

# Virtual Teams In Higher Education: The Light And Dark Side

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## ABSTRACT

*Students and faculty are grappling with learning teams in the online environment - more than half of all higher education organizations offer online courses (Hoffman, 2006). As online course developers try to replicate the best practices of traditional classrooms, the asynchronous technology of the Internet has added great capability while also increasing the confusion that distance in space and time can add to the learning process.*

*This study conducted a qualitative survey of online learning teams using content analysis by three researchers and grounded theory by the fourth researcher. Analysis of the rich text responses prompted the researchers to propose a model for online team development that reflected the functionality or dysfunctionality of teams. Key influences related to the internal or external locus of control of conscientious students. Key findings include strong connections between conscientiousness and attitude towards teamwork on the input side with satisfaction and trust for outcomes. Unlike other research, these online teams linked performance not to pedagogy, but conscientiousness, attitude towards teamwork, and trust. Technology did not hinder performance, suggesting that the new generation of learners is more comfortable with online interactions. The study detected a new factor, team leadership, as a core issue limiting learning and success within teams.*

**Keywords:** Distance Education; Online Learning; Higher Education; Educational Technology; Teaching Methods & Styles; Research & Development; Teams; Virtual Teamwork; Leadership; Trust; Qualitative Research

## INTRODUCTION

The availability of online classes as a convenient alternative for traditional face-to-face classes has been increasing exponentially as colleges, universities, and especially students recognize the advantages of learning from home - reduced travel time, fuel use, facilities use, and increased flexibility in study time, to name a few. As online course developers try to replicate the best practices of traditional classrooms, the asynchronous technology of the Internet has added great capability while also increasing the “fog and friction” (i.e., confusion) that distance in space and time can add to the learning process (Kiesling, 2001). In traditional classrooms, for example, the use of student teams is one instructional strategy that has seen increased use as research over the last 30 years has shown its effectiveness in increasing student learning (Michaelsen, Knight, & Fink, 2004). Transforming student team activities for use in online courses has been possible for some time in various learning management systems. Evidence suggested that the asynchronous nature of online learning might add or exacerbate challenges that students may or may not experience in the classroom. Since the development of online courses is a relatively new phenomenon, however, there is little research on the issues surrounding online student teams. The purpose of this paper is to provide a literature review of the research on classroom teams and virtual teams to identify possible avenues for further research in the area. The paper first looks at the research on traditional classroom-based teams and virtual teams. It then examines the theoretical basis for some of the issues identified in the research, communication theory, and the impact of technology. It concludes with a summary of some of the commonly identified variables that warrant further research.

### **Classroom-based Teams**

The first research on academic team-based learning occurred in the University of Oklahoma in the late 1970s (Michaelsen, et al., 2004). Teams, his research showed, seemed to learn more, take more responsibility for their learning, and have more fun.

Other research uncovered characteristics of effective learning groups - effective groups tended to support each other, were held accountable both individually and as a group, worked on team skills in addition to content skills, and evaluated their teamwork (Barkley, Cross, & Major, 2005). A substantial number of research studies on cooperative or collaborative learning in the classroom showed positive results in academic, social, and emotional growth in student teams, from elementary to college-age students and from a wide range of ethnicities and abilities. Various meta-analyses also confirmed that team-based activities promoted learning. In one meta-analysis on students in higher education by Springer, Stanne, and Donovan (1999), the academic achievement of students in small groups was approximately one standard deviation higher (effect size = .51) than students in lecture-based classes, and students in those studies had more positive attitudes toward the course content.

A number of studies have examined what personality characteristics lend themselves to team effectiveness. In a meta-analysis of these studies (Peeters, Van Tuijl, Rutte, & Reymen, 2006) that addressed the effect of Big 5 personality types on professional and student team effectiveness, the study found that extraversion, emotional stability, and openness to experience were not significant factors in either professional or student teams; and though higher average levels in agreeableness and conscientiousness had a positive effect on professional team performance (and variability had a negative impact), those factors were “virtually absent in student teams” (p. 392). The study suggests that these two factors may be less significant in student teams because student teams work together for shorter timeframes and are not as dependent on one another (i.e., one conscientious student can usually complete the entire project, if need be.)

