . . . it was hard to coordinate everyone’s schedules”
- “I met one team member on AIM before class began. I took the initiative ‘Hi, I’m Mariah, your future teammate. . .’”
- “We met after the first class. We talked a bit about ourselves, our backgrounds, what we thought of class. We familiarized each other with technology . . . Informal teaching and instruction of other team members. We talked about assignments and how we would do them.”
- “It was difficult negotiating to meet online . . . what night and time worked best for everyone varied with children, work schedules, etc.”

Since the purpose of the teams was to complete team assignments, all teams adopted the assignment due dates as their timeline goals. During the first online meeting, the teams tended to have one individual accept responsibility for coordinating and compiling the first week’s team assignment. This became a standard for later assignments. For example, one member would volunteer to compile all member inputs into one document and post it for other to review before submitting it to the instructor. Then, the next member volunteered to do the same for the next assignment.

4.4. *Team norms*

As in traditional face-to-face teams, norms were developed to facilitate team performance. From the questionnaire items, based on a 5-point Likert scale, punctuality was indicated as being

important for team communication and teamwork ($M=4.27$, $S.D.=0.51$). Other team norms, such as knowledge and information sharing ($M=4.46$, $S.D.=0.50$), requiring active participation ($M=4.07$, $S.D.=0.52$), and timely response in terms of feedback ($M=3.82$, $S.D.=0.42$) all indicate a high expectation of adherence to team norms by most individuals across teams.

Although each team was unique, there were commonly shared elements in their process, especially the work procedures for completing team assignments. Generally, the teams settled into a work process similar to the one described below after the first two or three assignments. Of course this varied between teams, with some teams meeting less often and others meeting more often (up to three or four times a week). The typical work process of the virtual teams was:

1. Meet after the class synchronous session to define roles for the assignment and discuss timeframes for completion.
2. Do reading individually and get together by Monday and post individual input on WebBoard™.
3. Meet synchronously as a team 2 days before the assignment was due and refine input.
4. The person who plays the role of assignment compiler would draft and post with revised input.
5. Assignment posted for final approval and additional comments 1 day before due date.
6. Any additional comments would be added and posted into a final draft.

Each team's work process was continually refined as the teams progressed through the class and became more efficient in assembling their work. The students made several interesting statements that were unique to their specific team's group norms during the interviews:

- “During the WebBoard chat, one person would tend to lead the group discussion by keeping the team focused on the task at hand. There seemed to be a split between males and females within the group.”
- “For conflicts, we'd speak to the person individually on private chat (AIM) and not discuss it in front of others. It is difficult to resolve communication issues [online].”
- “If someone missed a meeting, a summary would be posted or forwarded to him/her. There was an expectation to check the WebBoard 5–6 times a day. We developed our own language and abbreviations to ease communication.”
- “Coming up with a document took awhile online initially, but we got more efficient. We came up with our own abbreviations—own language (p = paragraph, s = sentence). We had our own jargon as a team.”
- “We had a captain each week. We didn't meet much. We used the WebBoard more, and our meetings were short.”

4.5. Team performing

Analysis of the accumulated team assignment scores showed that there was no difference among the seven team's scores. Therefore, in terms of the team actual performance, the teams

appeared to perform at the same level. During the team performing stage, two main characteristics were manifest through each team as they progressed: (1) team leadership and roles, and (2) team interaction, independence, and trust.

4.6. Team leadership and roles

The role of leadership was an interesting aspect of the virtual teams. Surprisingly, only two of the seven teams had a leader emerge in the group. Most of the groups shared the leadership role, often rotating on a weekly basis. The team leader sometimes was identified as the same person as the assignment compiler. The team compiler would take leadership for when other members should submit their work and setting a timeline to finish their assignments. However, in a virtual environment, the leadership role was not defined clearly. The leader was depicted to be a person who kept the team going and reminded members of important deadline.

Responses to the interview question, “Did you have a leader in the team?” are shown below:

- “Those who were experienced with technology were more dominant.”
- “Leader, gatekeeper (reminding when assignments were due). There were different roles at different times. These roles shifted informally. It was very much like an actual team, except roles emerged virtually.”
- “One person emerged as the leader for the team, and this person would keep the group on task. This person had strong opinions and personality.”
- “We did not have a leader, and this was problematic . . . It’s difficult to [form a team] face-to-face, and even more so with a virtual team. People are too polite and don’t resolve conflicts.”
- “No. Roles varied based on what the assignment was, because we all had different backgrounds. Everyone had a specialty; there was an English reviewer, 2 people to write-up the assignments, 2 people to critique. It depended on personal scheduling.”
- “No. The person who compiled was kind of a “leader for the week.” We didn’t designate, but shared it throughout the course.”

