2013

Awareness and Usage of Collaboration and Communication Technologies in Student Teamwork

Manouchehr Tabatabaei
Georgia Southern University, mtabatab@georgiasouthern.edu

Marco Lam
York College Pennsylvania

Awareness and Usage of Collaboration and Communication Technologies in Student Teamwork

Manouchehr Tabatabaei
Georgia Southern University
USA

Marco Lam
York College of Pennsylvania
USA

ABSTRACT

In this study, we investigate students' awareness and usage of collaboration and communication technologies (CCTs). Coordination and communication are two of the key processes for effective teamwork that have been identified in the literature. We find significant differences in awareness of CCTs between various student groups. However, when controlling for awareness, we find no difference in usage. While the proportion of students that are aware of various CCTs is high, the reported usage of CCTs is low. Because of the increased emphasis on teamwork, students need to be taught the technologies they need to use for collaboration and communication in various teamwork activities. Our results suggest that instructors cannot assume that students are familiar with CCTs and will therefore not know how to apply these technologies.

INTRODUCTION

Effective coordination, collaboration, and communication are important in effective teamwork activities (Mickan & Rodger, 2000). The advancement in technology has facilitated and impacted collaboration and communication amongst members of the team who are (1) in one location, i.e., co-located, and can meet face-to-face (Siegel, Dubrovsky, Kiesler & McGuire, 1986; Dennis, George, Jessup, Nunamaker & Vogel, 1988; Hollingshead & McGrath, 1995; Bordia, 1997; Thompson & Coovert 2003; Laru & Jarvela, 2008) or (2) geographically dispersed, i.e., virtual team, and cannot meet face-to-face option (Warkentin et al., 1997; Townsend, DeMarie, & Hendrickson, 1998; Watson-Fritz, Narasimhan & Rhee, 1998; Furst, Blackburn & Rosen, 1999; McCreary, 2009). The purpose of this study is to determine the awareness and usage of Collaboration and Communication Technologies (CCTs) for teamwork among students.

In the organizational setting, it has become increasingly important for individuals to be skilled at working as part of a team in addition to possessing individual strengths (e.g., Morehead, Steele, Alexander, Stephen & Duffin, 1997; Stewart & Barrick, 2000). Business leaders are looking for effective project managers and team players (Goltz, Hietapelto, Reinsch & Tyrell, 2008). Therefore, employers and recruiters are looking for graduates possessing teamwork skills, including collaboration and communication skills. To address this need, the programs model curricula, such as IS 2010 Model Curriculum (Topi, Valacich, Wright, Kaiser, Nunamaker, Sipior & de Vreede, 2010), and accreditation bodies, such as the Association to Advance Collegiate Schools of Business (AACSB – International) and the Accreditation Board for

  ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy

Engineering and Technology (ABET), are all supporting and requiring teamwork to be an integral part of the curriculum.

In addition to preparing students to be effective team leaders and team members for their future career, there are educational reasons to incorporate group work throughout the curriculum. Prior research has shown that participation and involvement of students in the classroom has a direct impact on learning (Chen & Looi, 2011), and that learning as a group is potentially more effective than individual learning (Mejias, 2006). Because the number of online courses and degrees offered at higher education institutions has increased significantly in recent years (Allen & Seaman, 2011) more students are encouraged and required to work in virtual teams. Effective usage of CCTs can facilitate teamwork activities whether the team is co-located or virtual and therefore can be an effective tool in achieving learning goals (Tutty & Klein, 2008). The online students who cannot meet face-to-face can form virtual teams for teamwork activities. However, offline students can also take advantage of virtual team for some teamwork activities while still meeting face-to-face the same way that online students forming virtual team can still meet face-to-face for some teamwork activities.

Before students can use CCTs to enhance collaboration and communication among the team, they need to be aware of these technologies. Our results indicate that there is a difference in awareness of CCTs between undergraduate and graduate students, online and offline students, younger and older students, and male and female students. However, when controlling for this difference in awareness, we find no differences in usage of these technologies in teamwork. Overall, students indicate great awareness of CCTs but the usage of the various CCTs is relatively low. This suggests that students lack applied technological knowledge and knowledge on how to effectively use technology in teamwork activities. Hence, our results suggest an important role for instructors that assign group projects. Instructors cannot assume that students are familiar with CCTs and will therefore know how to apply these technologies in group work. By teaching how the various technologies can be applied, or by requiring that these technologies are used for group projects, the communication and collaboration of the teams can potentially be improved

The remainder of this paper is organized as follows. In section 2, we provide an overview of the literature and we develop our hypotheses. We discuss the methodology in section 3. We then discuss our results in section 4 and provide our conclusion and suggestions for future research in section 5.