### **Dysfunctional Teams**

Some early research, however, also indicated that student teams had a number of issues; 1) dissatisfaction for all team members getting the same grade despite different levels of effort, 2) unequal concern between students over grades, and 3) difficulty with coordinating meeting times (Michaelsen, et al., 2004). Since those early observations, there has been little further research on dysfunctional classroom-based teams (Barkley, et al., 2005). Informal student survey results suggested that there were both positive effects of teamwork recognized by students and instructors, as well as negative aspects of student teams. Negative items included dominating students, “social loafers,” students who missed meetings and deadlines, students who disappeared for extended periods, teams digressing from the task, and teams that did not communicate well nor had clashing personality types.

### **Virtual Teams**

Goold, Augar, and Farmer (2006) found that, even though, on average, students enjoyed working in teams in a classroom setting, most were less enthusiastic with working in a group in an online environment. However, the overall trend was that more students had positive opinions than negative opinions. Additionally, Walther (1996) suggested that in the virtual environment teams are able to adapt to the new environment and achieve high performance.

Yoon (2006) examined online student team behaviors in seven virtual teams, categorizing the behaviors into three domains - Work, Social, and Management. In reviewing student behaviors over time, Yoon found that the majority of interactions in early weeks of a team project were aimed at social behaviors (42.6%), which he speculated “might indicate that virtual learning team members try hard to enhance the social presence in an online environment before focusing on work. The percentage of interactions focused on work increased over time to become the dominant behaviors (68.7%) by the end of the project. Management interactions were lowest, starting at 23% and dropping to 10.7% by the end of the project.

In a recent study, Grzeda, Haq, & LeBrasseur (2008) emphasized the importance of the team-building process in their instructional design in order to alleviate the project-oriented assignments that do not promote team process skill development, a common complaint from business. While the overall number of positive comments exceeded negative ones, there were two areas of lopsided results when drilling down to the categories that might be indicative of problem areas for further exploration - Orientation/team directions (8 positive comments, 92 negative) and technology (9 positive, 91 negative). On the other hand, comments on team process (59 positive, 41 negative) and team effectiveness (78 positive, 22 negative), which were the focus of the study's instructional design, were very positive, indicating that the inclusion of team-building processes may contribute positively to the online learning experience.

### **Communication in Virtual Teams in Higher Education**

By 2001, more than half of all schools in higher education had already given online courses (Hoffman, 2006). The question of what makes a good team is salient. Whereas personality attributes and performance outcomes are normally outside of a student team's control, communication is firmly placed in the center as a key mediating variable for successful virtual team learning. The communication literature substantiates that reliable communication and deepening disclosures lead to trust (Altman & Taylor, 1973). However, this trust-building communication within teams appears elusive - only 20% of CEO's rate their top teams as "high performing" (The Bolton Group, 2005). Authors on the topic of virtual team communication quip that teamwork needs touch, indicating that proximity matters for effective team communication.

When attempting to understand the process of communication within higher-education virtual teams, it is crucial to comprehend the interpersonal relationships of the members. Communication plays the central role in the stability, maintenance, and processes that allow these relationships to function. Various theories inform communication in online learning teams. In addition, studies on virtual teams reveal key variables of interest.

The most applicable theoretical approaches include structural, interactionist, exchange, developmental theories, and systems perspectives. Whereas the structural-functional perspective views communication in the team as a system of structural elements and therefore specifies their function in the maintenance of the system, the interactionist perspective takes into account an individual's experience of the meaning of their environment. The emphasis in this perspective assumes that team members create and negotiate roles through virtual team interaction, rather than merely playing out culturally determined scripts (Burr, Leigh, Day, & Constantine, 1979).

The exchange theoretical perspective assumes that team members are constantly making trade-offs regarding social behavior with the team. Equity theory is similar to exchange theory and explicitly states that what a team member puts in, they should get as much out. There is an emphasis on fairness and a sense of justice or equity in the team relationships (Huseman, Hatfield, & Miles, 1987).

The developmental stages perspective focuses on the pattern over the formation process that teams take. The stages perspective can also be applied to relationship dissolution. Tuckman's (1965) four-stage group model is a developmental stages team approach. This perspective can encompass social penetration theory, which has been validated in research that shows a gradual deepening in the exchange of information leading to a deeper felt trust among team members.

Last, a systems theoretical approach takes the perspective that a team member operates within a larger (team) system, which in turn operates within a larger higher education system (Senge, 1990). The interactions or transactional patterns lay the "track" for how to relate to one another during teamwork. Systems theory can be used to contrast functional vs. dysfunctional communication patterns within teams or between teams. Because the systems perspective is more scalable and applicable to various processes, the systems approach is the optimal perspective for this study.