Comparing the questionnaire responses to the interview statements resulted in some seemingly conflicting responses. For example, the questionnaire item, “The team leader was appointed by team members” received a low value ($M = 1.54$). This initially can be interpreted negatively, but the response may have been due to the fact that the role often shifted through the team. Additionally, the item “Team members alternated their role to be team leader” ($M = 3.22$, $S.D. = 0.82$) conflicted somewhat with the interview responses. However, there was a general consensus that whoever the leader was, he or she “kept individuals working as a team” ($M = 4.31$, $S.D. = 0.55$). One result of the lack of consistent leadership may be seen in the responses students gave to the statements “Team members had a shared understanding of what the teams was supposed to do” ($M = 2.84$, $S.D. = 0.50$) and “Team members used their own judgment in solving problems” ($M = 4.14$, $S.D. = 0.54$). This may be indicative of a task-oriented approach to team performance resulting in less of a “team” and more of an individual work group.

4.7. Team interaction, interdependence, and trust

Virtual teams are uniquely dependent on team interaction and individual acceptance as they collaborate from a distance in their individual social network. As mentioned above, each of the teams formed in a uniquely different way, which fostered varying social interdependence from group to group. The teams' perceptions of their effectiveness and cohesion also varied from team to team. In general, each team exhibited a collectively positive team perception of individual teammates and their willingness to contribute to a common vision and commitment to achieving team goals. As a member of one team said, "we worked very cooperatively. Each of us has the capacity to trust each other explicitly to do well." Another student claimed, "It was a team thing—we all made suggestions, we all contributed. It was a group effort and it was shared leadership."

However, not all team member perceptions of whether or not their teammates were contributing to effective team outcomes were congruent. For instance, during an interview, one team member suggested that there was cohesion and team effectiveness when leadership emerged and "everybody in the group found a role as a communicator, giving feedback, providing content, or writing the drafts" within the team. In contrast, one of her teammates made the claim that "We never became a team. There was spotty participation throughout, and things were often left in a half finished state."

To better understand the students' social interaction needs, they were asked to respond to the question "Did you feel the need to meet face-to-face?" Respondents repeatedly claimed that meeting face-to-face was unnecessary. Out of 20 interviews, 17 students reported that it was not necessary to meet face-to-face. They responded that, in general, everything that was required of them was accomplishable virtually without the face-to-face interaction. However, there were discrepancies in some of the interviewee responses. One student said "No—it is not necessary to meet face-to-face, we got an idea of each other's personalities online," but later the same student said "One of the biggest drawbacks is the distances apart from each other. You can't get together and discuss over coffee or exchange information. This hampers getting it all together." In fact, three of the teams had some team members meet face-to-face at different times where it was geographically feasible and suggested that these meetings were beneficial in building social relationships with their colleagues. Individuals who were left out of the face-to-face meetings summarized their feelings well by saying, "It would have been fun or great, but wasn't necessary. Those who met face-to-face had a better relationship. But they didn't let it hinder other relationships."

In response to the question "Was there a need for meeting face-to-face?" the typical answer was "No, but ...". Several benefits of not meeting face-to-face emerged, including (1) not meeting face-to-face enabled more flexibility in scheduling meetings, (2) people were less inhibited from a distance, and (3) in the long run, it is less time consuming because of "less socializing and more focus on the task." It appears that even though meeting face-to-face was not necessary for most of the course requirements for these participants, there is evidence that it is still desirable when possible. One team member stated, "Collaboration is enhanced by face-to-face. You can do anything if you are paired up right—it's more or less a comfort level. The most significant thing I discovered is that I am a social learner, and the WebBoard™ doesn't fulfill that need. I realized that we as a society have moved on though, and I have to adapt." Perhaps those who are ready to

meet the changing dynamics of business and education will be those that can adapt well to the changing nature of communication and information delivery.

4.8. Team conflict

Since the team assignments were not complex, most consisted of writing team papers or analyzing a case study, team conflicts did not arise from their task difficulty. Most team conflicts stemmed from a lack of willingness to participate, lack of planning, or individual disagreements. These three social issues influenced the successfulness of building team trust and unity. In two of the teams, bad feelings about an incident were never resolved. Individuals were able to simply log off the chat sessions at any time they felt like it and could virtually disappear if they chose to. When conflicts were not resolved effectively, it hampered the progression of the team. One team found that “it was difficult to resolve communication issues” but when they occurred, they would “speak to the person individually on private chat, keep on private chat, and not discuss it in front of others” which was a problem one of the teams ran into—a public dispute. Overall, teams found that they “Had to have a lot of trust with other members” and although the majority of the teams had no real problems with this, any type of trust issue made collaboration very difficult.

