THE IMPACT OF PREDISPOSITION TOWARDS GROUP WORK ON INTENTION TO

USE A CSCW SYSTEM

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Groupware packages are increasingly being used to support content delivery, class discussion, student to student and student to faculty interactions and group work on projects. This research focuses on groupware packages that are used to support students who are located in different places, but who are assigned group projects as part of their coursework requirements. In many cases, students are being asked to use unfamiliar technologies that are very different from those that support personal productivity. For example, computer-supported cooperative work (CSCW) technology is different from other more traditional, stand-alone software applications because it requires the user to interact with the computer as well as other users. However, familiarity with the technology is not the only requirement for successful completion of a group assigned project. For a group to be successful, it must also have a desire to work together on the project. If this pre-requisite is not present within the group, then the technology will only create additional communication and coordination barriers. How much of an impact does each of these factors have on the acceptance of CSCW technology?

The significance of this study is threefold. First, this research should contribute to how a user's predisposition toward group work affects their acceptance of CSCW technology. Second, it should help identify ways to overcome some of the obstacles associated with group work and the use of CSCW technology in an academic online

environment. Finally, it should help identify early adopters of CSCW software and how these users can form the critical mass required to diffuse the technology.

This dissertation studied the impact of predisposition toward group work and prior computer experience on the intention to use synchronous CSCW. It was found that predisposition toward group work was not only positively associated to perceived usefulness; it was also related to intention to use. It also found that perceived ease of use, at least in this study, had a direct and positive impact on intention, and was not mediated through perceived usefulness. These findings hold implications for academia and how it uses complex collaborative software. Avenues for further research have been identified.

ACKNOWLEDGEMENTS

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CHAPTER 1

INTRODUCTION

This chapter introduces the problem statement, purpose of the study and provides definitions of the terms involved in the research. The theoretical base, research questions, and hypotheses, and significance of the study are also presented.

Problem Statement

Many researchers (McGrath & Hollingshead, 1994; Johnson & Johnson, 1991, 1994) agree that much of the world's work is done by people working together in groups. As technology advances, collaborative work is being translated into a variety of tool sets available to groups. As a result, there is a significant body of research literature on the development, implementation, and use of computer-supported technologies both by individuals and groups. Computer-supported cooperative work (CSCW) technology has been shown to be useful in many domains that require the accomplishment of complex tasks by a small group of people (Huhns et al., 1993). The factors contributing to the acceptance of CSCW are likely to vary with the technology, target users, and context. Vanderbosch and Ginzberg (1996), for example, noted four essential prerequisites for the implementation, acceptance and use of groupware by end-users: 1) the need to collaborate, 2) an individual's knowledge of the software, 3) management support, and 4) organizational culture. The first two prerequisites can be viewed as individual needs, while the latter two are more organizational in nature. This study will explore the first two prerequisites 1) an individual's need to collaborate and 2) an individual's knowledge of groupware software as it relates to CSCW technology.

Purpose of the Study

Groupware packages are increasingly being used to support content delivery, class discussion, student to student and student to faculty interactions and group work on projects. This research focuses on groupware packages that are used to support students who are located in different places, but who are assigned group projects as part of their coursework requirements. In many cases, students are being asked to use unfamiliar technologies that are very different from those that support personal productivity (Grudin, 1994). For example, CSCW technology is different from other more traditional, stand-alone software applications because it requires the user to interact with the computer as well as other users. However, familiarity with the technology is not the only requirement for successful completion of a group assigned project. For a group to be successful, it must also have a desire to work together on the project. If this pre-requisite is not present within the group, then the technology will only create additional communication and coordination barriers (Lou et al., 2000). The question is, how much of an impact does each of these factors have on the acceptance of CSCW technology? More specifically, if students do not have a predisposition to work together on projects, then how does this impact how they perceive the usefulness of CSCW technology? Moreover, how will a student's experience with similar software tools aid in the user's perception and acceptance of CSCW technology?

Significance of the Study

The significance of this study is threefold. First, this research should contribute to how a user's predisposition toward group work affects their acceptance of CSCW technology. Second, it should help identify ways to overcome some of the obstacles

associated with group work and the use of CSCW technology in an academic online environment. Finally, it should help identify early adopters of CSCW software and how these users can form the critical mass required to diffuse the technology.

Research Questions

The research questions for this study draw from the academic disciplines of management information systems and communication studies.

When a group of individuals come together to accomplish a task, solve a problem, or make a decision, group communication is an important function. Groups, typically seek to accomplish some task or goal while maintaining satisfactory interpersonal relationships among group members (Wheeless, Dickson-Markman, & Wheeless, 1982); Yoder, Wallace, & Hugenberg, 1996).

This research tried to answer two major questions:

1. How will perceptions of working together on a project impact a user's intention to use CSCW software?

2. How will the amount of computer experience with similar software tools affect intentions to use CSCW software?

Theoretical Foundation

The research framework for the "predisposition to work together" construct is drawn from several different sources including expectancy theory (Vroom, 1964), attachment theory (Bowlby, 1969; Baumeister & Leary, 1995) and affiliation motivation research (Hill, 1987). According to each of these theories, humans have a basic need to belong to groups and affiliate with other people. For example, expectancy theory (Vroom, 1964) defines this need as a conceptualization of individual motivation.

Vroom's valence model shows that the overall attractiveness of group work is to 1) enhance communication, 2) increase ability to coordinate, 3) facilitate collaboration and 4) improve competence in performing a job (Chen & Lou, 2002). In a similar manner, attachment theory (Bowlby, 1969) states that we all have a need for attachment. This need for attachment is evident very early in our lives, as demonstrated by a person's attachment to their primary caregivers. As the individual grows and develops, he or she forms new attachments; first to friends and classmates, then to co-workers, a union, an organization, or other social entities. Affiliation motivation indicates an individual's desire and tendency to build social relationships and develop a sense of intimate fellowship with others (Hill, 1987). Hill (1987) states that the "motivation for social contact can be considered a central influence on human behavior" (p1008). Thus, a person's innate need to collaborate can be termed affiliation motivation. Hill's research attempts to identify specific reasons that social contact may be rewarding to individuals. He identified four specific social rewards relevant to the desire for social contact: 1) a positive affect or stimulation associated with closeness and communication; 2) attention or praise from others; 3) reduction of negative affect, or emotional support; and 4) social comparison, the seeking of information about a self relevant issue from others, when objective criteria for evaluation are not readily available. An individual's predisposition toward working together on a project may also reflect these four dimensions.

The framework for assessing the "individual's knowledge and experience" construct is based on social cognition theory (Bandura, 1977). The self-efficacy concept, originally presented in Bandura's (1977) social cognition theory, refers to a judgment of how well one can execute a course of action required to deal with

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perspective situations. The term computer self-efficacy (CSE) may be defined as "a judgment of one's ability to use a computer" (Compeau & Higgins, 1995, p. 192). Computer self-efficacy has become an important factor in determining whether a technology will be accepted. Morris and Turner (2001) argued that "people who believe they are capable of using IT [information technology] to accomplish their tasks are more likely to use IT than those who do not share similar self-efficacy beliefs" (p. 882). According to Bandura (1986), self-efficacy is affected by past experiences, by observing others, by persuasion, and affective arousal. Thus, self-efficacy studies often include experience as a control factor or as an antecedent of self-efficacy. Users may employ the knowledge gained from their prior experience to form their intentions (Fishbein & Ajzen, 1975). In a study by Taylor and Todd (1995), which examined the role of prior experience on information technology (IT) usage, results suggest that there are some significant differences in the relative influence of the determinants on IT usage depending on experience. Hoxmeirer, Nie and Purvis (2000) noted that people who have had positive experiences with computers are likely to look for new ways to use them.

Researchers in the field of CSCW seem to agree that the term, computer-supported cooperative work was introduced in 1984. Other terms used in this area of research are computer-supported collaboration, and Groupware (Grudin, 1994). These terms have all been used to refer to people working together as a group with the assistance of computer technology. Groupware and/or CSCW applications, being integrated into the academic environment, are designed to support cooperation and collaboration among a group of users who are not located in the same room (Swigger,

1996; Swigger et al., 1999; Swigger, Brazile, Livingston, & Lopez, 1997). Li, Lou, Day, and Coombs (2004) observed that groupware not only allows an individual to seek information and support from others but also works as an alternative space for providing support and help for others. Grudin (1988, 1994) noted that usage and resulting benefits are only achieved if the majority of the users whose work is affected by the groupware application accept and use the system. A groupware application will be used by a group, only if it is not seen as an impediment to communication and coordination (Lou, Luo, and Strong, 2000).

Research Model and Hypotheses

Several research models have been developed to investigate the factors affecting the acceptance of computer technology. The technology acceptance model (TAM), one of the most tested models, is intention-based (Davis, Bagozzi, and Warshaw, 1989), meaning that information technology (IT) usage is determined by an individual's intention to use a system. Furthermore, the behavioral intention (BI) to use a system is primarily determined by its perceived usefulness (PU) and perceived ease of use (PEOU). Behavioral intention is a measure of the strength of one's intention to perform a specified behavior (Fishbein and Ajzen, 1975, p. 288). Perceived usefulness (PU) is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989, p.320). And, Perceived ease of use (PEOU) is "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320). One of the major purposes of TAM is "to provide a basis for tracing the impact of external factors on internal beliefs, attitudes, and intentions" (Davis et al., 1989, p. 985). A number of studies have successfully

adopted TAM to study the acceptance of Internet related technologies such as e-mail (Hubona & Kennick, 1996), the World Wide Web (Moon & Kim, 2001), e-collaboration (Dasgupta, Granger, & McGarry, 2002) and electronic commerce (Pavlou, 2001; Prabhakar, 1999). This study incorporated a predisposition to work together on group projects and computer experience as two external variables to the technology acceptance model.
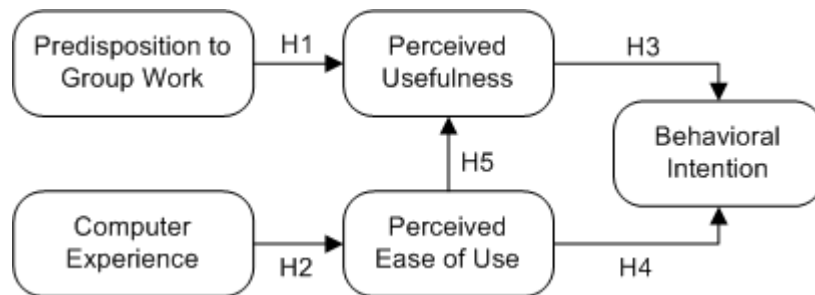
Figure 1. Research design.

This extended TAM was used to first assess the impact of a users' predisposition to group work on the perceived usefulness of CSCW (see Figure 1). By focusing on the user's perceptions, the intention to use a CSCW system may be determined.

H1: An individual's predisposition toward working in a group is positively associated with his/her perception of the usefulness of CSCW.