These communication theoretical approaches are useful for investigating virtual learning teams. Studies that have investigated communication in teams also contributed empirical data to highlight key variables. Key variables identified in research include roles, communication interactions, trust, satisfaction, clear goals,

collaboration, and candid/frank communications (Kirkman, Rosen, Gibson, Tesluk, & McPherson, 2002). Bales (1950) found in his content analyses of group communication that there was a constant balance between task and cohesion concerns inherent in interactions, and members strove to reduce tension by pro-social talk. Kirkman, et al. (2002) identified five key challenges for virtual team success in their case study of the Sabre reservations system. These challenges included building trust, cohesion, and team identity, and overcoming isolation. In the absence of face-to-face contact in this case, participants were able to increase trust by demonstrating reliable performance. Team relationship satisfaction was an essential outcome variable for virtual learning teams (Kirkman, Rosen, Tesluk, & Gibson, 2004; Lee-Kelley, 2006; and Lurey & Raisinghani, 2001).

### **Technological Impact on Virtual Teams**

The outcomes of teams and virtual teams above identify differences between the two approaches. In current learning practice, the growth of online education and acceptance of technology has transformed the basis of team interaction. Underlying this transformation is an enablement linked to technology. The communications considerations related traditional communication theory to the remote or virtual world. To complete the review of the literature, a technology view of virtual teams provides a consideration of the new underlying dependency.

Early reviews of online or virtual teams highlighted the shortfall in team function when there was a limited face-to-face component (Shneiderman, Borkowski, Alavi, & Norman, 1998; and Smagt, 2000). The limited capability, and especially the complexity of technology options, limited practical communications (Shneiderman, et al.). Virtual teams were effectively limited by complexity rather than function of technology, resulting in the perceived need for establishing underlying requirements, such as trust, through physical meetings.

As technology evolved, new capabilities and underlying infrastructure allowed improved emulation of traditional meetings. Over time, the required degree of technology expertise reduced from the Shneiderman et.al (1998) and Smagt (2000) era, to more manageable proportions. The transition was initially just a matter of degree with technology understanding and skills remained a severe limitation (Heffner & Cohen, 2005, and Lewis, Shea, & Daley, 2005). In considering undergraduate student virtual teams, research by Heffner and Cohen found that the degree of Web-based interaction was a predictor of performance. While students mostly started a course with limited skills and reduced efficacy, Lewis et al. were able to track a marked improvement throughout the duration of the course leading to improved virtual team outcomes. Students recognized the value of technology only where they had been exposed to the technology (Heffner & Cohen).

The use of Time-Interaction-Performance theory by Munkvold and Zigurs (2007) enabled the analysis of outcomes by virtual teams working with limited timelines and less stable membership. In research analyzing the outcome of 12 virtual teams (Beranek & Martz, 2005), the researchers found links to outcomes in the cohesiveness, perception of progress, and satisfaction areas. The same communication implications emerged in the work by Piccoli, Powell, & Ives (2004) where the advantages of self-directed work required technology to provide rich communications. The danger of separated interactions implied by asynchronous virtual teams led to sub-group communications with other team members not receiving all of the information (Andres, 2006). Improved technology was shown to overcome the communication limitation leading to an improved information exchange.

Earlier, it was stated that the impact of technology on trust could be avoided if trust was established in a traditional team setting before moving the team to a virtual setting (Smagt, 2000). This role of trust and the implicit role of technology were endorsed as a prerequisite for knowledge exchange. Most forms of learning, the aim of virtual teams in education, require the free exchange of knowledge. Kanawattanachai and Yoo (2002) emphasize the role of trust in graduate student projects. The previous considerations have identified a number of roles where technology needs to provide a solution for virtual teams and this may imply a need for diverse solutions.

Building on team options and communications, one can conclude that technology is an important underlying facilitator. Technology skills, faculty facilitation, and trust are integrated and important factors for virtual team success. Within the former, communications facilitated by a rich array of technology options provided the bridge to equivalent success with traditional teams.

**METHOD**

This is a qualitative study of surveys given to online students. It uses two qualitative analysis methods - content analysis and grounded theory analysis - to look at the data from two different perspectives. For the content analysis, specific variables were identified from the literature. Using systems theory, variables were sorted into input, throughput, and output process variables. In the grounded theory analysis, the variables, patterns, and themes were allowed to emerge from the data.