5. Discussion

Although both the Tuckman and Gersick models were initially used as frameworks for structuring the findings of this study, our data tend to fit better with Tuckman’s model. While further research will be needed to confirm this, we did notice that virtual learning teams evolved around project timelines and three stages of team process much like face-to-face teams. These processes included the activities identified by Tuckman in the terms of forming, norming, and performing. The concept of stages also seems to be relevant to virtual learning teams as it was evident that team performance was dependent on how well the teams were able to establish procedures, resolve conflicts, and collaborate to bring about a successful task.

Typical situations for the teams emerged as well and were found to be interesting. Initial meetings in the teams seemed to involve the creation of the group norms and procedures that set the direction in which the teams could accomplish their tasks. Since the first assignment was due 2 weeks after the course started, the first team meetings most frequently started within the first week of the course. Teams generally tried to get to know each other quickly and get right on task. For some of the teams, an individual in a team tended to emerge as a team coordinator and initiated the interaction. Then, they developed a procedure for how the task should be accomplished. This procedure was later used as a team standard for working on subsequent team assignments.

It is also interesting that all the teams went through a similar task process. This typically included team interactions online and decisions on how the procedures and timeframes would be established for working on team assignments. Each member individually did readings and posted information on the WebBoard™. Then, they met again online to integrate all their postings. A team compiler revised a final draft and posted it on WebBoard™ for other team members to review before submitting it to the instructor. This team task process was developed as the teams

went through the first class assignment and the teams became more efficient in their work process with later assignments.

Another interesting finding was the emergent roles of shared leadership in the team as a coordinator and compiler. Members from four of the seven teams mentioned that leadership of the team was shared among team members, but they informed us that the compiler of each assignment became the team leader during that week. This resulted in the leadership role rotating among members for each assignment. The other two teams saw the team coordinator as a leader for the entire time, and they also served the role of facilitator and coordinator. They kept track of the assignment due date and often initiated the first interaction among the team.

Problems in the virtual teams came from a lack of willingness to participate, lack of planning, conflicting schedules, or individual disagreements. Most of these are social interaction issues. Lack of non-verbal cues made those issues invisible to other team members. While most participants mentioned that they missed face-to-face meetings, they said it was not necessary and they could accomplish all the assignments without face-to-face interaction. It is likely that non-verbal language played an important role in social interaction and team building but not in the task process. It seems that with a short period of time for team building and because of the limitations of the distance education environment, team members did not spend much time on social tasks. We found that the teams needed to be quick in redefining their process, be familiar with various technologies, and efficient in collaboration among team members in a virtual environment.

5.1. Recommendations

Several strategies should be considered as important to virtual learning teams for improving team development and group processing. As for the success of the online learning teams, there are three issues that should be considered:

(1) *Select appropriate virtual learning team tasks.* As with any collaborative learning project, the types of assignments or work assigned in virtual team situations should be carefully considered. There should be a clear objective and benefit established for using group assigned tasks, especially in a virtual environment. The majority of interviewees suggested that if the task were too complex, it would be difficult to accomplish without the option of face-to-face interaction.

(2) *Provide team building and collaboration training.* Virtual team members need more time in the beginning to coordinate their first task and establishing relationships and protocols in their initial meeting is critical. Instructional material on team effectiveness, formation, planning, and facilitation should be included early in online programs. The faculty member must become a mediator and facilitator of virtual teams. The tendency is to form the teams and assume that people know how to interact and efficiently operate in “virtual teams” but it is not so. The majority of good teams do not occur out of happenstance—they are developed.

(3) *Develop project timelines that match the team development model.* In many online courses, team projects have been used to evaluate student performance. This study showed that the time-frame of the project has a direct impact on the development of the virtual teams. Project timelines that are established by the instructor should be reasonable and allow enough time for students to adjust themselves to work in a virtual environment.

5.2. Conclusion

This paper provides a glimpse of how virtual online teams develop and carry out their tasks. Like many descriptive studies, the results of this study were not meant to be formally generalized to other virtual teams, but the uniqueness of these virtual learning teams and their environment provide insight into how they develop and progress throughout their team life. Further research should address the issues of dynamic interaction during online meetings, the role of the instructor in establishing and supporting virtual learning teams, how teams select and use technology to support group performance, and what actions help teams better collaborate and lead to greater team performance and individual learning.

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