Generally speaking, TAM is an effective model for both experienced and inexperienced users, accounting for a reasonable proportion of the variance in intention and behavior (Taylor & Todd, 1995). However, the relationships within TAM are different between experienced and inexperienced users. Based on an analytical literature review, Sun and Zhang (2004) found that experience may influence relationships between 1) behavioral intention and actual usage; 2) perceived usefulness and behavioral intention (Taylor & Todd, 1995); 3) social norms and perceived

usefulness (Venkatesh & Davis, 2000); and 4) external technological supports and perceived ease of use (Igbaria et al., 1997).

H2: An individual's level of experience with similar software tools is positively associated with his perception of the ease of use of the CSCW.

Previous studies using the TAM model have supported the relationships between perceived usefulness, perceived ease of use, and behavioral intention. Therefore, the following TAM hypotheses were evaluated in relation to CSCW technology.

H3: Perceived usefulness of CSCW is positively associated with behavioral intention to use CSCW.

H4: Perceived ease of use of CSCW is positively associated with behavioral intention to use CSCW.

H5: Perceived ease of use of CSCW is positively associated with perceived usefulness of CSCW.

Limitations

This study is limited by a number of factors. The factors include:

1. Contextual limitations: the study was carried out in a university setting

2. Measurement limitations: the use of subjective measures

3. Sampling constraints: a convenience sample of students was used

4. Interpretive constraints: based on responses from subjects in three classes

Delimitations

The study was delimited by the following:

1. The sample consisted of students enrolled in classes where the professor elected to participate in the research, and whose students volunteered to participate. A different pattern of responses might emerge on other student samples.

2. The length of time spent on training and using the collaborative system was delimited by the standard length of the class period.

3. The professor of record determined and designed the course related group task project to be completed by the student groups.

Summary

This chapter introduces the problem statement, purpose of the study and provides definitions of the terms involved in the research. The theoretical base, research questions, and hypotheses, and significance of the study are also presented.

The following chapter contains a review of literature on affiliation motivation and computer experience as it relates to this study. The review continues with studies pertaining to the development of the technology acceptance model (TAM) and its use in the prediction of user acceptance of information technology. It concludes with a review of the research utilizing TAM or similar models as a research model to predict user acceptance in collaborative or groupware environments.

CHAPTER 2

INTRODUCTION

Because working in groups and using groupware or computer-supported cooperative work (CSCW) technology is becoming an important tool in the teaching and learning process in colleges and universities, it is crucial to have a better understanding of the factors affecting students' intention to use these technologies in this environment. This research has focused on the students' perceptions concerning disposition toward working together in a group to complete an assigned group project using CSCW technology and their perceptions of the usefulness and ease of use of the CSCW system as it relates to their intention to use/accept the system. The purpose of this study was to investigate student perceptions toward group work and acceptance of CSCW technology in a university setting. This chapter consists of a review of the literature on 1) affiliation motivation as it relates to the disposition toward group work, 2) self efficacy as it relates to self perception of computer experience and use of software tools similar to collaborative software, and 3) the technology acceptance model and its use in the analysis of acceptance and use of collaborative technology.

Predisposition towards Group Work

The research framework for the "predisposition to work together" construct is drawn from several different sources including expectancy theory (Vroom, 1964), the interpersonal communication theory of fundamental interpersonal relationship orientation (Schultz, 1958), attachment theory (Bowlby, 1969; Baumeister & Leary, 1995) and affiliation motivation research (Hill, 1987). According to each of these theories, humans have a basic need to belong to groups and affiliate with other people.

Expectancy Theory

For example, expectancy theory as originally developed by Vroom, 1964 defines this need as a conceptualization of individual motivation. It is considered one of the most promising models of individual motivation (Melone, 1990). Expectancy models are cognitive explanations of human behavior that cast a person as active, thinking, predicting creature in his or her environment. The person "continuously evaluates the outcome of his or her behavior and subjectively assesses the likelihood that each of his or her actions will lead to various outcomes" (Chen & Lou, 2002, p. 5). Very few studies have looked into users' perceptions of groupware technologies and their motivation to participate. In the Chen and Lou's (2002) application of expectancy theory, the valence model shows that the overall attractiveness of a groupware application to the user is comprised of four potential outcomes. They are: 1) enhancing communications among co-workers; 2) increasing the ability to coordinate activities; 3) facilitating collaboration among co-workers; and 4) improving competence in performing a job.

In a follow up study (Chen, Lou, and Luo, 2002) used expectancy theory to explain the behavioral intention (motivation) of a student to adopt an online learning technology. Their empirical results showed that students have strong preferences for the potential outcomes of online learning technologies and these preferences are consistent across individuals. On average, students consider improving competency in performing coursework as the most attractive outcome of an online learning technology. However, the other three outcomes 1) enhancing communications among classmates and professors, 2) increasing the ability to coordinate course-related activities, 3) and

achieving a better collaboration among fellow students were also considered important factors by the students in their motivation to adopt an online learning technology.

Fundamental Interpersonal Relationship Orientation

When a group of individuals come together to accomplish a task, solve a problem, or make a decision, group communication is an important function. Groups, typically seek to accomplish some task or goal while maintaining satisfactory interpersonal relationships among group members (Wheeless, Dickson-Markman, & Wheeless, 1982); Yoder, Wallace, & Hugenberg, 1996). The interpersonal communication theory, fundamental interpersonal relationships orientation (FIRO) (Shutz, 1958), concentrates on three interpersonal needs that most people share: the needs for inclusion, control and affection. Shutz (1958) maintains that people begin relationships in order to satisfy one or more of these needs. Although Shutz (1958) believes that people seek ways to fulfill these three needs, the theory does not presume that all people are equally motivated by them or that the needs can predict human behavior precisely in any given circumstance. The three basic interpersonal needs are inclusion, control, and affection. Affection refers to the need of being liked or loved or seeking a sense of interpersonal warmth. Friendships and other intimate relations often serve this function. A dimension similar to affection is affiliation, a tendency to receive gratification from harmonious relationships and from a sense of communion (Hill, 1987).

Theorists maintain that groups offer individuals the means of satisfying their need for affiliation power. Shutz's (1958) fundamental interpersonal relations orientation, in particular, stresses the relationship between the individual's behavior in groups and their need to receive an expression of inclusion, control, and affection.

Attachment Theory

In a similar manner, attachment theory (Bowlby, 1969) states that we all have a need for attachment. This need for attachment is evident very early in our lives, as demonstrated by a person's attachment to their primary caregivers. As the individual grows and develops, he or she forms new attachments; first to friends and classmates, then to co-workers, a union, an organization, or other social entities. This need to belong states that the need for interpersonal attachments is a fundamental motive that has evolved for adaptive purposes. The need to form and maintain strong, stable interpersonal relationships is a powerful, fundamental and extremely pervasive motivation (Buameister & Leary, 1995). This theory is supported by the finding that people feel anxious when they face exclusion from their social groups (social exclusion theory).

Affiliation

Affiliation motivation indicates an individual's desire and tendency to build social relationships and develop a sense of intimate fellowship with others (Hill, 1987). Hill (1987) states that the "motivation for social contact can be considered a central influence on human behavior" (p1008). Thus, a person's innate need to collaborate can be termed affiliation motivation. Hill's research attempts to identify specific reasons that social contact may be rewarding to individuals. He identified four specific social rewards relevant to the desire for social contact: 1) a positive affect or stimulation associated with closeness and communication; 2) attention or praise from others; 3) reduction of negative affect, or emotional support; and 4) social comparison, the seeking of information about a self relevant issue from others, when objective criteria for

evaluation are not readily available. An individual's predisposition toward working

together on a project may also reflect these four dimensions of affiliation.

In a study examining the impact of affiliation motivation on the intention to use a

groupware system, Li et al. (2004) stated that the need to collaborate can be attributed

to two factors: 1) the nature of the task and 2) an individual's innate need to collaborate,

"termed affiliation motivation" (p.1). They incorporate affiliation motivation as a new

construct in the technology acceptance model (TAM) and hypothesized that affiliation

motivation would have 1) a direct effect on the students' intention to use an

asynchronous groupware system and 2) be positively associated with perceptions of

ease of use of the groupware. The results of the study indicated that affiliation

motivation was significantly associated with behavioral intention. It appears that the

need or motivation to be attached to others can impact the decision to use a groupware

system. Also significant was the finding that affiliation motivation is positively

associated with perceived ease of use of groupware.

<div align="center">Computer Experience</div>

The framework for assessing the "individual's knowledge and experience"

construct is based on social cognition theory (Bandura, 1977). The self-efficacy

concept, originally presented in Bandura's (1977) social cognition theory, refers to a

judgment of how well one can execute a course of action required to deal with

perspective situations. The term computer self-efficacy (CSE) may be defined as "a

judgment of one's ability to use a computer" (Compeau & Higgins, 1995, p. 192).

Computer self-efficacy has become an important factor in determining whether a

technology will be accepted. Venkatesh and Davis (1994) verified that users' perceived

ease of use is strongly regressed on computer self-efficacy in the early stage of

technology acceptance. Morris and Turner (2001) argued that "people who believe they

are capable of using IT [information technology] to accomplish their tasks are more

likely to use IT than those who do not share similar self-efficacy beliefs" (p. 882).

According to Bandura (1986), self-efficacy is affected by past experiences, by observing

others, by persuasion, and affective arousal. Thus, self-efficacy studies often include

experience as a control factor or as an antecedent of self-efficacy. Users may employ

the knowledge gained from their prior experience to form their intentions (Fishbein &

Ajzen, 1975). In a study by Taylor and Todd (1995), which examined the role of prior

experience on information technology (IT) usage, the results suggest that there are

some significant differences in the relative influence of the determinants on IT usage

depending on experience. Hoxmeirer and colleagues (Hoxmeirer et al, 2000) noted that

people who have had positive experiences with computers are likely to look for new

ways to use them.

Several researchers have examined the various methods being used to assess

computer use and computer experience. Mitra (1998) in a review of the literature on

computer use indicated three main ways of conceptualizing computer use by focusing

on: temporality, the issue of instruction, and the specific software and applications that

are being used. For example, Wu and Morgan (1989) identified several applications for

which college students appear to use computers including information retrieval, data

analysis, programming, word processing, creating graphics and communication.

In a very few cases, studies included all three aspects. One such case Igabaria,

Guimares, and Davis (1995) integrated the elements of temporality, instruction, and

application into their research model using TAM to test the determinants of microcomputer usage. Computer experience was measured on a self-report Likert-type scale as extent of experience using 5 different generic types of software and languages (where 1=none and 5=extensive). In their study, there is recognition that computer use or computer experience can have various manifestations.

Further, in a paper that reviews current definitions and methods used to assess computer experience, Smith, Caputi, Crittenden, Jayasuriya and Rawstorne (1999) report that most of the studies reviewed adopted measures that assess what they termed objective computer experience (OCE), rather than subjective (SCE). They define OCE as "the totality of external observable, direct and /or indirect human-computer interactions which transpire across time (p.229), and SCE as "a private psychological state reflecting the thoughts and feelings a person ascribes to some existing computing event" (p. 230). They lament, however, that researchers have still not devised a reliable and valid measure of the conceptualized subjective computer experience.