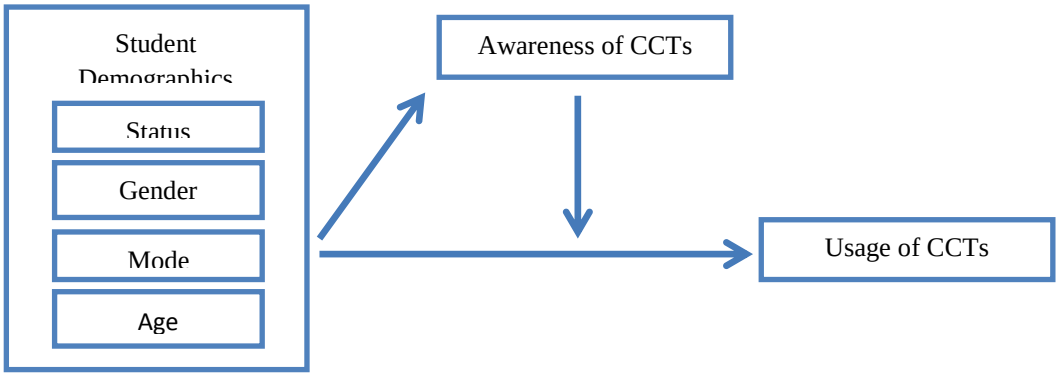
LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Because of the impact of effective teamwork on the performance of organizations (e.g. Janis, 1982; Goodman, Ravlin & Schminke, 1987; Sundstrom, DeMeuse & Futrell, 1990; Morehead et al., 1997), teamwork has received considerable attention in the extant literature. Several factors for effective teamwork have been identified including group cohesiveness (Smith, Smith, Olian, Sims, & Scully, 1994), and team size (Campion, Medsker & Higgs, 1993; Guzzo, 1986; Hackman, 1983; Hackman & Walton, 1986; Latane, 1986). The findings suggest heterogeneity of team members' background is unrelated or negatively related to effectiveness, and a main reason for team failure is poor interpersonal and communication skills (Campion et al., 1993).

Gladstein (1984) extended McGrath's input-process-output model to develop a model of group behavior. In the model, group composition and structure as well as resource availability and organizational structure form the inputs for the group processes. Group effectiveness (group performance and satisfaction) are the outputs in the input-process-output model. The group process refers to both social processes in the group and task processes (Guzzo & Dickson, 1996). Guzzo and Dickson (1996) argue that technology is one of the factors that constrains the group process. In this research, we look at some of the technologies that are available to facilitate the group process.

Within a team, the members have a common purpose, interdependent roles, and complementary skills (Yukl, Chavez & Seifert, 2005). Two of the team processes identified in the literature that are key to effective teamwork are coordination and communication (Mickan & Rodger, 2000). The two ways to share knowledge are through written documents and through contact (Haas & Hansen, 2007). In particular, we look at technologies that can be used for: storing and sharing information, (e.g., SharePoint, podcasts, emails, Google Docs), remote live exchange (e.g., Skype, Google Talk, Adobe Connect), online discussion portals (e.g., threaded discussion), and meeting spaces (e.g., Webinar). A complete list of current technologies at the time of survey is included in Table 2. Therefore, since usage of CCTs requires awareness (Dennis et al., 1998) and group processes are affected by group composition (Furst et al., 1999; Gladstein, 1984; Stevens & Campion, 1994), i.e., group member demographics, the model in Figure 1 is tested.

Figure 1: Student demographics relationship with awareness and usage of CCTs.



Many studies have shown differences in usage of Internet and technology among students (Bennett & Maton, 2010; Salaway & Borreson Caruso, 2007; Selwyn, 2008). Graduate students generally have more work experience and are involved with more teamwork, co-located or virtual. Graduate students also have more teamwork experience because of the teamwork requirements of graduate courses. Further, the completion of the undergraduate program has given them more exposure to teamwork. However, this experience with team work does not necessarily translate in and increased awareness and usage of CCTs.

In general, the new generation, i.e., the younger student, is more exposed to technology from early school years and home computing. Therefore undergraduate students (younger students) are more technology savvy than graduate students (older students), including graduate students with more work experience. The undergraduates are more computer literate, but may have little

experience in applying their technological knowledge. Hence, we propose the following hypotheses, stated in the alternative form.

H1a: Undergraduate students have greater awareness of CCTs than graduate students.

H1b: A larger proportion of graduate students using CCTs for teamwork when controlling for awareness, compared to undergraduate students.