**Sample**

The unit of analysis for this study was a student’s typed answer to one of the four survey questions in an online survey. The sample included 120 text answers to open-ended survey questions from 30 students in eight different online upper division Management and Marketing courses with four different instructors.

**Variables in the Content Analysis**

Based on the literature review, the researchers in this study selected 18 variables that were significant in other studies. Variables fitted two main categories - *General Team Behaviors* and *Team Process Variables*. A further division fitted the latter - *Inputs, Throughputs, and Outputs* (Table 1).

**Instrument**

The instrument used to collect students’ evaluation of their team experiences used a written debriefing format based on Kolb’s Experiential Learning Theory (Osland, et al, 2006). The four debriefing questions asked follow the Experiential Learning Cycle - Concrete Experience (the virtual team experience), Reflective Observation, Abstract Conceptualization, and Active Experimentation. In addition, the survey included an open-ended comments question and nine demographic questions regarding team size, familiarity with team members, familiarity with technology, number of team experiences, academic program gender, age, and job type.

**Table 1: Commonly Identified Variables in Qualitative Research on Virtual Student Teams**

General Team Behaviors	Team Process Variables		
	Team Process Inputs	Team Process Throughputs	Team Process Outputs
Work/Task	Agreeableness	Team Process	Team Effectiveness
Social/Interpersonal	Conscientiousness	Using technology	Satisfaction/dissatisfaction
Management	Attitude towards teamwork	Communication/interactions	Trust
	Attitude towards technology	Virtual Presence	Learning
	Orientation/team directions	Collaboration	
	Team size		

**Data Collection**

Data collected used an online survey embedded in the college’s learning management system. Two sets of invitations to complete the open-ended survey went to students in eight online course sections. The invitations included consent instructions and disclaimers. Thirty students completed the survey with over 96% item completion rate.

**Data Analysis**

*Content Analysis Coding*

Three members of the research team independently coded the 120 units of analysis after two training sessions to calibrate the coding. The researchers evaluated for the presence of three Team Behaviors and coded as “present” or “not present.” Team Process variables were coded as “positive” or “negative.” After two rounds of

coding, the team reviewed and discussed their independent coding, resulting in an ultimate inter-rater reliability rating of .82. Researchers were careful to code a variable as “present”, “positive”, or “negative” only when the student explicitly mentioned a clear phrasing of the concept.

*Grounded Theory Analysis Coding*

The analysis of the data using grounded theory starts by the researcher gaining a deep understanding of the data, following the tradition established by Glaser and Strauss (1967) where each text item is considered in small parts to find analytic categories (Bernard, 2000). The process continues to evaluate the text linked by categories for comparison and refinement. The basis of open coding advocated by Glaser and Strauss, and detailed by Strauss and Corbin (1998), aims to discover information in the text. Next, the understanding of themes moves to find linkages and determine themes (Miles & Huberman, 1994), a process similar to axial coding considered by Strauss and Corbin. The use of computing resources allows multiple comparisons of sentences and clauses to aid sense making of the text (Creswell, 2003) and simplify the management of a codebook. By using memoing, as proposed by Miles and Huberman, one finds conceptual models from the themes established earlier. The need to reduce concepts to a single model (Robson, 2002) has less relevance in the current research.

**RESULTS**

**Demographics**

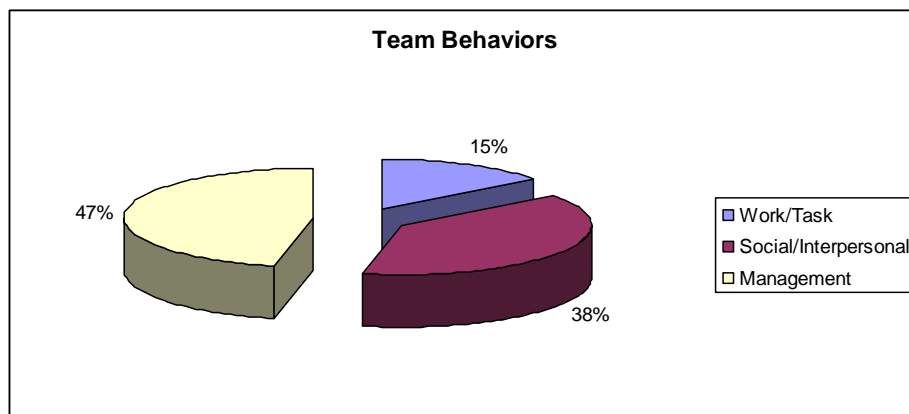
Respondents were more evenly distributed by age than the institution or programs (31% for 20-29, 34% for 30-39, 28% for 40-49, as opposed to 65%, 25%, and 14%, respectively, for the largest baccalaureate program and 44%, 16%, 10% respectively for the institution.). The gender of the respondents was representative of the institution (66% female, 34% male vs. 63.3 % female, 36.7% males). Of interest to this study, respondents were quite familiar with computer technology, with 64% using four or more programs at work. There were high levels of team experienced with 84% having had four or more team experiences and 56% having had more than six experiences. Most respondents had not worked together on a regular basis, with 56% saying that they were not at all familiar with their teammates and 40% more saying they were only somewhat familiar with their teammates.