Measures of Different Levels of Computer Experience

Several studies have been conducted with TAM as the research model using levels of computer experience as one of the external variables. In the Igbaria, et al. (1995) study mentioned above, computer experience influenced perceived usage and variety of use directly as well as indirectly through perceived ease of use and perceived usefulness. A study which introduced several new variables, including user characteristics and end-user computing satisfaction, assessed computer experience using five items to which respondents indicated their years of experience in using

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computers, writing computer programs and using similar packages, as well as their

current skill level with various packaged application software (Al-Gahtani & King, 1999).

Results showed only a significant link from computer experience to attitude about

system usage; links to perceptions of ease of use and usefulness were not supported.

Agarwal and Prasad (1999), in a study examining the relationship between individual

differences and information technology acceptance as mediated by the constructs of the

technology acceptance model, assessed prior familiarity with similar technologies using

three items: level of familiarity with personal computers, prior usage of GUIS, and prior

usage of input devices such as mice and joysticks.   Their results showed that prior

experience with similar technologies had a positive association with ease of use only.

<div style="text-align:center">Computer-Supported Cooperative Work</div>

Researchers in the field of CSCW seem to agree that the term, computer-

supported cooperative work (CSCW) was introduced in 1984. Other terms used in this

area of research are computer-supported collaboration, and Groupware (Grudin, 1994).

These terms have all been used to refer to people working together as a group with the

assistance of computer technology. Over the years, CSCW conferences in the US have

emphasized small-group support. Within the research field of CSCW, people study 1)

the use of applications that were developed for individual users by groups in

organizational settings; 2) the ways in which software developed to support groups

affects individuals and their group processes, projects, and even the organization

(Grudin, 1994). And, while the term "groupware" as used by Peter and Trudy Johnson-

Lenz (Grudin, 1994) seems to restrict the term to small organizational units which

emphasize the technology over the work, it has come into widespread use over the past 20 years.

A vast array of applications come under the CSCW umbrella including, but not limited to, desktop conferencing and video conferencing systems, collaborative writing, email, interactive computer aided design software, electronic whiteboards, file and application sharing, distance learning, and telemedicine (Grudin, 1994; Ducksworth, 2001). The two features that seem to distinguish CSCW systems from other types of applications are the mode of interaction they support and the geographical distribution of the users (Shneiderman, 1998). Mode of interaction can be either asynchronous, i.e., occurring at a different time, or synchronous, i.e., occurring at the same time. The group's geographical distribution may be either local or distributed (Palmer & Field, 1994; Ducksworth, 2001). The groupware typology (Figure 2) is a widely used space and time categorization. Activities do not always fall into a single time and space category. For example, collaborative writing can occur in a single session, or it can transpire over many months, as when editing and updates occur over several months (Grudin, 1994).

| | **TIME** | | |
	Same	Different but predictable	Different and unpredictable
Same	Meeting facilitation	Work shifts	Team rooms
Different but predictable	Teleconferencing Videoconferencing Desktop conferencing	Electronic mail	Collaborative writing
Different and unpredictable	Interactive multicast seminars	Computer bboards	Workflow

Figure 2. Time and space categories. (© 1994 IEEE, used with permission)

Groupware and/or CSCW applications are designed to support cooperation and collaboration among a group of users who are not located in the same room (Swigger, 1996; Swigger et al., 1999; Swigger, Brazile, Livingston, & Lopez, 1997). Li and fellow researchers observed that groupware not only allows an individual to seek information and support from others but also works as an alternative space for providing support and help for others (Li et al., 2004). Grudin (1988, 1994) noted that usage and resulting benefits are only achieved if the majority of the users whose work is affected by the groupware application accept and use the system. A groupware application will be used by a group, only if it is not seen as an impediment to communication and coordination (Lou et al., 2000).

Theory of Reasoned Action

The theory of reasoned action (TRA), a widely studied model from social psychology, is concerned with the determinants of consciously intended behaviors

(Fishbein & Ajzen, 1975). It is based on the assumption that human beings are usually rational and make systematic use of information available to them (Igbaria, Iivari, & Maragahh, 1995). According to TRA (Figure 3), a person's performance of a specified behavior is determined by his or her behavioral intention (BI) to perform the behavior, and BI is jointly determined by the person's attitude (A) and subjective norm (SN) concerning the behavior. Further, a person's attitude toward to a behavior is determined by his or her salient beliefs about consequences of performing the behavior (Davis et al., 1989).
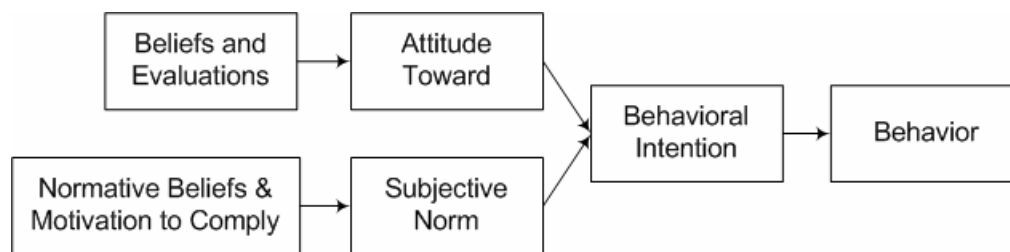
Figure 3. TRA model.

The TRA is a general model that can be applied in any domain, and as such, researchers using TRA must first identify the beliefs that are salient to the subject regarding the behavior

Technology Acceptance Model

Developed by Davis (1989), the technology acceptance model was designed as an adaptation of TRA for use in the field of information systems to address the question of system acceptance by end-users. The TAM (Figure 4) variables of perceived usefulness and perceived ease of use replaced the TRA attitudinal determinants, which had to be derived separately for each behavior (Davis et al, 1989).
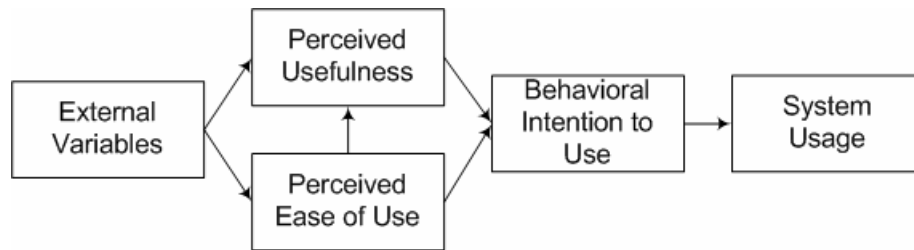
Figure 4. Technology acceptance model. (Copyright © 1989 by the Regents of the University of Minnesota. Used with permission)

Both the TRA and the TAM models were found to predict intentions and usage satisfactorily; the TAM however was found to be much simpler and easier to use and was a more powerful model of the determinants of usage acceptance of computer technology (Davis et al., 1989).

As stated by the Davis, Bagozzi and Warshaw:

The goal of TAM is to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified (p. 985).

TAM Reliability and Validity

Several studies have been done to verify or support the reliability and validity of the TAM model. Adams, Nelson, and Todd (1992) found strong support for convergent validity and divergent validity of the two scales, and that overall TAM maintained its consistency and validity. Szajna (1994) reported that the perceived usefulness and perceived ease of use instrument has been shown to have predictive validity for 1) intentions to use, 2) self-report usage, 3) self-predicted usage, 4) attitudes toward use and 5) choice. Sambamurthy and Chin (1994) applied TAM to study group attitudes toward group decision support system (GDSS) use in an experimental lab approach and

found that perceived usefulness was the more dominant factor at the end of the second meeting in shaping group attitudes toward GDSS.

<div align="center">Extensions of the TAM</div>

The TAM model has been used to evaluate the perceived usefulness and ease of use of over thirty different types of information systems. These information systems can be broadly classified into four major categories: 1) communication systems, 2) general-purpose systems, 3) office systems, and 4) specialized business systems (Lee, Kozar, & Larsen, 2003). A number of external variables representing user characteristics, task characteristics, system characteristics, and organizational characteristics have been tested over the last eighteen years. Researchers have started to look at the moderating effects of culture, gender, social influences, task, user type and information system (IS) type on the TAM variables (Lee et al., 2003).

However, relatively little research has been conducted using TAM to examine the various factors affecting behavior intention to use groupware. When looking at the effects of group attitudes toward decision support systems use in an experimental lab with computer supported groups, Sambamurthy and Chin (1994) reported that perceived usefulness was the more dominant factor at the end of the second meeting in shaping group attitudes toward GDSS. For future research, they suggested investigating social influences, having several groups working on different tasks over longer periods of times. Chin and Gopal (1995) investigated the relative importance of beliefs about group support systems (GSS) in the context of GSS adoption intentions and found that relative beliefs assessed for a specific system were clearly connected to usage. In a longitudinal study of senior executives, intentions to use a specific

groupware system were found not to correlate with system use eight weeks later (Yoo, 1998). The author suggested that, as users work with the new technology, they reformulate their own beliefs, which they then share with others, affecting the beliefs of the newly contacted. Yoo (1998) speculated that there is a possible relationship between social influences and the groupware technology acceptance process. When perceived *critical mass* was viewed as an external variable, Lou, Luo, and Strong (2000) found that it had the largest total effect (direct and indirect) on intention to use (Lotus Domino Discussion Databases) groupware. The other TAM relationships were also found to be significant.   A courseware management tool for e-collaboration was used to test various findings of TAM (Dasgrupta Granger, & McGarry, 2002). This system had communication tools that allowed group members to exchange messages and files asynchronously or synchronously with other group members. One finding, contrary to TAM, showed that perceived usefulness had a negative relationship with use of the system. The authors conclude that it was likely that subjects who repeatedly use the system realize the time implications inherent in its use, and use it less frequently, even though they might perceive the system as useful.

In examining the effect of affiliation motivation on the intention to use groupware, Li et al. (2004) were looking at the impact of our innate need to be attached, interact or collaborate. Their findings suggest that a person's decision to use groupware is partially influenced by their motivation to be attached to others.

Summary

This chapter consisted of a review of the literature on 1) affiliation motivation as it relates to the disposition toward group work, 2) self efficacy as it relates to self

perception of computer experience and use of software tools similar to CSCW software, and 3) the TAM model and its contribution to the understanding of user acceptance of CSCW technology.

The third chapter describes the sample, the course related tasks, the training, and the data collection method. Students enrolled in several College of Arts and Science classes at a university in the southwest were surveyed at the beginning of the class period. The initial survey was a questionnaire to assess 1) an individual's predisposition to work with others on a group project and 2) an individual's perception of their level of computer experience, and use of similar tools. The students received training on the use of the synchronous CSCW technology. After the training session, students were asked to perform group project tasks based on course related requirements. After completing the assigned tasks, the students were asked to assess 1) predisposition to work with others on a group project and 2) perceptions about using a CSCW technology.

CHAPTER 3

INTRODUCTION

This chapter describes the study's participants, the tasks performed by the subject's in a synchronous computer-supported cooperative work (CSCW) environment, the training materials provided, and the instruments used for data collection.