Many have suggested online learning resources needed for online learning communities (e.g., Manouselis, Vauorikarit &Van Assche, 2010), and many have discussed the impact of technology on teamwork (e.g., Laru & Jarvella, 2008; Thompson & Coovert, 2003). An important tool for information sharing and progress review is the team meeting (Scott, 1999). While research reports no difference in efficiency between co-located and virtual teams when it comes to sharing verbal information, the exchange of non-verbal information (e.g., Warkentin, Sayeed & Hightower, 1997) and coordination (e.g., Eveland & Bikon, 1989) is much more challenging for a virtual team.

The number of online courses is increasing, and more students are forming and working in virtual teams for class projects. These virtual teams interact through videoconferencing and chat rooms (Johnson, Suriya, Yoon, Berrett & La Fleur, 2002). Also, students taking online courses may know more about technology in general when graduating (Hollenbeck, Zinkhan & French, 2005). Because students enrolled in online courses have fewer opportunities for face-to-face collaboration and communication we hypothesize that students enrolled in online courses utilize technology more than students enrolled in offline courses (e.g., traditional or classroom based) for teamwork. Hence, we propose the following hypotheses, stated in the alternative form.

H2a: Online students have greater awareness of CCTs than off-line students.

H2b: A larger proportion of online students using CCTs for teamwork when controlling for awareness, compared to off-line students.

Prior education research has reported gender differences in attitudes towards learning and learning styles (Kaenzig, Hyatt & Anderson, 2007) and these differences are reported in the classroom (Kang, Lundebert, Wolter, DelMas & Herreid, 2012) as well as virtual environment (Lin, Tutwiler & Chang, 2012). Male students have dominated the computing profession, and there are more male students enrolling in computing and technology fields every year (e.g., Beyer, 2008). The gender stereotypes in academic cultures is about who seems to naturally belong in which disciplines and professions and, by extension, who is likely to succeed (Ceci, Williams & Barnett, 2009). Therefore, the gender stereotypes in technology (Stout, Dasgupta, Hunsinger & McManus, 2011) may indicate differences in awareness and usage of CCTs between male and female students. Hence, we propose the following hypotheses, stated in the alternative form.

H3a: Male students have greater awareness of CCTs than female students.

H3b: A larger proportion of male students using CCTs for teamwork when controlling for awareness, compared to female students.

ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy

The impact of age and experience on team and teamwork activities has also been discussed extensively (Jackson, 1996; Wegge, Roth, Neuback, Schmidt & Kanfer, 2008; Williams & O'Reilly, 1998). The younger generations have been raised with technology (Tapscott, 1998), and seem to be more comfortable using different technologies at home and school compared to older generations (Barnes, Marateo & Pixy Ferris, 2007; Bennett & Maton, 2010; North, Snyder & Bulfin, 2008). Thus, because the typical college-aged student has grown up in the high-tech world, managing technology is second nature to them. Such students are inclined to be tech savvy, and quickly grasp the technical aspects of the virtual environment (Nance, 2007). Hence, we propose the following hypotheses, stated in the alternative form.

H4a: Younger students have greater awareness of CCTs than older students.

H4b: A larger proportion of younger students using CCTs for teamwork when controlling for awareness, compared to older students.

METHODOLOGY AND SURVEY INSTRUMENT

The paper-based survey instrument for this study included demographics, and a list of CCTs. The response scale used allowed the participants to indicate lack of familiarity with a technology by checking off "I am not familiar with this technology." Otherwise, they would indicate the amount of usage on a five-point response scale from "this technology was not used "to "this technology was used very much."

A total of 310 students enrolled in a state university in the southeastern region of the country participated in this study. The participants were enrolled in upper-division undergraduate and graduate (MBA) courses that required teamwork for course assignments. Some of these courses were offered as traditional or offline courses and some were offered as non-traditional or online courses. A list of twenty-four CCTs often mentioned in the literature (i.e. Gould, 2006) was presented to the participants of this study. The participants were asked to indicate their awareness of these technologies and their usage of various CCTs in teamwork assignments, working in co-located or virtual teams, in their offline and online courses. The survey was administrated in the classroom for both offline and online courses at the end of semester. The online students were presented with the survey before their in-class final exam.

RESULTS

The demographics of the respondents are: undergraduate students (77.7%), graduate students (22.3%), online (27.8%), offline (73.2%), males (76.1%), females (23.9%). Their ages range from 19 to 78, with a mean and median of 24 years. The age indicated by two respondents appears to be significantly higher than others. However, the results remain the same with or without including their responses to the survey in data analyses. The mean age of respondents (24) is used to differentiate younger (< 24), and older (≥ 24) students.

In this study, we investigate the difference in awareness and usage of CCTs in teamwork between several groups; undergraduate and graduate students, online and offline students, male and female students, and younger (< 24) and older (≥ 24) students. We first test the overall differences in awareness between the various groups of students. The results are reported in

Table 1 Panel A. The results indicate that there is a statistically significant difference at 1% level of significance, between different groups with respect to awareness of CCTs. As hypothesized, undergraduate students have a greater awareness of CCTs than graduate students (H1a), online students have a greater awareness of CCTs than offline students (H2a), male students have a greater awareness of CCTs than female students (H3a), and younger students have a greater awareness of CCTs than older students (H4a).