**Content Analysis**

The research team analyzed two types of variables - Team Behaviors and Team Process variables (categorized as Inputs, Throughputs, and Outputs).

**Team Behaviors**

Students discussed team management behaviors in almost half of their answers (47% of responses), discussed social and interpersonal behaviors in over one-third of the answers (38% of responses) and work or task behaviors in only 15% of responses (Figure 1).



**Figure 1: Presence of Team Behaviors**

Team Process (Table 2 and Figure 2)

Variables with the highest number of total comments, positive or negative, were two Input variables - *Conscientiousness* (91) and *Attitude towards Teamwork* (82). Two output variables - *Team effectiveness* and *Satisfaction/dissatisfaction* - had the next highest number of comments (66 and 54, respectively), although *Trust* and *Learning* also had a relatively high number of comments (43 and 37, respectively). The highest numbers of comments in the Throughput category were *Team Process* (46), *Collaboration* (39), and *Communication/Interaction* (38). The variables with the highest ratios of negative to positive comments were *Trust* (7:1; i.e., there were seven negative comments for every one positive comment), *Attitude towards Technology* (9:1), *Using Technology* (6.5:1), *Virtual Presence* (4:1), and *Orientation/team directions* (3:1). A relatively small number might exaggerate the ratios as the two technology variables only had 20 and 10 comments, respectively, and *Orientation/team directions* only had 10 comments. The variables with the lowest number of comments were *Agreeableness* (16), *Virtual process* (10), and *Using technology* (10).

Table 2: Team Process Variables

	Input						Throughput					Output			
	Agreeableness	Conscientiousness	Attitude towards teamwork	Attitude towards technology	Orientation/team directions	Team size	Team Process	Using technology	Communication/interactions	Virtual Presence	Collaboration	Team Effectiveness	Satisfaction/dissatisfaction	Trust	Learning
Total positive responses	11	50	39	2	5	1.7	20	1.3	19	2	17	36	20	5.3	26
Total negative responses	5	41	44	18	15	0.7	26	8.7	19	8.3	22	30	33	38	11
Total responses	16	91	82	20	20	2.3	46	10	38	10	39	66	54	43	37
Ratios	2.1	1.2	1.1	9	3.1	2.5	1.3	6.5	1	4.2	1.3	1.2	1.6	7.1	2.4