Sample

The sample was a sample of convenience drawn from students enrolled in courses at the University of North Texas who agreed to participate in a Fund for the Improvement of Post Secondary Education (FIPSE) research study. The FIPSE funded Virtual Collaborative University (Swigger, 1996) was designed to allow students the ability to engage in same time/different place collaborative activities over the internet. "These activities focus on teaching students how to organize and systematize their explorations for information and then to share this information with members of the group" (Swigger, Brazile, Lopez, & Livingston, 1997). Data was collected over the course of the three year FIPSE research project from both undergraduate and graduate students studying in the following areas: mathematics, computer science, education, library science, communications, and geography. The sample used in this research is drawn from this larger sample and includes primarily undergraduate students studying in the areas of computer science, communication studies, and geography.

The Collaborative Environment

The Virtual Collaborative University research project was designed to develop and test a suite of software tools that would allow student-to-professor and student to-student real-time communication. Collaborative activities are supported through a suite

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of tools that permit groups to chat (with other individuals as well as the group), use a whiteboard, and share both files and applications (Swigger et al., 1999). A brief description of each tool follows:

Browser: The browser is a Web browser based on Microsoft® Internet Explorer (Microsoft Corporation, http://www.microsoft.com). It can be used in the same way as other browsers, but it could be viewed by all participants. For example, the student could visit the home page of their class to get the current assignment. Students could search for information needed for the completion of the assigned group task.

Individual chat: Individual chat allowed one student or professor to talk to one other person.

Group chat: The group chat allowed the student (or professor) to talk with all other members of your group who are logged in.

Whiteboard: The whiteboard allowed the student (or professor) to draw and/or load an image to the screen.

File sharing: File sharing allowed the student (or professor) to send and receive files from other members of the group.

Application sharing: Application sharing allowed the student (or professor) to run a program with other members of the group. For example, a student could run a word processing software program and all members of the group would see the document being worked on. By using the collaborate option, the student running the word processing software program could let others in the group edit or add to the document.

Ultimately, the tools selected for use by each student was that student's choice and usually depended on the task that was assigned.

Description of the Tasks

For the purposes of this study, the students who elected to participate were required to work on an assigned academic task in groups using a synchronous collaborative system.

The FIPSE funded Virtual Collaborative University research project was conducted in a field research manner in that the professor of each course that participated designed the group task that their students were to perform while using the synchronous collaborative system. Care was given in the design of the group task to ensure that more than one of the available tools would be used to complete the group task. Examples of group task are included in Appendix B.

The instructor also determined the manner in which the student groups were to be formed. Some instructors assigned the students to specific groups, some allowed the student's to determine their own groups, and some formed groups by the counting method, i.e. every fourth student in the same group. In each class, the groups were to work together on the assigned task from its initiation to completion. Three courses that met these requirements were: a course in geography, a course in communication studies, and a course in computer science. Thus, these three groups were selected as the sample courses that were used in this particular study.

In the geography course, the students were to work in groups, using the collaborative software, to locate weather images related to general circulation patterns. They were then to discuss the images, and assign labels to the different features on each image. In order to complete this assignment as the instructor designed it, it was assumed that the students use the shared browser, the whiteboard, the individual/group

chat, and application sharing tools to create a final document that could be submitted to the instructor.

In the communication studies course, each group was asked to select a case to study, analyze, and develop solutions. They were instructed to discuss the problem as a group and create an outline of the group's proceedings. The outline was to be the outcome of an iterative process that included revision/editing. To complete the assignment, as designed by the instructor, it was assumed that the students would use the individual chat, the group chat, the browser, and application sharing collaborative tools.

In the computer science course, the student groups were asked to develop, share, and test data files, and report on their results. To complete the assignment, as designed by the instructor, it was assumed that the students would use the individual chat, the whiteboard, the file sharing and application sharing tools.

Training Sessions

A training session was given to each class that participated in the research project. The session provided general information about the FIPSE research grant, an explanation of the survey instruments, and detailed explanation/instruction on how to use the collaborative software and each of the tools. Participants were informed that no analyses would be done that identified any individual.

The training consisted of a detailed explanation of the suite of tools, including handouts, a demonstration of their use as well as an opportunity for a hands-on trial before the students began using the synchronous collaborative system to work on the

assigned group project. The consent to participate form is in Appendix D. The rest of

the training materials are included in Appendix A. The training materials consisted of:

1. Fund for the Improvement of Postsecondary Education (FIPSE) Virtual Collaborative

University consent form to participate (Appendix D). This consisted of a single sheet

that informed the participants about the project and asked them to sign a consent form

giving the researchers permission to use their data.

2. Virtual Collaborative University (VCU) introduction. A single page handout that

provided students with information on how to access the VCU system, which

applications were available in the system, and how to request technical support.

3. About the VCU Tools booklet. This consisted of a multiple page handout that

provided in-depth information about each of the tools available in the VCU system and

how to use them.

4. Saving Images from the Internet for Use in the VCU Whiteboard example. This was

a single page handout provided to the geography students to assist them with their

assignment.

5. Quick Steps for File and Application Sharing example. This consisted of a multiple

page handout that provided students with instructions on how to establish file sharing or

application sharing and some guidelines on how to manage the sharing process.

6. A booklet labeled "Tips for Teaming: Working Together. " A single page handout

was provided that listed information about how to work and learn in cooperative groups.

     The VCU software training session and materials were given to all the classes.

Measurements

Pre-task Survey

The Pre-task Survey (Appendix C) contained sets of questions intended to gather information about the demographic makeup of the group, and a second set that asked questions about the group's predisposition toward group work. The demographic section of the survey was designed to gather descriptive data on each student such as gender, age range, classification, and ethnic background. The individual's perception of their level of computer experience was also assessed. The questionnaire used Likert-type questions to assess an individual's predisposition to work with others on a group project. It was adapted from the affiliation motivation multidimensional construct instrument (Hill, 1987). This survey was administered during the initial training session

Post-task Survey

After completing the assigned tasks, the students were administered the Post-task survey (Appendix C) to assess an individual's perceptions about using a CSCW technology. This Likert-type questionnaire was compatible with the technology acceptance scales used to measure perceived usefulness and perceived ease of use (Davis et al., 1989). A single item used to measure behavioral intention was modeled on the items from Taylor and Todd (1995).

Method of Analysis

Because survey items used in this study were adapted from previous questionnaires (Davis, 1989, Hill, 1987, and Davis et al., 1989), a principal component factor analysis was conducted on the data collected to verify that the survey items demonstrated the anticipated pattern of factor loadings. The reliability coefficients

(Cronbach alpha) test was conducted for each of the constructs. Sufficiently high

values indicated that each construct subscale possessed adequate internal consistency.

Separate regression models were run for each of the hypotheses. SAS ® System for

Windows (SAS Institute, Inc., http://www.sas.com) was used for the analysis. The data

analysis is reported in Chapter Four.

CHAPTER 4

INTRODUCTION

This chapter describes the sample collected for analysis, the steps taken to analyze the sample, and the results of the analysis. The analysis begins with a description of the principal component analysis that was used to verify that the questionnaire for collecting data on the predisposition toward group work was consistent with the affiliation motivation questionnaire (Hill, 1987) and that the components of affiliation load appropriately. Even though the reliability coefficients associated with the TAM perceived usefulness and perceived ease of use constructs have been well documented (Davis et al., 1989; Szajna, 1994; Moon & Kim, 2001), a principal component analysis was used to verify that the questionnaire developed for this study was consistent with the TAM questionnaire (Davis, 1989) and that the components of perceived usefulness (PU) and perceived ease of use (PEOU) load appropriately. Following a description of these results, each hypothesis will be analyzed and results from those analyses will be reported.

Sample

The sample was a sample of convenience drawn from students enrolled in courses at the University of North Texas who agreed to participate in a Fund for the Improvement of Post Secondary Education (FIPSE) funded project called the Virtual Collaborative University (Swigger, 1996) research project. The sample includes both undergraduate and graduate students enrolled in the following course areas: mathematics, computer science, education, library science, communications, and geography. Data was collected over a three year period (1997through 1999). The total

number of subjects participating in the FIPSE study was 787 subjects. Of that group, 452 subjects completed at least one of the following questionnaires: demographic, disposition toward group work, or the technology acceptance. In order to be considered usable data within this study's sample, each subject must have fully completed all three questionnaires: the demographic, the disposition toward group work, and technology acceptance questionnaire. After removing incomplete questionnaire data, a sample of 104 subjects remained. Of the 104 subjects 54 were female and 50 were male.

Internal Consistency

Because survey items were adapted from questionnaires used in previous studies (Davis, 1989, Hill, 1987, and Davis et al., 1989), it was necessary to access the component factor loadings and the reliability coefficients for each of the constructs. SAS® System for Windows (SAS Institute, Inc., http://www.sas.com) was used for the analysis.

Disposition towards Group Work

Responses to the fourteen-item Disposition towards Group Work questionnaire were subjected to a principal component analysis using ones as prior communality estimates. The principal axis method was used to extract the components, and this was followed by a varimax (orthogonal) rotation.

The initial theoretical research model suggested that four components would be displayed. Although initial four components displayed eigen values greater than 1, a review of the results of a scree test and the interpretability criteria suggested that only the first two components were meaningful. Therefore, only the first two components

were retained for rotation. Combined, components 1and 2 accounted for 48% of the total variance.

Questionnaire items and corresponding factor loadings are presented in Table 1. In interpreting the rotated factor pattern, an item was said to load to a given component if the factor loading was .40 or greater for that component, and was less than .40 for the other. Using these criteria, and the interpretability criteria seven items were found to load on the first component, which was subsequently labeled the Stimulating Communication component. Two items loaded on the second component, which was labeled the Social Comparison component.

Table 1

Rotated Factor Pattern and Final Communality Estimates from Principal Component

Analysis of Group Work Questionnaire

Components			
1	2	h^2	Items
.69	-.05	.48	1. I like to participate in student groups.
.50	-.08	.26	2. I learn more from talking with my classmates than I do in class
.51	-.18	.29	3. If I needed help with an assignment for this course, I would ask a classmate
.77	-.17	.62	4. I enjoy studying with classmates, and would join a study group.
.83	-.05	.70	5. I find that I learn a lot by participating in group projects.
.78	.00	.60	6. I enjoy studying with classmates, and would form a study group
.26	.71	.58	7. When I do group projects, I feel I do more than my share of the work.
.45	.02	.20	8 When I'm assigned to a group project, I find it difficult to state my opinion.
.84	.01	.71	9 I find group projects very useful.
.26	-.62	.44	10. When I do group projects, I feel that some members do not share their work.
.14	-.47	.24	11. I find it difficult to schedule meetings with group members to complete the project.
.40	-.49	.40	12. The idea of one grade for the entire group appeals to me
.73	.21	.58	13. I have developed teamwork skills by working on group projects.
.33	.68	.57	14. When I do group projects, I feel I am more motivated than other group members are.