We next test whether the usage of these technologies for teamwork differs among the various groups when controlling for awareness. The participants used a five-point response scale to indicate their usage from "None" to "Very Much." The results are reported in Table 1 Panel B. The results indicate that there is a non-statistically significant difference at 1% level of significance, between different groups with respect to usage of CCTs. Hence, when controlling for awareness of CCTs, we find no difference in usage of CCTs for group work between graduate and undergraduate students (H1b), online and offline students (H2b), male and female students (H3b), and older and younger students (H4b).

Table 1: Comparison of awareness and usage of CCTs.

Panel A: Average proportion of students aware of various CCTs

	UG	G	On	Off	M	F	Y	O
Aware	0.90	0.82	0.90	0.82	0.91	0.79	0.90	0.81
P-Value	0.001		0.001		0.001		0.001	
Hypotheses	H1a		H2a		H3a		H4a	

Panel B: Average student usage of various CCTs

	UG	G	On	Off	M	F	Y	O
Usage	2.13	2.05	2.08	2.11	2.09	2.17	2.18	1.95
P-Value	0.38		0.44		0.27		0.21	
Hypotheses	H1b		H2b		H3b		H4b	

Aware – Proportion of students aware of CCTs
Usage – The degree to which students are using CCTs measured on a 5-point scale (1=not used, 5=very much)
UG – Undergraduate; G –Graduate
M – Male; F – Female
On – Online; Off – Offline
Y - Younger, i.e., under 24 years old; O - Older, i.e., 24 years or older
All p-values are one-tailed

Table 2 below provides pair-wise comparisons of usage of CCTs in this study for the various groups. Consistent with our hypotheses, the p-values provided are one-tailed. The pairs that are statistically significant at 5% level of significance (α=0.05) are highlighted. The pairwise comparisons show overall undergraduate, online, male, and younger age groups are more aware of CCTs than their counterparts for many of the technologies. However, when controlling for awareness, we find few differences in the usage of the technologies.

ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy

Table 2: Pairwise comparisons of CCTs for awareness and usage.

Technology	H1a			H1b			H2a			H2b		
	Aware			Usage			Aware			Usage		
	U	G	P	U	G	P	On	Off	P	On	Off	P
1. Email/Gmail	0.98	0.99	0.46	4.27	4.46	0.09	0.99	0.98	0.42	4.29	4.38	0.26
2. SharePoint	0.75	0.58	0.001	1.72	1.72	0.50	0.77	0.52	0.001	1.70	1.78	0.33
3. Instant Messaging	0.98	0.98	0.44	2.77	2.57	0.17	0.98	0.95	0.13	2.73	2.68	0.40
4. Podcasts	0.92	0.83	0.03	1.59	1.24	0.01	0.93	0.74	0.001	1.53	1.44	0.26
5. Google Docs	0.94	0.93	0.39	2.50	2.45	0.40	0.95	0.83	0.001	2.54	2.28	0.09
6. Google Blogger	0.87	0.61	0.001	1.60	1.26	0.01	0.86	0.61	0.001	1.58	1.33	0.03
7. Google Talk	0.88	0.75	0.01	1.80	1.83	0.44	0.88	0.71	0.001	1.85	1.64	0.11
8. Google Orkut	0.76	0.27	0.001	1.34	1.23	0.16	0.73	0.42	0.001	1.33	1.29	0.35
9. Twitter	0.95	0.67	0.001	1.59	1.28	0.02	0.97	0.55	0.001	1.56	1.35	0.07
10. Facebook	0.97	0.93	0.08	3.09	2.14	0.001	0.99	0.86	0.001	3.05	2.14	0.001
11. Threaded Discussion	0.95	0.98	0.12	2.67	2.67	0.49	0.97	0.91	0.06	2.67	2.69	0.44
12. Chat Rooms	0.96	0.95	0.35	2.25	2.48	0.14	0.97	0.92	0.06	2.24	2.55	0.06
13. Video Conference	0.97	0.96	0.38	1.84	1.84	0.49	0.98	0.91	0.04	1.85	1.78	0.34
14. Webinar	0.86	0.70	0.001	1.51	1.44	0.33	0.85	0.78	0.10	1.52	1.39	0.17
15. Teleconference	0.92	0.93	0.41	1.85	1.92	0.35	0.93	0.85	0.03	1.85	1.93	0.32
16. Telephone	0.98	0.98	0.48	3.30	3.12	0.20	0.99	0.96	0.12	3.24	3.30	0.40
17. Cell Phone	0.98	0.98	0.47	4.02	4.01	0.48	0.99	0.97	0.13	3.99	4.13	0.19
18. Skype	0.97	0.96	0.42	2.10	1.87	0.13	0.98	0.88	0.01	2.07	1.93	0.24
19. NetMeeting	0.86	0.7	0.001	1.51	1.66	0.18	0.84	0.83	0.37	1.49	1.73	0.05
20. Adobe Connect	0.82	0.5	0.001	1.33	1.36	0.40	0.81	0.59	0.001	1.33	1.35	0.44
21. Second Life	0.83	0.46	0.001	1.30	1.33	0.40	0.81	0.52	0.001	1.30	1.30	0.49
22. YouTube	0.95	0.89	0.05	1.67	1.45	0.09	0.96	0.86	0.01	1.62	1.59	0.40