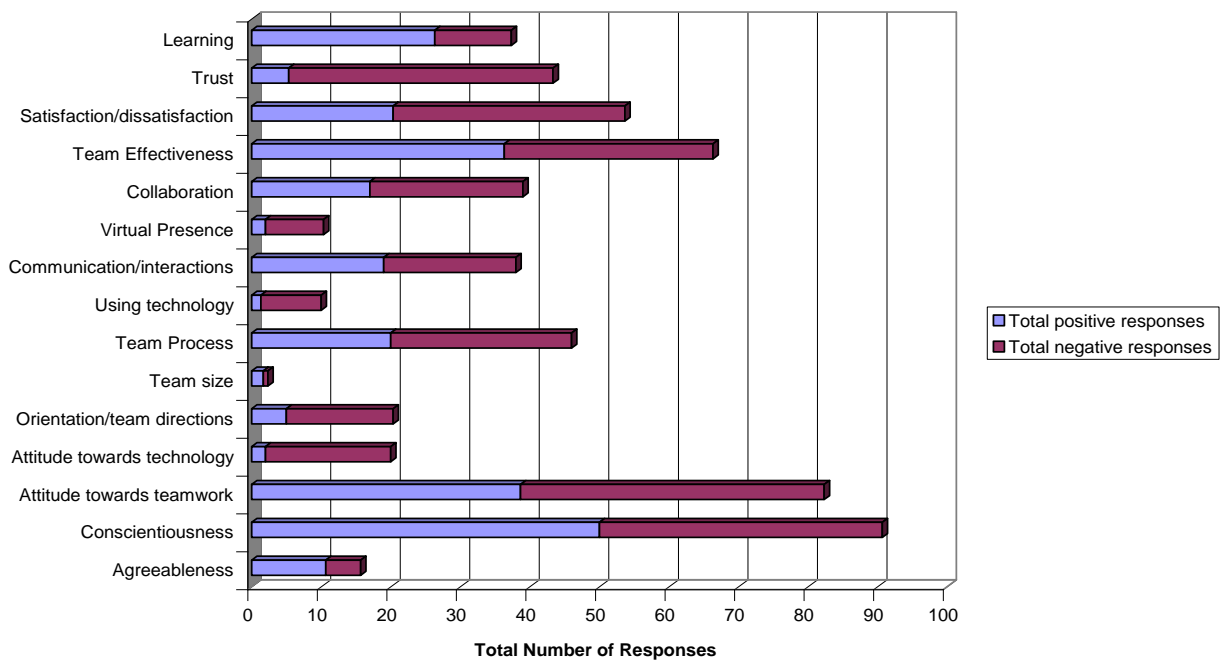


Figure 2: Team Process Variables

## **Grounded Theory Outcomes**

The research used grounded theory to provide an interpretation of the data to verify findings derived through content analysis. Analysis of the data using grounded theory relied on the understanding of a researcher that had not preconceived convictions regarding team outcomes. Despite experience with in class and virtual teams, the history provided a basis for understanding the student responses rather than predetermining meaning. The researcher did not participate in the content analysis or training for other researchers.

Analysis started with careful reading of the open-ended questions from respondents without accessing demographic or other data of the respondents. A second reading used notes to start recording meaning and ideas in the responses following the process outlined by Miles and Huberman (1994). To aid data analysis, the data were broken into separate ideas, one idea per cell in an Excel spreadsheet with index fields to enable re-assembly of the data or provide context if needed.

The process of open coding resulted in many codes for 353 concepts provided by 30 respondents across four open-ended questions. Common concepts related to virtual teams, relevance to teams in business organizations, equity for team member grades, learning achieved, and the team success. Further concepts included the amount of effort expended by various members, abilities of the instructors, team members, and the quality of course content. Other concepts included team member objectives, personalities, motivation, previous history, communications, participation, and leadership. After careful scrutiny of exceptions, following suggestions by Bernard (2000), no cause became apparent that might invalidate previous interpretations.

Two further readings of the text consolidated and confirmed consistency of the interpretations. An example of a change was where the text “at first I dreaded having to be on a team because of past experiences” recoded from History to Anticipation. Of the 353 codes, adjustments to 48 codes led to improved representation of the text and provided consistency of interpretation.

The researcher then tried to establish patterns in the responses or proceed to axial coding described in Strauss and Corbin (1998). Communications remained an important and separate concept in the text. Related to the former was a cluster that related to the execution of team processes. Personality, balance of efforts, pressure, leadership, process, and timing combined to form the largest set of concepts. The third group of concepts represented outcomes of the team processes and their relevance to a real business setting. Online considerations formed a subset of ideas that reflected the respondent’s interpretation of problems. Online issues included attitude, timing of work, communications, and meetings. The use of virtual tools varied with some responses identifying that online study and teams were problematic, such as “I just don’t think it works as effectively in online classes as it does face to face.” Finally, the course and instructor’s ability to communicate expectations and requirements formed the last cluster.

The previous led to themes as contemplated by Creswell (2003) and Robson (2002). The objective in this segment of the research was not to reduce concepts to a single theme as extolled by Strauss and Corbin (1998) or an absolute inclusiveness from Glaser and Straus (1967). It was evident that the research created an inter-related set of concepts leading to a number of parameters that had an impact on the relevance and learning regarding teams and an online environment. Themes that emerged from the text analysis using grounded theory indicate that students see less value in virtual teams as their success is limited due to added complexity, a different premise relating to time shifting and time pressure. The short-term nature of teams in compressed classes and control structures did not represent true work teams in industry and provided limited value. Many learners felt that they had too little control and that the system favored persons less willing to work, and the random allocation of membership had too much influence on outcomes.