Note. N = 104. Communality estimates appear in column headed h^2

Subsequent to the development of the two components associated with

disposition to group work, the coefficient alpha was computed to determine the internal

consistency reliability of the scale used to assess the disposition toward group work

constructs. A reliability coefficient may be defined as the percent of variance in an

observed variable that is accounted for by true scores on the underlying construct

(Hatcher, 1994).   The internal consistency is the extent to which the individual items

that constitute a test correlate with one another or with the test total. In the social

sciences, the index used to measure internal consistency reliability is the coefficient

alpha (Cronbach, 1951).

    For the stimulating communication construct (COMM) questions, coefficient

alpha reliability estimates (Cronbach, 1951) all exceed .70, and are reported on the

diagonal of Table 2. This coefficient exceeds the minimum value of .70 recommended

by Nunnally (1978).

Table 2

Means, Standard Deviations, Intercorrelations, and Coefficient Alpha Reliability

Estimates for the Stimulating Communication Construct Variables

			Intercorrelations						
Variable	*M*	*SD*	1	2	3	4	5	6	9
Question 1	4.37	1.26	(85)						
Question 2	3.55	1.24	34[**]	(86)					
Question 3	4.13	1.19	40[***]	29[*]	(86)				
Question 4	3.89	1.35	43[***]	34[**]	51[***]	(82)			
Question 5	3.94	1.41	47[***]	39[***]	32[**]	62[***]	(82)		
Question 6	3.38	1.51	38[***]	43[***]	35[**]	76[***]	66[***]	(83)	
Question 9	3.86	1.31	54[***]	31[*]	27[**]	57[***]	76[***]	55[***]	(83)

Note. N = 104. Decimals omitted from correlations and coefficient alpha
reliability estimates.
[*] *p* < .01, [**] *p* < .001, [***] *p* < .0001

    The social comparison construct (SOCC) of the disposition toward group work

consisted of two items, Question 7 (*M*=4.0, *SD*=1.16) and Question 14 (*M*=3.85,

SD=1.13), the construct coefficient alpha reliability estimates was .70.

Technology Acceptance Model

Before conducting the principal component analysis, the coefficient alpha was computed to determine the internal consistency reliability of the scale used on the technology acceptance questions. A reliability coefficient may be defined as the percent of variance in an observed variable that is accounted for by true scores on the underlying construct (Hatcher, 1994). The internal consistency is the extent to which the individual items that constitute a test correlate with one another or with the test total. In the social sciences, the index used to measure internal consistency reliability is the coefficient alpha (Cronbach, 1951).

For the technology acceptance questions, coefficient alpha reliability estimates (Cronbach, 1951) all exceed .70, and are reported on the diagonal of Table 3. This coefficient exceeds the minimum value of .70 recommended by Nunnally (1978).

Table 3

Means, Standard Deviations, Intercorrelations, and Coefficient Alpha Reliability Estimates for the Technology Acceptance Variables

Variable	*M*	*SD*	Intercorrelations								
			1	2	3	4	5	6	7	8	9
1. Question 1	3.58	1.38	(73)								
2. Question 2	2.77	1.38	32**	(77)							
3. Question 3	3.00	1.33	35***	15	(71)						
4. Question 4	3.00	1.50	-4	33**	-11*	(82)					
5. Question 5	3.43	1.45	43***	-1	39***	-18*	(73)				
6. Question 6	1.88	1.14	6	37***	26*	27**	7	(77)			
7. Question 7	2.96	1.38	52***	16**	74***	-19	45***	22*	(71)		
8. Question 8	3.63	1.47	35**	5	55***	-14	56***	9	59***	(72)	
9. Question 9	2.82	1.35	44***	-3	58***	-11	42***	15	71***	56***	(71)

Note. *N* = 104. Decimals omitted from correlations and coefficient alpha reliability estimates.
*p < .01, **p < .001, ***p < .0001

Principal Component Analysis

Responses to the 9-item Technology Acceptance questionnaire were subjected to a principal component analysis using ones as prior communality estimates. The principal axis method was used to extract the components, and this was followed by a varimax (orthogonal) rotation.

Only the first two components displayed eigen values greater than 1, and the results of a scree test also suggested that only the first two components were meaningful. Therefore, only the first two components were retained for rotation. Combined, components 1 and 2 accounted for 60% of the total variance.

Questionnaire items and corresponding factor loadings are presented in Table 4. In interpreting the rotated factor pattern, an item was said to load to a given component if the factor loading was .40 or greater for that component, and was less than .40 for the other. Using these criteria, six items were found to load on the first component, which was subsequently labeled the Perceived Ease of Use component. Three items also loaded on the second component, which was labeled the Perceived Usefulness component.

Table 4

Rotated Factor Pattern and Final Communality Estimates from Principal Component

Analysis of Technology Questionnaire

Component			
1	2	h^2	Items
.63	.24	.45	1. Technology enhanced my ability to learn the material.
.10	.80	.65	2. I found the use of multiple tools to be overwhelming.
.79	.14	.65	3. The use of the collaborative software was valuable to my learning in this class/completion of this project.
-.24	.70	.55	4. I spent too much time trying to learn to use the collaborative software.
.69	-.13	.50	5. I could use the technology that I learned for this project outside the context of this class.
.19	.69	.51	6. I was at a disadvantage in this project because I do not possess adequate computer skills.
.88	.09	.79	7. Because of the collaborative software I was better able to visualize the ideas and concepts that were taught in the course.
.79	-.09	.63	8. Chat helped me communicate with other students in the class about this project.
.81	-.02	.66	9. Because of the collaborative software, I enjoyed this course more than I would have otherwise.

Note. $N = 104$. Communality estimates appear in column headed h^2

Once the component analysis was completed, scores were assigned to each

subject to indicate where that subject stood in relation to the retained components. The

assigned scores were factor-based scores, which is a linear composite of the variables

that demonstrated meaningful loadings for the components in questions, PU PEOU,

COMM, and SOCC. The factor-based score for PU was created by adding the subject's

responses to the technology acceptance items 2, 4, and 6. The factor-based score for

PEOU was created by adding the subject's response values to the technology

acceptance items 1, 3, 5, 7, 8, and 9. The factor-based score for COMM was derived

by adding the subject's response values to the disposition toward group work items 1, 2,

3, 4, 5, 6, and 9. Adding the subject's response values to items 7 and 14 of the

disposition toward group work created the factor-based score for SOCC. The

behavioral intention construct (BI) consisted of a single item. At this point, other

analyses were performed against the PU, PEOU, COMM, SOCC, and BI factors.

<div align="center">Analysis for Hypothesis 1</div>

Hypothesis 1: An individual's predisposition toward working in a group is

positively associated with his/her perception of the usefulness of the CSCW.

Results were analyzed using both bivariate correlation and multiple regression.

Means, standard deviations, Pearson correlations and coefficient alpha reliability

estimates appear in Table 5. The bivariate correlations revealed that the predictor

variable COMM was significantly related to PU with $r = .20$. This correlation to PU was

significant at $p < .05$, and was in the predicted direction.

Table 5

Means, Standard Deviations, Intercorrelations, and Coefficient Alpha Reliability

Estimates

Variable	*M*	*SD*	Intercorrelations		
			1	2	3
PU	7.63	2.99	(76)		
COMM	27.14	6.89	20	(86)	
SOCC	7.85	2.02	-5	23	(70)

Note. N = 104. Decimals omitted from correlations and coefficient alpha reliability
estimates
*$p < .0001$

Using multiple regression, PU scores were then regressed on a stepwise

combination of the affiliation (COMM and SOCC) values. The equation containing the

variable COMM was significant, $F(1, 102) = 4.46$, $p = .037$, adjusted $R^2 = .0325$.

Analysis for Hypothesis 2

Hypothesis 2: An individual's level of experience with similar software

applications is positively associated with his perception of the ease of use of CSCW

Results were analyzed using both bivariate correlation and multiple regression.

Means, standard deviations, Pearson correlations and coefficient alpha reliability

estimates appear in Table 6. The bivariate correlations revealed no predictor variables

that were significantly related to PEOU. All correlations to PEOU were outside of an

acceptable range, $p < .05$.

Table 6

Means, Standard Deviations, Intercorrelations, and Coefficient Alpha Reliability

Estimates

Variable	M	SD	Intercorrelations								
			1	2	3	4	5	6	7	8	9
1. PEOU	19.82	6.45	(71)								
2. Word Processing	3.88	.94	-10	(76)							
3. Spreadsheet	2.84	1.10	-5	45*	(70)						
4. Database	2.59	1.20	-2	52*	72*	(81)					
5. Presentation	2.49	1.30	3	36*	59*	44*	(73)				
6. Email	3.92	1.10	1	62*	55*	57*	55*	(75)			
7. Web Browser	3.89	1.43	-6	59*	42*	41*	47*	69*	(69)		
8. FTP	1.96	1.64	-2	29*	35*	26	40*	40*	48*	(71)	
9. Overall Skill	3.09	.96	1	69*	72*	72*	73*	79*	72*	59*	(71)

Note: $N = 104$. Decimals omitted from correlations and coefficient alpha reliability estimates.
* $p < .0001$

Using multiple regression, PEOU scores were then regressed on the linear

combination of all level of experience values. The equation containing these eight

variables was not significant, $F(8, 95) = .57$, $p = .77$, adjusted $R^2 = -.0345$.

Hypotheses 3 through 5 were each analyzed using bivariate correlation. The means, standard deviations, Pearson correlations appear summarized in Table 7.

Table 7

Means, Standard Deviations and Intercorrelations

			Intercorrelations		
Variable	*M*	*SD*	1	2	3
PU	7.63	2.99			
PEOU	19.83	6.45	5		
BI	3.17	1.42	0	64[*]	

Note: *N* = 104. Decimals omitted from correlations and coefficient alpha reliability estimates
[*]*p* < .0001

Analysis for Hypothesis 3

Hypothesis 3: Perceived usefulness of CSCW is positively associated with behavioral intention to use CSCW.

The bivariate correlations revealed that the predictor variable (PU) was not significantly related to BI. The correlation to BI was outside of an acceptable range, *p* < .05.

Analysis for Hypothesis 4

Hypothesis 4: Perceived ease of use of CSCW is positively associated with behavioral intention to use CSCW.

The bivariate correlations revealed that the predictor variable (PEOU) was significantly related to behavioral intention with *r* = 64. This correlation was significant at *p* < .0001, and was in the predicted direction.

Analysis for Hypothesis 5

Hypothesis 5: Perceived ease of use of CSCW is positively associated with perceived usefulness of CSCW.

The bivariate correlations revealed that the predictor variable was not significantly related to PU. The correlation between PEOU and PU was outside of an acceptable range, $p < .05$.

CHAPTER 5

CONCLUSION

Introduction

This research focuses on groupware packages that are used to support students who are located in different places, but who are assigned group projects as part of their coursework requirements. In many cases, students are being asked to use unfamiliar technologies that are very different from those that support personal productivity (Grudin, 1994). For example, computer-supported cooperative work (CSCW) technology is different from other more traditional, stand-alone software applications because it requires the user to interact with the computer as well as other users. However, familiarity with the technology is not the only requirement for successful completion of a group assigned project. For a group to be successful, it must also have a desire to work together on the project. If this pre-requisite is not present within the group, then the technology will only create additional communication and coordination barriers (Lou et al., 2000). If students do not have a predisposition to work together on projects, then how does this impact how they perceive the usefulness of CSCW technology? Moreover, how will a student's experience with similar software tools aid in the user's perception and acceptance of CSCW technology?