Aware – Proportion of students aware of CCTs
Usage – The degree to which students are using CCTs measured on a 5-point scale (1=not used, 5=very much)
UG – Undergraduate (n = 241); G – Graduate (n = 69)
On – Online (n = 82); Off – Offline (n = 227)
P - p-values (one-tailed)

Table 2: (continued) - Pairwise comparisons of CCTs for awareness and usage.

Technology	H3a			H3b			H4a			H4b		
	Aware			Usage			Aware			Usage		
	M	F	P	M	F	P	Y	O	P	Y	O	P
1. Email/Gmail	0.99	0.99	0.48	4.27	4.45	0.09	0.99	0.99	0.41	4.27	4.40	0.82
2. SharePoint	0.77	0.55	0.00	1.66	1.93	0.06	0.76	0.47	0.001	1.75	1.65	0.26
3. Instant Messaging	0.99	0.91	0.01	2.77	2.58	0.18	0.98	0.98	0.37	2.78	2.61	0.21
4. Podcasts	0.94	0.73	0.00	1.48	1.61	0.20	0.91	0.88	0.23	1.61	1.30	0.02
5. Google Docs	0.95	0.88	0.06	2.52	2.38	0.26	0.94	0.93	0.42	2.47	2.52	0.58
6. Google Blogger	0.88	0.58	0.00	1.52	1.55	0.42	0.87	0.61	0.001	1.56	1.46	0.25
7. Google Talk	0.89	0.70	0.00	1.77	1.96	0.13	0.88	0.70	0.001	1.84	1.74	0.29
8. Google Orkut	0.74	0.40	0.00	1.32	1.31	0.47	0.74	0.29	0.001	1.37	1.21	0.08
9. Twitter	0.95	0.77	0.00	1.51	1.58	0.31	0.95	0.74	0.001	1.61	1.31	0.02
10. Facebook	0.98	0.92	0.04	2.91	2.77	0.25	0.98	0.94	0.10	3.27	1.98	0.001
11. Threaded Discussion	0.96	0.94	0.21	2.65	2.74	0.33	0.96	0.93	0.16	2.76	2.47	0.07
12. Chat Rooms	0.97	0.95	0.29	2.28	2.39	0.31	0.96	0.96	0.42	2.28	2.36	0.64
13. Video Conference	0.97	0.93	0.10	1.80	1.97	0.17	0.97	0.93	0.10	1.93	1.64	0.06

ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy

14. Webinar	0.86	0.69	0.00	1.44	1.65	0.07	0.85	0.64	0.001	1.58	1.30	0.03
15. Teleconference	0.94	0.84	0.02	1.78	2.16	0.02	0.93	0.87	0.11	1.96	1.67	0.06
16. Telephone	0.99	0.96	0.15	3.25	3.30	0.41	0.98	0.98	0.43	3.41	2.92	0.01
17. Cell Phone	0.99	0.97	0.16	3.98	4.14	0.17	0.99	0.99	0.45	4.13	3.76	0.01
18. Skype	0.98	0.90	0.01	2.04	2.06	0.46	0.97	0.97	0.49	2.13	1.85	0.07
19. NetMeeting	0.87	0.59	0.001	1.53	1.60	0.31	0.84	0.71	0.02	1.57	1.48	0.26
20. Adobe Connect	0.83	0.46	0.001	1.33	1.35	0.42	0.81	0.46	0.001	1.38	1.23	0.09
21. Second Life	0.82	0.53	0.001	1.28	1.39	0.15	0.81	0.41	0.001	1.37	1.16	0.04
22. YouTube	0.97	0.84	0.001	1.64	1.56	0.30	0.96	0.86	0.01	1.78	1.25	0.001

Aware – Proportion of students aware of CCTs
Usage – The degree to which students are using CCTs measured on a 5-point scale (1=not used, 5=very much)
M – Male (n = 236); F – Female (n = 73)
Y – Younger, i.e., under 24 years old (n = 215); O - Older, i.e., 24 years or older (n = 24)
P - p-value (one-tailed)

While only a small percentage (10%) of students is unfamiliar with the various CCTs, usage of the CTTs is relatively low. When controlling for awareness, the average usage of CCTs is only 2.1 on a 5 point scale. It appears that students are not taking advantage of their awareness and do not apply and use these CCTs in teamwork. One reason could be that while students are aware of technology, they do not know how to apply and use it.