## **CONCLUSIONS**

While considerable research has been done with student teams in traditional classroom settings, since online learning is a relatively new phenomenon (within the last ten years), there has been little formal research on the issues involved with virtual student teams. A few qualitative studies have started developing models for online



learning, but quantitative studies have not replicated or validated those potential models. There have been several instructional design studies aimed at overcoming issues surfaced in qualitative studies or anecdotal experience; however, studies of instructional design approaches have explored better tools and techniques for online learning without necessarily knowing what problem areas are most important to address.

The purpose of this study was to explore students' opinions and reactions to virtual teams using qualitative methods in order to identify specific variables and potential models that might then be examined using quantitative methods. After reviewing variables found in the literature on virtual student teams, it seemed the next step in furthering the research would be to identify which variables found support from student opinions and reactions after engaging in virtual team experiences. By analyzing student responses to questions regarding their team experience using both content analysis and grounded theory, a clear picture of relevant items emerged. The results indicated that while team experiences were mixed (positive and negative), respondents had concerns that transcended their specific experience. Four overarching connections between specific inputs and outputs resulted from both content analysis and grounded theory.

### **Conscientiousness, Effort, and Equity**

There appeared to be some strong connections between *conscientiousness* and *attitude towards teamwork* on the input side with *satisfaction* and *trust* on the outcome side of the virtual team development process. Conscientious students stated they tended to take the leadership role, completed all their work on time or early, and were focused on quality. They expressed high frustration with students who indicated they were only available on weekends, did not appear to share the conscientious students' goal of achieving an "A," or did not respond or submit their "fair" share of an assignment. This triangulated with the grounded theory analysis in which equity in grades earned compared to ability and effort expended had a number of strong comments.

### **Effort vs. Learning**

Despite the highest number of negative comments reflecting anger at teammates who were perceived to lack conscientiousness, a negative attitude towards teamwork, and a lack of trust, comments on learning, which had a moderate number of responses (37), resulted in more than a two-to-one ratio of positive responses. This finding is different from Kirscher and Van Bruggen (2004) who concluded that positive "online team learning experiences" are a function of an effective pedagogy, relevant content, and supportive learning communities (communities that had developed "group cohesion" through a process of affiliation, impression formation, and interpersonal attraction).

### **The Impact of Technology**

While the low number of comments in this study specifically related to technology may indicate a high level of acceptance of technology, research has shown that the introduction of any new technology tends to increase awareness of that technology until students adapt to the new technology (DeRosa, Hantula, Kock, & D'Arcy, 2004; Thomas & Bostrom, 2008; and Yoon & Johnson, 2008). In this study, the number of comments and strength of feelings in comments on personal traits (e.g., *conscientiousness* and *attitude towards teamwork*) and communication skills (e.g., *communication/interaction* and *collaboration*) far outweighed the number and strength of comments on the impact of technology. However, the nature of the comments suggested that the serial, one-way, asynchronous nature of most online communication within the teams exacerbated the distrust felt by conscientious students when their teammates did not respond in accordance with their expectations. The study found evidence of what Senge, Kleiner, Roberts, and Ross (1994) referred to as the ladder of inference by reacting to a few instances of behavior and leaping to conclusions and generalizing about other people. Conscientious students leapt to conclusions that their teammates were slackers based on their expectations of rapid response to their one-way communication, reinforced by prior experiences of poor responses. Asynchronous communication, such as email and discussion boards, may be giving students the impression of being two-way communication, but two-way communication only happens after receipt and acknowledgement by the receiver (Berlo, 1960). Since many students have related to the researchers that the primary reason for taking online courses is flexibility in interaction with the courses, it seems that the expectations of conscientious students may not align with the expectations of flexibility of their teammates. Typical comments included items such as "the only discussion was in the discussion board, and they should not