Discussion of Findings

Hypothesis 1: An individual's predisposition toward working in a group is positively associated with his/her perception of the usefulness of the CSCW.

Hypothesis 1 was supported. In the TAM research model design it is predicted that the effects of all external variables would be mediated through the primary beliefs of perceived usefulness and perceived ease of use, and affect behavioral intention through these two beliefs, (Davis et al., 1989). The results of this study indicate that this may also be the case when the students are using a synchronous collaborative system. Previous research of group decision support systems, group support systems and groupware (Sambamurthy & Chin, 1994; Chin & Gopal, 1995) using the TAM model have either examined groups working at the same time and the same location, or groups working at different times and different locations (asynchronous and geographically distributed).

Interestingly, results of a study (van Dolen & De Ruyter, 2002) utilizing the TAM model to examine which external factors drive customer satisfaction with a moderated group chat reported a different finding. Their results indicate that at the individual level usefulness was not significant but at the group level perceived usefulness, perceived ease of use and perceived enjoyment are significant. The authors muse that "Seemingly, they process information about the usefulness through group discussion" (pg. 505). In future studies, social norms and social influence needs to be in the equation as reported in other recent studies (Venkatesh & Davis, 2000; Kanahanna & Straub, 1999) as well as group-level effects of proposed factors. Also they might need to use the tools longer; that is, not just a single session

Further analysis of the sample data indicates a significant and direct, but weak, positive association (r = .21, p < .05) of one aspect of predisposition to group work to behavioral intention. That aspect, termed stimulating communication in this study is a

construct measuring the affiliation motivation associated with group work. In a recent study using asynchronous groupware affiliation motivation was found to be significantly and directly associated with behavioral intention (Li et al., 2004). The finding in this study provides tentative support for the result reported by Li et al. (2004). The findings from both studies provides support that in CSCW environment, at least one aspect of disposition toward group work as measured by the affiliation motivation construct may have a direct affect on intention to use collaborative technology and should be addressed in future research. If future research continues to provide support for this relationship, then it should also be developed and exploited by management/faculty/organizations through training and structure of the CSCW system.

Hypothesis 2: An individual's level of experience with similar software applications is positively associated with his perception of the ease of use of CSCW

Hypothesis 2 was not supported. A possible reason for the lack of finding could have been due to the fact that the subjects did not get adequate opportunities to assess the ease of use of the synchronous collaborative system in a single session. Within the class time period allotted, the subjects were given a training session and a short hands-on use session before they worked on the assigned group task project. After completing the assignment, subjects were given the post-task questionnaire. It is possible that a single session was inadequate to form an opinion about the ease of use of the synchronous collaborative system. This was a limitation of this study that may have impacted the result. In future studies, researchers should ensure that subjects are exposed to the technology more than once and for a longer period of time.

It is possible that the result could be indicative of the way the construct was measured, although there is research that supports this measurement method. Igbaria et al. (1995) used a level of experience measurement method in testing the determinants of microcomputer usage and found that prior computer experience influenced perceived usage directly as well as indirectly through perceived ease of use and perceived usefulness. However, Smith et al. (1999) suggest that computer experience be conceptualized as bi-dimensional, consisting of objective and subjective components. Future research should include other methods to assess computer experience.

This result may be an indication that the actual skill set of this sample was lower than self perception (self-rating) the students' indicated. Self-report methods appear to have some problems. For example, Anderson (1981) suggests that subjects may respond to a question in a way that the subject believes to be more socially acceptable rather than in a way that is consistent with their true beliefs and feelings. Again, future research should include other methods to assess computer experience such as measures of performance on computer skill tasks.

Another possible explanation for the results for this particular hypothesis could be that the skill set needed for general computing literacy did not transfer or may have even interfered with the acquisition of new skills related to collaborative technology, thus affecting the way users' perceived the ease of use of the collaborative software. Students may see collaborative technology as a new and totally different application. For example, studies of behaviors such as learning and skill acquisition (Tobias, 1994), researchers have shown how preexisting knowledge and expectations can significantly

bias how people respond to new events. Students are likely to be influenced by preexisting assumptions and beliefs when introduced to new information, especially in academic courses. Research in educational psychology have concluded that prior knowledge within a specific domain, such as text processing (McCucheon, 1986) and computer programming (Klahr & Carver, 1988) benefit students' learning and achievement. At times, however, prior knowledge can make it difficult to understand or learn new information (Committee on Developments in the Science of Learning, National Research Council, 1999). And, sometimes, prior beliefs may be highly resistant to change, even in the context of formal coursework (Fisher, et al., 2000).

Future research should investigate the positive and negative impacts of prior experience with other software applications on the perceived ease of use of this system. In addition, the possible impacts of other individual characteristics on users' acceptance of a synchronous collaborative system need to be examined in future research.

Lastly, it may be that the complexity of software and communication along with group work interactions has a bigger impact on acceptance of technology than experience with similar software tools alone. Further research is needed to identify and test these interactions.

Hypothesis 3: Perceived usefulness of CSCW is positively associated with behavioral intention to use CSCW.

Hypothesis 3 was not supported. This result was not in keeping with other studies employing the TAM model, which suggests that perhaps the subjects in this particular study did not intend to use CSCW in the future, even though they may have thought the software useful. The results of a study utilizing the TAM model to examine

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which factors drive customer satisfaction with a moderated group chat indicate that at the individual level usefulness was not significant.

A possible explanation could be that previous studies did not examine the TAM research model in a situation where the users were working together at the same time and geographically distributed. It is possible that other issues, such as socialization aspects of distributed work, raised by the geographical dispersion outweigh the perceived usefulness in the user's decision to use. Research by Karahanna and Straub (1999) on the psychological origins of perceived usefulness suggests that social presence (the degree to which a medium conveys the psychological presence of the message sender) and through the social information processing theory, social influence. This theory posits that perceptions and attitudes toward the technology are influenced by social norms, by actions and statements of supervisors and peers, and by past attitudes and prior use. The findings in this study indicate that further research that incorporates aspects of social presence and social influence is needed

Hypothesis 4: Perceived ease of use of CSCW is positively associated with behavioral intention to use CSCW.

Hypothesis 4 was supported. Initially, this finding seems not to be in keeping with the TAM model. However, the results reported by Davis et al. (1989), although contrary to TAM, indicate that ease of use was found to have a very strong direct effect on intentions, but only at the start of application use – after repeated usage, ease of uses' effect had only an indirect effect through its influence on perceived usefulness (p. 994).

Perhaps because synchronous CSCW is a more complex system/platform, and more interactions among the individual, system, and group are required, ease of use becomes a more dominant factor. In addition, social influence was not addressed in this study. Taylor and Todd (1995) suggest that including social norms may provide a more complete understanding of the determinants of intention.

Hypothesis 5: Perceived ease of use of CSCW is positively associated with perceived usefulness of CSCW.

Hypothesis 5 was not supported. This finding is inconsistent with previous studies. A possible reason for the lack of finding could have been the fact that the subjects did not have sufficient time to assess the potential use of the synchronous collaborative system. Within a single class period, the subjects were trained on the use of the system, asked to complete a specific task, and provided answers to a questionnaire. It is possible that this time was inadequate to form an opinion about the potential use of the synchronous collaborative system. Subjects should be given enough time to get familiar with a system before they are asked to express opinions about the usefulness of the system. .

Results of a study (van Dolen & De Ruyter, 2002) utilizing a model based on TAM to examine which factors of a group chat drive customer satisfaction indicate that, at the individual level, usefulness was not significant, but at the group level perceived usefulness, perceived ease of use and perceived enjoyment were significant. In addition, their findings indicate that satisfaction of a group chat tool is influenced by both the individual's subjective experience, as well as by the shared perceptions of the customers. These results seem to indicate the presence of group-level effects which

are independent of individual-level effects. The authors muse that "Seemingly, they [subjects] process information about the usefulness through group discussion (pg. 505). The authors conclude that it is not only the individual perceptions of customers that are influential, but also the shared experience of ease of use within the group that results in satisfaction. Future research involving synchronous collaborative systems should also look for group-level as well as individual-level effects in proposed factors.

Hence, it is possible that the technology acceptance model is not the best predictor of the intent to use a synchronous collaborative system. Given the findings reported above, it is apparent that further research is necessary to test the influence of the perceived usefulness and perceived ease of use, and subjective norms on the intention to use a synchronous collaborative system.

The additional result reported in this study suggests that the use of a synchronous collaborative system may be partly due to their motivation of being attached to others. This motivation may result in satisfactory communication among team members working on a collaborative project. This would be of particular interest to organizations that have a virtual organizational form, or are using distributed teams working on projects. Therefore, this finding holds significance for universities considering implementing synchronous CSCW systems.

Summary of Implications

A research model that can be used to study the intentions to use synchronous CSCW was developed in this study. This model adds to the existing models of technology adoption and presents a model that can be used in studying the adoption of a rapidly proliferating technology. This study extends previous models of technology

adoption by incorporating predisposition toward group work as an external variable. Thus, this study may add to the previous studies on technology adoption and may extend the body of knowledge in this area. This study also identified a direct, but weak relationship between the predisposition toward group and intention to use the system. This finding adds to the body of knowledge on motivation to use a collaborative system.

Avenues for Future Research

Replicating the study using a larger number of participants, different measures of computer experience, including social influence as a endogenous variable, and testing the direct relationship between predisposition toward group work is necessary to further study the adoption and use of synchronous collaboration software.

In addition, as suggested by the results and discussion of this study, future research needs to extend the time period given for initial training and use of the synchronous collaborative system. The study design should also encourage or increase frequency of use so that both initial and subsequent beliefs about the perceived usefulness and perceived ease of use will be based on more in-depth perceptions.

Future research should examine the relationships between predisposition toward group work, computer experience and use of similar software and the intention to use a synchronous collaborative system in an experimental setting so that the influence of these constructs can be studied by experimental manipulation.

This study looked at two factors that are considered to be important in the implementation, acceptance and use of groupware. These factors 1) the need to collaborate and 2) knowledge of the groupware software are thought of as individual factors involved in distributed collaborative work. The second two factors considered to

be organizational in nature. The factors of management support for distributed collaborative workers and the organizational cultural that might support distributed collaborative work also need to be studied.

Conclusion

This dissertation studied the impact of predisposition toward group work and prior computer experience on the intention to use synchronous CSCW. It was found that predisposition toward group work was not only positively associated to perceived usefulness; it was also related to intention to use. It also found that perceived ease of use, at least in this study, had a direct and positive impact on intention, and was not mediated through perceived usefulness. These findings hold implications for academia and how it uses complex collaborative software. Avenues for further research have been identified. Given the rapid rise in the use of the Internet by higher education and organizations, and the increasing formation of virtual team within organizations, Internet based collaboration software technology has great potential. Further study into its adoption and use is recommended.