CONCLUSION, LIMITATIONS, AND FUTURE WORK

The primary purpose of this study is to determine the awareness of undergraduate and graduate students with the CCTs, and how much they are using these technologies in teamwork in online and offline courses. The student groups under examination were undergraduate, graduate, offline, online, male, female, younger, and older. The findings suggest many students are aware of different CCTs, but they are not applying and using them frequently. This finding is consistent with the prior literature that report that younger students' application of technological knowledge is limited to common recreational activities, such as Internet browsing, chatting, or social networking (Ractham, Kaewkitipong & Firpo, 2012). Thus, this younger generation lacks applied technological knowledge and how to effectively use technology in teamwork activities to improve productivity and effectiveness of the team.

There are several implications of our findings. Students need to be taught and encouraged to use the effective ways of applying technology. In particular, because of the increased emphasis on teamwork, students need to be taught the technologies they need to use for collaboration and communication in various teamwork activities. Hence, instructors should determine the appropriate technologies for different teamwork activities, and encourage and enforce students to use them. Students should be provided with guidelines of what technology is beneficial and how to use a particular technology for a given activity in teamwork and other activities. Online students have to learn and use various technologies in their online courses, and therefore overall they are expected to know more about computer technology upon graduation. However, they also should be taught effective usage of various technologies and how to effectively work in a virtual team. For example, they should be taught predetermined effective CCTs in order to be effective team members working in virtual teams.

This study like others has its limitations. One limitation of this study is the list of CCTs provided to the participants. This list may not look current, but it was when this study was conducted.

However, the way technology is changing and advancing, with no commonly agreed purpose and overlapping scopes, no list may ever be complete and current.

The survey in this study was conducted in business courses requiring team projects for consistency and better comparison. However, the future studies should examine awareness and usage of CCTs across different disciplines, regions, and cultures. It would be interesting to compare results from different disciplines and cultures.

It is also important to investigate why students are not taking advantage of technologies to use and apply to their teamwork. The preventing factors should be determined for not using the known technologies in teamwork activities. It is possible that students are aware of technology, but they do not know how to use and apply it to teamwork. Future studies should also focus on determining effective technologies in collaboration and communication. It should be determined what communication technologies are most beneficial to each of the groups focused in this study and facilitate their teamwork activities. This should encourage instructors to teach and enforce usage of these effective CCTs in all of their courses requiring teamwork.

REFERENCES

Allen, I. E., & Seaman, J. (2011). Going the distance: Online education in the United States 2011. Babson Survey Research Group. Retrieved from http://sloanconsortium.org/publications/survey/going_distance_2011.

Barnes, K., Marateo, R., & Pixy Ferris, S. (2007). Teaching and learning with the net generation. Innovate Journal of Online Education, 3(4), Retrieved from http://www.innovateonline.info/index.php?view=article&id=382.

Bennett, S., & Maton, K. (2010). Beyond the digital natives debate: Towards a more nuanced understanding of students' technology experiences. *Journal of Computer-Assisted Learning*, 26(5), 321-331.

Beyer, S. 2008. Gender Differences and Intra-Gender Differences amongst Management Information Systems Students. *Journal of Information Systems Education*, 19(3), 301-310.

Bordia, P. (1997). Face-to-Face Versus Computer-Mediated Communication: A Synthesis of the Experimental Literature. Journal Of Business Communication, 34(1), 99-120.

Campion, M.A., Medsker, G. J., Higgs, A. C. (1993). Relations between work group characteristics and effectiveness: Implications for designing effective work groups. *Personnel Psychology*, 46, 823-850.

Ceci, S. J., Williams, W. M., & Barnett, S. M. (2009). Women's under-representation in science: Sociocultural and biological considerations. *Psychological Bulletin*, 135(2), 218-261.

Chen, W., & Looi, C. K. (2011). Active classroom participation in a Group Scribbles primary science classroom. *British Journal of Educational Technology*, 42(4), 676-686.

Dennis, A. R., George, J. F., Jessup, L. M., Nunamaker, J. F., & Vogel, D. (1988). Information technology to support electronic meetings. *Management Information Systems Quarterly*, (12)4, 591-624.

Eveland, J. D. & Bikon, T. K. (1989). Work group structures and computer support: A field experiment. *ACM Transaction on Office Information Systems*, 6, 354-379.