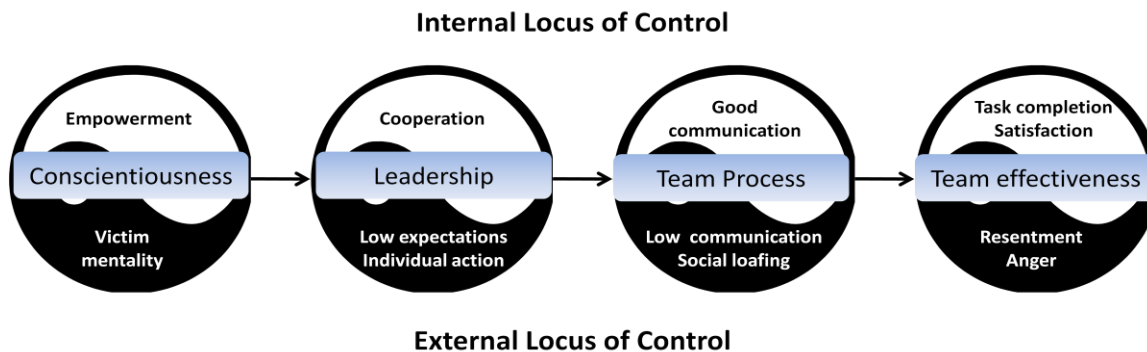
considered [sic] as discussions.” Many of the virtual interactions had limitations related to the need to work asynchronously and limited availability due to pressures from work and family commitments. Comments ranged across the spectrum and included strong negative responses, such as “I absolutely hate online teams.” Several students also made strong negative comments about members’ procrastination and submitting marginal assignments.

**Leadership**

On reflection, a new theme arose across the grounded theory analysis of teams. The organization within the team was problematic, with symptoms addressing issues with conscientiousness, outcomes, limited time, asynchronous interactions, and the conviction that teams do not work. It appeared that leadership and management challenges of teams were a core challenge, appearing as both a symptom and cause of problems. This triangulated with the content analysis of comments falling in the category of conscientiousness that specifically identified leadership as an important trait or skill by students identifying themselves as conscientious.

**Virtual Team Development modeling**

This study took steps to validate key variables from earlier studies and identify new variables to develop a model of virtual team learning for future studies using quantitative methods. There appeared to be preliminary support for developing a model that describes functional and dysfunctional teams (Figure 3). Functional teams would have conscientious students who assume leadership (or appropriate followership) functions, leading to a strong team process, resulting in increased trust and an effective team.



**Figure 3: Proposed Model for Virtual Student Team Development**

In the model, there are two team development flows, depending on whether the respondent had an internal or external locus of control. With an internal locus of control, a conscientious student would feel empowered to take a leadership role, cooperate with other conscientious students, develop and maintain good communication flow, and complete the task with a feeling of satisfaction for a good team experience. They would ignore those who were not conscientious. Those conscientious students who appeared to have an external locus of control felt like victims because their grade depended on students who were slackers, took individual action rather than making the extra effort to work with others, had poor communication with their teammates, and accused them of social loafing, leading to resentment and anger at teammates and the team process.

**LIMITATIONS AND AREAS FOR FUTURE RESEARCH**

One limitation of the study is the character of students who answered the surveys. Comments on conscientiousness almost universally indicated that the respondent was the conscientious team member, while fellow teammates were not. It may be that a preponderance of conscientious students answered the survey, either because of their conscientious nature or because of higher than average frustration with other students deemed lower on the scale of conscientiousness by the respondents.

Further research is needed to confirm the connections found in this study between conscientiousness, attitude towards teams, satisfaction, and trust. The data did not show whether the number of conscientious people on the team made a difference to effective outcomes, which would be of interest. In addition, research beyond individual case studies into the effect of team-building or trust-building interventions and comparisons between asynchronous and synchronous online communication tools would provide stronger evidence supporting particular “best practices.” This should include, most importantly, research on the variables *using technology*, *communication /interaction*, and *virtual presence* and their relationships with team cohesiveness and team effectiveness. Finally, further research, both qualitative and quantitative, is needed to identify and measure student learning (and interference with learning) when virtual teams are used in online instruction. They suggest a need for group reinforcement and consequences for good and bad behaviors.

Further research is also warranted in identifying approaches to improving virtual learning team interactions. In research analyzing the outcome of 12 virtual teams (Beranek & Martz, 2005), the need to train members in methods to establish effective communication showed a strong correlation with outcomes. The importance of a meaningful group purpose or goal cannot be understated. All members should have the ability to clearly articulate goals. Walter and Bunz (2005) showed that achieving the performance goals was the outcome of functional group communication. Their quasi-experimental research identified a significant improvement when students were given a formula for success. The variables identified in this study should be used in quasi-experimental or action research instructional design studies in which one or more variables are modified to determine best practices. This study appears to support research (Heffner and Cohen, 2005, and Lewis et al., 2005) and may suggest that assigned web team interaction or trust-building activities could lead to improved team effectiveness. Quantitative surveys measuring the variables proposed in the above model could help determine whether a team development intervention is effective.

#### **AUTHOR INFORMATION**

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