APPENDIX A

TRAINING MATERIALS

Getting Started with the V.C.U. System

To begin using the V.C.U. activities and working with your group, you need to activate the V.C.U. System on your workstation.

1. The V.C.U. software will be located in different folders on the Start Menu, depending on decisions made by the network personnel responsible for each computer lab. If you need additional help finding the menu option for the V.C.U. software and you are using a computer lab at the University of North Texas ask one of the lab personnel to help you find the software on the menu.

2. After you select the V.C.U. option from the Start Menu, the V.C.U. System will display the main window on your workstation.

    - At this point, the V.C.U. activities are not yet available.
    - If you sent a Chat message to "everyone in the system", only you would receive the message!

3. To begin using the V.C.U. activities, first select the Activate system option on the System Menu. You will be asked to enter your User ID Number. Enter the numbers of your User ID <u>without</u> any dashes.

    - Now Chat and Post a note are available.

V.C.U. Chat

Chat is like a telephone call. Using Chat, you may communicate with others who are

active in the V.C.U. System. You can send messages to:

- everyone active in the system;
- everyone in your class;
- everyone in your section;
- everyone in your group; or
- a single person.
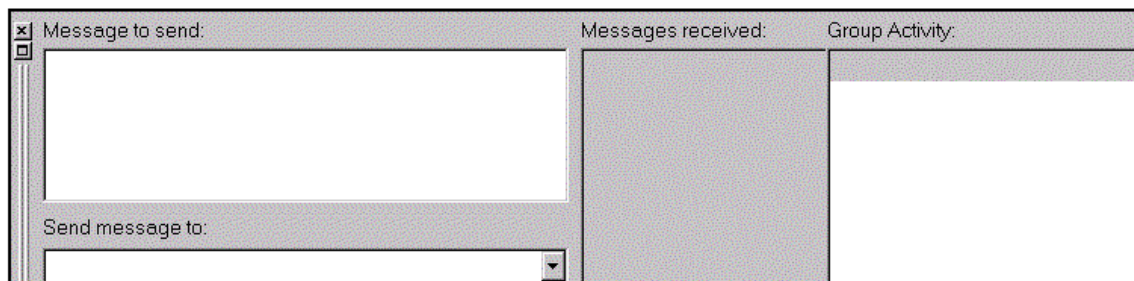
To send a message:
- Select the person or group to receive your message, using the arrow button by the text box titled "Send message to".
- Type your message in the white text area titled "Message to send".

- Press the Enter Key.

The Chat Window displays messages that you receive from individuals and from a group. The messages will be displayed in the area called "Messages Received". The area for entering Chat messages and viewing Chat messages is always available unless you close it using the Close Button. To restore the Chat Window once it has been closed:

- Select View on the V.C.U. Main Menu.
- Now, select the "Chat Window" option to display the Chat Window once again.

Saving Images from the Internet
For Use in the VCU Whiteboard

Find an Image on the Internet

Once you have located an image (no larger 512K) you would like to use, follow these steps:

1.   Select the image with a right mouse click.

2.   Choose "Save Picture As" and follow the normal steps for saving (select where to save the file, the file name, and the file extension – this information will fill in for you automatically in most cases).

Reminder: Be sure to note the directory, file folder, file name and extension. If you renamed the image, make note of the new file name including the extension.

Placing the Image in the VCU Whiteboard

Once you have located and saved an image you would like to use, communicate within your group to have one person open the Whiteboard. Decide which group member will show their saved image first

 Follow these steps to place the saved image on the VCU Whiteboard to share the image with your group:

1.   Select the Rectangle Tool ( )from the Whiteboard toolbar. Use this tool to make a rectangular shape on the Whiteboard to insert your image.

2.   Choose Select Tool ( )from the Whiteboard toolbar.
3.   Left click the mouse on the rectangle you just drew to select that shape to work with.
4.   Now, right click on the rectangle to show the "properties" menu for this shape. On this menu, select "Properties…" and the Shape Properties dialog will appear.
5.   In the edit box labeled "Add Image to Shape", either type in the appropriate file name or select "Browse" to find the file you want to place in the Whiteboard.
6.   If you want the image to display just like you saved it, select "Change Size of Shape to Fit Image."
7.   If you would like to make other changes, just repeat steps 2-4 to change the text on the shape, change the border's width, or change the fill option.
Note: Remember in the whiteboard the "Delete" command will erase the last action taken – regardless of who in the group did that action in the whiteboard.

Quick Steps for VCU File Sharing

Start the VCU software; it will be located on a submenu from the START/Program Menu or as an item directly on the START/Program Menu.

From the System Menu, select "Activate the System" and Enter your VCU ID in the dialog box.

From the System Menu, select "Connect to group" and make sure your current course, section and group are selected. Then press Ok. If you need to change to a different course, section and group, you can do that here.

Use the VCU Chat tool to communicate with group members. Select "Everyone in my Group" from the drop down list.

HINT: Communicate, communicate, communicate! Use the Chat to discuss the next action and to tell your team every time you are about to do something. The first step in a successful session is to decide who will be the Exchange Leader (EL) for this session.

The Exchange Leader should use View Menu "Who's Connected…" to verify that the other team members are connected to the appropriate group.

When the group is ready to Share a File (so the assignment can be completed), the Exchange Leader will:

NOTE: Only the Exchange Leader needs to do step 1.

1. From the VCU Actions Menu, select "Start Exchange", and then "Lead Exchange". Once in the "exchange mode", all team members can Share a File.
2. Use Chat to tell your team that you are ready to send a file and that they (The Receiver) need to decide where they want to receive the file being sent to them from you (The Sender).
3. The Receiver should select from the VCU Actions Menu, "File Transfer", and then "Options". Enter the folder name to receive the file being sent to you (The Receiver), or use "Browse" option to select a folder.
4. The Receiver will notify The Sender through Chat when they have completed this step.
5. The Sender then selects from the VCU Actions Menu, "File Transfer", and then "Send a file". Use the "Open" dialog to select the file to send. Once the Sender selects the "Open" button, the file is sent.

Quick Steps for VCU Application Sharing

Start the VCU software; it will be located on a submenu from the START/Program Menu or as an item directly on the START/Program Menu.

From the System Menu, select "Activate the System" and Enter your VCU ID in the dialog box.

From the System Menu, select "Connect to group" and make sure your current course, section and group are selected. Then press Ok. If you need to change to a different course, section and group, you can do that here.

Use the VCU Chat tool to communicate with group members. Select "Everyone in my Group" from the drop down list.

HINT: Communicate, communicate, communicate! Use the Chat to discuss the next action and to tell your team every time you are about to do something. The first step in a successful session is to decide who will be the Exchange Leader (EL) for this session.

The Exchange Leader should use View Menu "Who's Connected…" to verify that the other team members are connected to the appropriate group.

When the group is ready to Share an Application (so the assignment can be completed)

From the Programs Menu, select an application to be shared (i.e. MS-Notepad, or MS-WordPad). This application should be minimized, so that it will not interfere with the next few steps. It does not matter which workstation the application being shared is located on.

NOTE: Only the Exchange Leader needs to do step 2.

If you are already in "exchange mode" from doing File Sharing, then you do not need to do this step. From the VCU Actions Menu, select "Start Exchange", and then "Lead Exchange". Once in the "exchange mode", all team members can Share an Application.

From the Actions Menu, select "Show an Application" -- a dialog box listing Applications that can be shared will appear.

Select (highlight) an application to share, Click SHARE, then click CLOSE. (If an incorrect application is selected, reopen the dialog box, highlight the incorrect one and select Don't Share, then repeat the step above to share the correct application).

The application to be shared is in the Taskbar; it needs to be "brought forward" by each group member to view at his or her computer.

NOTE: This is an application outside of the VCU system, so the normal MS-Windows conventions are in place. For example, if the EL uses the VCU Chat tool to

communicate with group, the Shared application will be hidden on the EL's screen and will go to hatch marked on the group members' screens. The EL needs to click on the application in the Taskbar to bring it forward (make it the active window).

If the EL selects "Work Together" from the Action Menu, this allows others in the group to "take control" of the Shared Application. A single left mouse click allows any member of the group to "take control." This a powerful option, remember the "rules of communication" and the group work discussion.

When the assignment is complete, the file can be saved or printed only from the workstation that is actually running the application.

Tips for Teaming
Working Together to Achieve

Elements of Cooperative Learning and Work

Positive Interdependence

Team members must feel that they need each other in order to complete the group's task, that they "sink of swim" together. Positive interdependence is the perception that no member of the team can succeed unless the others do, and one member's work benefits another and vice versa.

Individual Accountability

Team learning is not successful unless every member has learned the material or has helped with and understood the assignment. Thus, it is important to frequently stress and assess individual learning so that group members can appropriately support and help each other.

Interpersonal and Small Group Skills

Individuals often do not come to school or work with the social skills they need to collaborate effectively with others. Time needs to be given to learning the appropriate communication, leadership, trust, decision making, and conflict management skills in order for groups to function effectively.

Group Processing

Processing means giving the team the time and procedures to analyze how well their groups are functioning and how well they are using the necessary social skills.

Taken from: The New Circles of Learning: Cooperation in the Classroom. D.W. Johnson, R.T. Johnson, and E.J. Holubec. Alexandria, VA: Association for Supervision and Curriculum Development, 1994.

Elements to Practice for Successful Cooperative Learning and Work
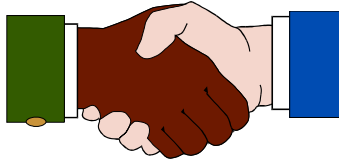
Specify Desired Cooperative Behaviors

- ˙ Encourage each other to participate.

- ˙ Have each member explain to their group how to get the answer.

- ˙ Check to make sure everyone in the group understands the material.

- ˙ Criticize ideas, not people.

Practice The Behaviors The Team Decides It Values

Have all team members present.

Spend time developing the ground rules for working together.

Enforce the ground rules (each member is responsible for this).

Encourage and make it possible for team members to raise difficult, subtle, and conflictual issues relating to the team's work and performance.

Taken from: The Fifth Discipline: The Art and Practice of the Learning Organization. Peter M. Senge. New York: Doubleday, 1990.

APPENDIX B

TASKS

COMM 2020: INTERPERSONAL COMMUNICATION

COMM 2020: MAJOR COMMUNICATION APPLICATION

GROUP PROBLEM-SOLVING AND REPORTS

Overview: Your group will select a [case](#) to study, analyze, and develop solutions. You will work as a group in problem-solving and creating a written OUTLINE of the group's proceedings. As a result of your group's analysis and solutions, individuals will make PRESENTATIONS in your groups on the problems and solutions. As future (and current) members of organizations, each of you will be asked to communicate interpersonally in ways that assist in the analysis of problems that lead to decisions. This assignment can be of real value to you if taken seriously. It is intended to help prepare you for very "real world" types of tasks.

1. Form a group with compatible classmates with diverse abilities. Because you will need to work together outside of class, it is important that you have compatible schedules. Exchange phone numbers and schedules.

2. Select one of the cases. Have a first, second, and third choice so that different cases can be used in class.

3. Review AGENDAS, CHAPTERS 12 & 13, CLASS NOTES AND HANDOUTS ON DECISION-MAKING.

4. DO GROUP DISCUSSION PHASE

Spend considerable time discussing and analyzing the case, then arriving as solutions. All should try to contribute to the discussion. Be aware of the agendas presented, and develop or make combinations of those agendas to suit your case and your group=s needs. You will need, most likely, to make modifications in your agenda as your group proceeds through its tasks.

   a. Each stage the group goes through should be recorded.

   b. Only KEY issues, definitions, information, analyses, criteria, etc. that arise at each stage should be recorded.

   c. Solutions in comparison to solution criteria and key issues should be recorded.

   d. Viable solutions or combinations of solutions should ultimately be determined by your group.

5. DO WRITTEN OUTLINE

The group should decide on how to produce the written OUTLINE (e.g.,responsibilities, deadlines, etc.). The written outline can be created as the group proceeds through discussion and revised/edited if necessary after. THE OUTLINE SHOULD

a. Cover each stage of the group's agenda and use a heading for each stage which names the stage.

b. Report on the process the group went through at each stage. c. Report only the key information, the key analyses, and solution decisions at each appropriate stage.

(SEE a - d under "4" above).You cannot and should not report everything in the outline.

GROUP REPORTS

As a group, you will make individual presentations based upon your case and your group discussions. Much of the quality of the presentation will be determined by what you did in your group discussion. Your presentations should not follow the agenda or outline used to arrive at solutions. Rather, you should divide up responsibilities for focusing on various problems, analyses, explanations, and solutions. Every presenter should use at least one visual aid.

Each presentation will require class volunteers to serve in roles that the group reports to. These volunteers will play their role in their panel and ask questions of the presenters.

As future members of organizations, each of you, often as part of a team, will be asked to solve problems and give presentations for your superiors. This assignment is designed to help prepare you for these types of presentations.

Organize, Plan, Prepare, Rehearse, Present

1. ORGANIZE and sign up on the schedule.

2. PLAN a format for the presentation. See "FORMAT FOR FORMAL GROUP PRESENTATIONS."

3. PLAN BY carefully dividing up parts of the presentation. Each member should speak for approximately equal times.

4. PREPARE BY using your case and outline for information.

5. Carefully PREPARE the oral presentations and visual aids.

6. REHEARSE as a group and individually.

7. PRESENT the report in class. Limit the group presentation to 30 minutes. We must have 2 groups w/questions per class meeting. Because this is a formal presentation, each group member must dress for the occasion.

GEOG 4240 TEAM EXERCISE

This exercise requires a team effort using the Virtual Collaborative University concept and software. The idea is to allow all team members to work on the same computer screen at the same time even when the members themselves are at different locations.

The exercise itself involves identifying features in the general circulation from images found on the internet. The idea is to find good examples of all of the pressure cells in the general circulation in as few images as possible. How it is more important to have good examples properly identified than just a few images. There are several ways to divide the workload among the members of the team. For instance, each member might take one cell in the 4-cell model and try to get as many examples as possible. Then the entire team can review persons work and collectively select and label the best examples. Alternatively, each person might get as many good images as possible and then the team selects the best for final submission. You must use the internet, but choice of sites and images is yours.

Note some sites are going to be much better than others and much better for certain types of weather information. For examples of hurricanes, Florida State University, the University of Miami, or the National Hurricane Center would be the best choices. However there is a well known professor (Prof. Gray) at Colorado State University at Ft. Collins, CO who issues predictions of how many hurricanes will form each year, so this site would probably be a good choice also.

Note also that most sites have only current weather info. If they do archive old stuff, it is generally not available. This can create problems getting examples of certain features. For instance, Sub-polar low pressure cells (SPLOs) are almost non-existent during summer in the Northern Hemisphere, so a July image is probably not real helpful. Low pressure cells, of any kind, are identifiable by cloud patterns, but high pressure cells are usually identifiable by a lack of clouds.

The second stage is to get the northern hemisphere 500mb chart (map not image) and then to link the features identified on the images to features on the chart.

Remember that these graphic images are large files and transfer rates will probably be slower than you would like. It would probably also help to work at a time of day when the internet has relatively little use instead of in the evening when it has maximum use. In any case "Patience is a virtue".

Finally each team will have a specific time to consult with your instructor (me), answer questions etc. Again this will be done using the same software.

Just to refresh your memory, there is a detailed write up on the general circulation in your packet. Find and identify the following features in each hemisphere.

- Sub-tropical High (STHI) Polar high

- ITCZ (Inter-tropical Convergence Zone) Trade winds? Siberian high Anarctic high
- Canadian High Sub-polar low (SPLO)
- South Asian Low Indonesian low
- Hurricanes/ Tropical Storms Westerlies
- Orographic precipitation Cyclones (Mid-latitude Cyclonic Storms)
- Rain Shadow Deserts Anticyclones
- Dry Line

APPENDIX C

QUESTIONNAIRES

VIRTUAL COLLABORATIVE UNIVERSITY
Pre-Task Survey

1. What type of operating systems have you worked on (choose all that apply)?

   ___Microsoft Windows   ___Macintosh   ___UNIX

   ___DOS   ___LINUX   ___Other

2. For each type of application that you use, use the following descriptions to indicate your level of experience.

   Level 1 = learning to use the operating system (e.g. Microsoft Windows or Macintosh) and getting comfortable with the idea of creating text, moving around in it, and revising it.
   Level 2 = use your operating system easily, gotten familiar with several different features/programs, and feel comfortable with the idea of exploring and learning new features/programs.
   Level 3 = have an active interest in how the program works, feel at ease with customization, writing macros.
   Level 4 = thoroughly familiar with the programs, simultaneously run multiple applications, integrate applications.

Applications:	Never Used	Level 1	Level 2	Level 3	Level 4
Word Processing					
Spreadsheets					
Databases					
Presentation					
E-mail					
Web Browsing					
FTP					

3. What is your age (choose a range)?

   ___Less than 20   ___20-29   ___30-39   ___40-49   ___50-59   ___60 or more

4. What is your gender?   Female____ Male____

5. Which of the following best describes your ethnic background (choose one)?

   ___American Indian or   ___African American, Black   ___Asian, or Pacific Islander
   Alaskan Native
   ___Hispanic   ___White, non-Hispanic   ___Other
                                  origin

Please indicate the extent to which you agree or disagree with each of the statements below by choosing the response that corresponds to your feelings, opinion, or experience.

1 = Strongly Disagree   2 = Moderately Disagree   3 = Slightly Disagree
4 = Slightly Agree   5 = Moderately Agree   6 = Strongly Agree

	1	2	3	4	5	6
I like to participate in student groups.						
I learn more from talking with my classmates than I do in class.						
If I needed help with an assignment for this course, I would ask a classmate.						
I enjoy studying with classmates, and would join a study group.						
I find that I learn a lot by participating in group projects.						
I enjoy studying with classmates, and would form a study group.						
When I do group projects, I feel I do more than my share of the work.						
When I'm assigned to a group project, I find it difficult to state my opinion.						
I find group projects very useful.						
When I do group projects, I feel that some members do not share their work.						
I find it difficult to schedule meetings with group members to complete the project.						
The idea of one grade for the entire group appeals to me.						
I have developed teamwork skills by working on group projects.						
When I do group projects, I feel I am more motivated than other group members.						

Comparative Analysis Questionnaire

1. What type of operating systems have you worked on (choose all that apply)?
   ___Microsoft Windows   ___Macintosh   ___UNIX

   ___DOS   ___LINUX   ___Other

   If you checked "Other" in the above question, please explain: _____

2. For each type of application that you use, use the following descriptions to indicate your level of experience.
   Level 1 = learning to use the operating system (e.g. Microsoft Windows or Macintosh) and getting comfortable with the idea of creating text, moving around in it, and revising it.
   Level 2 = use your operating system easily, gotten familiar with several different features/programs, and feel comfortable with the idea of exploring and learning new features/programs.
   Level 3 = have an active interest in how the program works, feel at ease with customization, writing macros.
   Level 4 = thoroughly familiar with the programs, simultaneously run multiple applications, integrate applications.

Applications:	Never Used	Level 1	Level 2	Level 3	Level 4
Word Processing					
Spreadsheets					
Databases					
Presentation					
E-mail					
Web Browsing					
FTP					

3. What is your age (choose a range)?
   ___Less than 20   ___20-29   ___30-39   ___40-49   ___50-59   ___60 or more

4. What is your gender?   Female____ Male____

5. Which of the following best describes your ethnic background (choose one)?

   ___American Indian or Alaskan Native   ___Hispanic
   ___African American, Black   ___White, non-Hispanic origin
   ___Asian, or Pacific Islander   ___Other

6. What Year are you in school? (Check only one)

___Freshman   ___ Masters Student
___ Sophomore   ___ Doctoral Student
___ Junior   ___ Post Graduate
___ Senior   ___ Not enrolled
___ Post Baccalaureate   ___ Other: _____

Experience with Collaborative Software

Please indicate the extent to which you agree or disagree with each of the statements below by choosing the response that corresponds to your feelings, opinion, or experience.

1=Strongly Disagree   2=Moderately Disagree   3=Slightly Disagree
4=Slightly Agree   5=Moderately Agree   6=Strongly Agree

	1	2	3	4	5	6
Technology enhanced my ability to learn the material.						
I found the use of multiple tools to be overwhelming.						
The use of the collaborative software was valuable to my learning in this class/completion of this project.						
I spent too much time trying to learn to use the collaborative software.						
I could use technology that I learned for this project outside the context of this class.						
I was at a disadvantage in this project because I do not possess adequate computer skills.						
Because of the collaborative software I was better able to visualize the ideas and concepts that were taught in the course.						
Chat helped me communicate with other students in the class about the project.						
Because of the collaborative software, I enjoyed this course more than I would have otherwise.						
The availability of the collaborative software in another class requiring group work would be an attraction to me.						
The availability of the collaborative software in another class would deter me from taking the class						

APPENDIX D

CONSENT TO PARTICIPATE

Fund for the Improvement of Postsecondary Education (FIPSE)
Virtual Collaboration University (VCU)

Consent to Participate

Thank you for agreeing to participate in this study to assess learning outcomes, collaborative work, and information seeking in the Virtual Collaborative University. You will not receive any direct benefit from taking part in the study, but the study may help to increase knowledge that may help others in the future.

You will be asked to use your student ID number on several surveys for this project. However, all analyses for this project will be done without reference to you or any other individual. The information you provide will be kept confidential.

By using the Virtual Collaborative University and completing the surveys you are implying that you have consented to participate in this study.

Dr. Kathleen Swigger (940/565-2817) and Dr. Robert Brazile (940/565-4176) are the co-investigators for this study. Please contact either of them if you have any questions about the study or what you are expected to do.

You do not have to participate in this study if you chose not to do so, it will not affect your course grade or relationship with the University of North Texas.

This project has been reviewed and approved by the University of North Texas Institutional Review Board for the Protection of Human Subjects in Research (940/565-3940).

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