Furst, S., Blackburn, R. & Rosen, B. (1999). Virtual teams: A proposed research agenda. *Information Systems Journal, 1* 9, 249-269.

Gladstein, D. L. (1984). Groups in context: A model of task group effectiveness. *Administrative Science Quarterly* 29: 499-517.

Goltz, S. M., Hietapelto, A. B., Reinsch, R.W., & Tyrell, S. K. (2008). Teaching teamwork and problem solving concurrently. *Journal of Management Education*, 35(4), 541-562.

Goodman , P. S., Ravlin , E., & Schminke, M. (1987). Understanding groups in organizations. In L.L. Cummings & B. M. Staw (Eds.), *Research in Organizational Behavior* Greenwich, CT: JAI Press, 121-173.

Gould, D. (2006). Methods and technologies. Fifth generation work - virtual organization. Retrieved from http://www.seanet.com/~daveg/technolo.htm.

Guzzo, R. A. (1986). Group decision making and group effectiveness in organizations. In: Designing Effective Work Groups, Goodman, P. (ed.), pp. 34-71. Jossey-Bass Publishers, San Francisco.

Guzzo, R. A., & Dickson, M. W. (1996). Teams in organizations: Recent research on performance and effectiveness. *Annual Review of Psychology*, 47(1), 307-339.

Hackman, J. R. (1983). *A Normative Model of Work team Effectiveness*. Technical Report No. 2, Research Program on Groups Effectiveness. New Haven, CT: Yale School of Organization and Management.

Hackman, J. R., & Walton, R. E. (1986). Leading groups in organizations. In P. S. Goodman & Associates (Eds.), *Designing Effective Work Groups* , San Francisco, CA: Jossey-Bass, 72-119.

Haas, M. R., & Hansen, M. T. (2007). Different knowledge, different benefits: toward a productivity perspective on knowledge sharing in organizations. Strategic Management Journal, 28(11), 1133-1153.

Hollenbeck, C. R., Zinkhan, G. M., & French, W. (2005). Distance learning trends and benchmarks: Lesson learned from an online MBA program. *Marketing Education Review*, 15(2), 39-52.

Hollingshead, A. B., & McGrath, J. E. (1995). Computer-assisted groups: A critical review of the empirical research, In R. A. Guzzo & E. Salas, (Eds.), *Team Effectiveness and Decision Making in Organizations*, San Francisco, CA: Jossey-Bass, 46-78.

  ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy

Jackson, S. E. (1996). The consequences of diversity in multidisciplinary work teams. In M. West (Ed.), *Handbook of Work Group Psychology*, Chichester, England: Wiley, 53-76.

Janis, I. L. (1982). *Groupthink* (2nd edition). Boston, MA: Houghton Mifflin.

Johnson, S.D., Suriya, C., Yoon, S. W., Berrett, J. V., & La Fleur, J. (2002). Team development and group processes of virtual learning teams. *Computers & Education*, 39, 279-393.

Kaenzig, R., Hyatt, E., & Anderson, S. (2007). Gender differences in college of business educational experiences. *Journal of Education for Business*, 83(2), 95-100.

Kang, H., Lundebert, M., Wolter, B., DelMas, R., & Herreid, C. (2012). Gender differences in student performance in large lecture classrooms using personal response systems ("clickers") with narrative case studies. *Learning, Media & Technology*, 37(1), 53-76.

Laru, J., & Jarvela S. (2008). Social patterns in mobile technology mediated collaboration among members of the professional distance education community. *Educational Media International*, 45(1), 17-32.

Latane, B. (1986). Responsibility and effort in organizations. In P. S. Goodman & Associates (Eds.), *Designing effective work groups*. San Francisco, CA: Jossey-Bass. 277-304.

Lin, M., Tutwiler, M., & Chang, C. (2012). Gender bias in virtual learning environments: An exploratory study. *British Journal of Educational Technology*, 43(2), 59-63.

Manouselis, N., Vuorikarit, R., & Van Assche, F. (2010). Collaborative recommendation of e-learning resources: An Experimental investigation. *Journal of Computer Assisted Learning*, 26(4), 227-242.

McCreary, B. (2009). Web collaboration: How it is impacting business. *American Journal of Business*, 24(2), 7-9.

Mejias, U. (2006). Teaching social software with social software. *Innovate: Journal of Online Education*, 2(5). Retrieved February 12, 2010, from http://innovateonline.infopdf/vol12_issue5/Teaching_Social_Software_with_Social_software.pdf.

Mickan, S., & Rodger S. (2000). Characteristics of effective teams: A literature review. *Australian Health Review*, 23(3), 201-208.

Morehead, A., Steele, M., Alexander, M., Stephen, K., & Duffin, L. (1997). *Changes at Work: The 1995 Australian Workplace Industrial Relations Survey*. Longman, South Melbourne, Australia.

Nance, M. (2007). Online degrees increasingly gaining acceptance among employers. *Diverse Issues in Higher Education*, Retrieved April 02, 2009, from http://diverseeducation.com/artman/publish/article_7181.shtml.

North, S., Snyder, I., & Bulfin, S. (2008). Digital tastes: Social class and young people's technology use. *Information, Communication & Society*, 11(7), 895-911.

Ractham, P., Kaewkitipong, L., & Firpo, D. (2012). The use of Facebook in an introductory MIS course: Social constructivist learning environment. *Decision Sciences Journal of Innovative Education*, 10(2), 165-188.

Salaway, G., & Borreson Caruso, J. (2007). The ECAR study of undergraduate students and information technology, 2007. EDUCAUSE. Retrieved from http://www.educause.edu/content.asp?PAGE_ID=13903&bhcp=1.

Scott, C. R. (1999) Communication technology and group communication, In: L.R. Frey (Ed.) *The Handbook of Group Communication Theory and Research*. Spon, London, 432-472.

Selwyn, N. (2008). An investigation of differences in undergraduates' academic use of the Internet. *Active Learning in Higher Education*, 9(1), 11-22.

Siegel, J., Dubrovsky, V., Kiesler, S., & McGuire, T. W. (1986). Group processes in computer-mediated communication. *Organizational Behavior and Human Decision Processes*, 37, 157-186.

Smith, K. A., Smith, K. G., Olian, J. D. , Sims, H. P., & Scully, J. (1994). Top management team demography and process: the role of social integration and communication. *Administrative Science Quarterly*, 39, 412-438.

Stevens, M. J. & Campion, M.A. (1994). The knowledge, skill, and ability requirements for teamwork: Implications for human resource management. *Journal of Management*, 20, 503-530.

Stewart, G.L. & Barack, M. R. (2000). Team structure and performance: Assessing the mediating role of intrateam process and the moderating role of task type. *Academy of Management Journal* 43(2): 135-148.

Stout, J. G., Dasgupta, N., Hunsinger, M., & McManus, M. A. (2011). STEMing the tide: Using ingroup experts to inoculate women's self-concept in science, technology, engineering, and mathematics (STEM). *Journal of Personality and Social Psychology*, 100, 255-270.

Sundstrom, E., De Meuse, K. P., & Futrell, D. (1990). Work Teams: Applications and Effectiveness. American Psychologist, 45(2), 120-133.

Tapscott, D. (1998). *Growing Up Digital: The Rise of the Net Generation*. New York: McGraw-Hill.

Thompson, L. F., & Coovert, M. D. (2003). Teamwork online: The effects of computer conferencing on perceived confusion, satisfaction, and post-discussion accuracy. *Group Dynamics: Theory, Research, and Practice*, 7(2), 135-151.

Topi, H., Valacich, J. S., Wright, R. T., Kaiser, K. M., Nunamaker, J. F. Jr., Sipior, J. C., & de Vreede, G. J. (2010). IS 2010: Curriculum guidelines for undergraduate degree programs in information systems information systems undergraduate model curriculum. *Communications of the Association for Information Systems*, 26, 359-428.

  ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy

Townsend, A. M., DeMarie, S. M., & Hendrickson, A. R. (1998). Virtual teams: Technology and the workplace of the future. *Academy of Management Executive*, 12(3), 17-29.

Tutty, J. I., & Klein, J. D. (2008). Computer-mediated instruction: A comparison of online and face-to-face collaboration. *Educational Technology, Research & Development*, 56(2), 101–124.

Warkentin, M. E., Sayeed, L., & Hightower, R. (1997). Virtual teams versus face-to-face teams: An exploratory study of a web-based conference system. *Decision Sciences*, 28(4), 975-996.

Watson-Fritz, M. B., Narasimhan, S., & Rhee, H. (1998). Communication and coordination in the virtual office. *Journal of Management Information Systems*, 14(4), 7-28.

Wegge, J., Roth, C., Neuback, B., Schmidt, K. H., & Kanfer, R. (2008). Age and gender diversity as determinants of performance and health in a public organization: The role of task complexity and group size. *Journal of Applied Psychology*, 93(6), 1301-1313.

Williams, K. Y., & O'Reilly, C. A. (1998). Demography and diversity in organizations: A review of 40 years of research. *Research in Organizational Behavior*, 20, 77-140.

Yukl, G., Chavez, C. & Seifert, C. F. (2005). Assessing the construct validity and utility of two new influence tactics. *Journal of Organizational Behavior*, 26 (6): 705-725.

  ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy

This Page Intentionally Left Blank

ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy