The Role of Gender in Computer-Mediated Communication Technology Selection to Disseminate Time-Sensitive Data within Virtual Teams

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Abstract—Organizations are ever-increasing the usage of teams of globally dislocated employees, or virtual teams, to collaborate on projects. Employees often need to share time-sensitive data before it decays and becomes useless. To help reduce costs and improve speed, management often requires employees to use computer-mediated communication (CMC) technologies, such as email, to share such data. From the literature, males and females have been shown to exhibit differing communication styles. The literature has shown women tend to use synchronous communication more than men. This can potentially lead to data not being shared effectively as a sender may not connect with his or her recipient(s) before the data decays. This research explores how gender can influence CMC technology selection to effectively disseminate time-sensitive data within virtual teams by administering surveys to players in an online game called Travian. Travian has over ten-million players globally collaborating in virtual teams. Surveys were administered over a 30-day period through the forums. As expected, the results of this study showed a relationship between gender and CMC technology selection to disseminate time-sensitive data.

*Keywords-*Virtual teams, computer-mediated communication, media richness theory, gender, information quality

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I. INTRODUCTION

Research on virtual teams and how they function has increased in prominence as an area of study in recent years. This fervor has been driven by the ever growing need for companies to think and act globally to reach potential customers while consolidating resources to save money and improve market share [1 - 3]. As a result, a paradigm shift occurred in the business world pushing for greater usage of virtual teams of employees working together via computer-mediated communication [1, 2, 4].

Communication between employees within a virtual team typically employ computer-mediated communication (CMC) technologies which include: email, Voice over Internet Protocol (VoIP) – both with and without video, instant messaging, and others [3, 5, 6]. For decades, communication researchers have explored various CMC technologies in both traditional and virtual teams [2, 7, 8]. Although research has been conducted on gender diversity and CMC usage, this relationship remains unclear and needs further research to explore this important area. In the next section, the background of this study is presented.

II. BACKGROUND

In the communication literature, the idea of richness in the media technologies used to communicate with others has been established for decades and has been titled media richness theory [9]. Media richness theory states that the highest level of richness comes from face-to-face communication with the lowest media richness belonging to written text, such as a written letter [3, 5, 6, 9]. For CMC, the higher richness media often simulates face-to-face communication, such as video conferencing. Studies in this area have shown that when people use media with higher levels of richness in electronic communication, such as video conferencing, to convey information, they have a greater potential for promoting understanding when compared to those people using a less rich media, such as email [3, 5, 6, 9]. The typology of communication media are shown in descending order of media richness in table 1 below.

Communication Media	Richness	Speed
VoIP with Video	High	High
VoIP Audio Only (Voice Chat)	Moderate	High
Instant Messaging/SMS/Text Messaging	Moderate	Moderate
Discussion Board/Forums/Blogs	Moderate	Low
Email	Low	Low

Table 1: Communication Media

Email is perhaps the quintessential medium of all the Internet-based communication. Since its first use in 1971, email has become ubiquitous in our highly connected modern world [5, 6]. People, in general, have embraced email as one of the most popular forms of computer-mediated communication (CMC). Email can be sent out to individuals or groups of people and can have multiple attachments of documents, images, or other files making it the workhorse of many organizations – both traditional and virtual. However, extant literature suggests email communication is low in media richness due to its written nature [5, 6]. Although email is transmitted instantaneously, it often requires the receiver to reply or take some action. This may be delayed since the receiver may not be online or unable to check his/her email. After the receiver has read the message, a reply may not occur for hours or days. This reduced level of interaction between sender and receiver lowers the richness and speed email.

Instant messaging (IM) is defined as any information technology that allows near-synchronous text based communication between two or more people through CMC [5, 6]. This broad definition encompasses multiple IM technologies, such as internet-relay chat (IRC) and text messaging via mobile phones. IM technologies allow people to communicate, via written communication, at a higher level of richness than email due to the greater amount of interactivity between sender and receiver [5, 6]. Although IM is a popular medium for communication, it is limited by the size of the messages transmitted. One of the benefits of IM is the speed of communication and interaction between users. However, it is possible the receiver may not reply to a message immediately or at all. Therefore, the speed of IM communication is moderate.

An online discussion board (DB) can be defined as a forum, both public and private, where topics with individual postings from an online community of participants may share ideas, make comments, or otherwise communicate with others [5, 6]. Discussion boards are often archived and users may continue to make new postings for days, months, and sometimes years after the original posting was created [5, 6]. Therefore, the media richness and speed of discussion boards are low. Blogs have a similar structure, but typically one author creates a new thread and his or her readers may choose to post comments. Blogs can have multiple authors, however, and can be used within a business environment to communicate relevant information to employees.

Voice over Internet Protocol (VoIP) Communication is defined as a conference in real-time between two or more participants in different locations using video with audio or audio-only through a communication transmission technology [5, 6]. VoIP has become ubiquitous in business since it allows for richness level just below that of face-to-face communication and is far more economically advantageous than travel costs to meet in-person. Managers often use scheduled VoIP meetings with employees to plan strategy, discuss any problems or complaints, and promote camaraderie [5, 6]. With synchronous communication, the speed of both VoIP with video and VoIP with audio only is high. In the next section the project goals are discussed.

III. PROJECT GOALS

In the related literature, effective sharing of time-sensitive data within an organization has been shown to be essential in multiple studies [6, 10, 11]. The sharing of time-sensitive data is often seen as critical in business since data can decay and become useless for decision making. Therefore, the media richness and speed of the communication media technologies used to share such data is an important consideration for

reducing data decay. Moreover, gender studies have shown distinct differences in how men and women utilize communication technologies to share information with others [12 - 14]. With the ever-growing usage of virtual teams within the business world, those differences must also be a consideration when businesses need to effectively share time-sensitive data. Therefore, this research explores the relationship, if any exists, between gender and the online communication media technologies used to successfully share data within virtual teams. This relationship is stated formally below as a null and alternate hypothesis:

> H10: There is no relationship between gender and the richness of online communication media technology selection for the sharing of time-sensitive data between members of a virtual team.

> H1A: There is a relationship between gender and the richness of online communication media technology selection for the sharing of time-sensitive data between members of a virtual team.

IV. METHODOLOGY

To pursue this research, a link to a survey was placed within the online game Travian's forums where players were invited to answer questions about their gender and communication experiences within the game. Travian is an online strategy game where over 10 million players worldwide compete within groups of virtual teams to win the game. Typically, the groups consist of hundreds of players. All of which must work together to win the game since it is not possible otherwise. Winning in Travian is an enormous undertaking requiring considerable effort among all team members over a lengthy period of time. Effective sharing of time-sensitive data is essential to successful completion of this game. Therefore, on the survey, players were asked about their experiences in effectively sharing time-sensitive data within their virtual team and the media technologies he or she used to accomplish this task. The link to the survey remained on the Travian forums for a 30 day period. Participants were asked about their gender and their usage habits for sharing time-sensitive data using each type of online communication media outlined above (i.e. – "I used email to effectively share time-sensitive data with my teammates."). The communication usage survey questions utilized a five-point Likert Scale style answer format to record the usage rates of each communication media technology on a scale from (1) "Strongly Disagree" to (5) "Strongly Agree."

V. RESULTS

The survey was placed on the Travian forums where an average of 1,100 players visited the forums each week while

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the survey link was active. The link to the survey remained active for 30 days and garnered 704 views during that time. When the survey period ended, there were 524 attempted surveys with 162 usable. The majority of rejected surveys were from drop outs due to age restrictions (below 18) or not being part of a virtual team (a solo player). The survey had 100 male participants (61.73%) and 62 female (38.27%). As expected, the younger generation was predominant in participating in the survey since it was an online game. The median age of the participants was 24.6. The data was compiled into an Excel Spreadsheet, cleaned, and then imported into R for statistical analysis. In addition to descriptive statistics, Fisher's Exact Test was used to test for significance due to the small sample size of the survey results. In table 2 below, the results are shown.

Survey Questions	Men		Women		Fisher's Exact Test
	Mean	STD Dev	Mean	STD Dev	P-Value
I like to use VoIP – Video Chat to share time-sensitive data with my teammates	1.53	1.03	1.61	1.13	0.6703
I like to use VoIP – Audio Chat to share time-sensitive data with my teammates	2.87	1.18	3.24	1.45	0.000004
I like to use Instant Messaging to share time-sensitive data with my teammates	4.45	0.77	4.24	0.91	0.4198
I like to use Blogs to share time-sensitive data with my teammates	1.87	1.30	1.79	1.09	0.4761
I like to use Email to share time-sensitive data with my teammates	3.47	1.45	2.83	1.56	0.0088

Table 2: Survey Questions and Statistical Results

VI. CONCLUSIONS

As expected from the literature, there are differences between men and women in how they choose to communicate with others [14 - 16]. The above results show that for most CMC technologies, men and women are similar in their communication habits for sharing time-sensitive data. Of the CMC categories surveyed, only email and audio chat were shown to be statistically significant. The stark difference between these two CMC technologies in terms of media

richness could not be more pronounced. Audio chat, which is essentially a phone call, is far higher on the media richness scale than email. Examining the CMC technology usage between men and women, the means tend to be higher for women in the higher richness technologies, while they tend to be higher for men in the lower richness technologies. As was stated previously, this supports previous research in gender studies regarding communication habits. It is noteworthy that this phenomenon is now shown to occur when sharing time-sensitive data whereas in previous research, it was more general in nature.

The null hypothesis stated there would be no relationship between gender and the richness of online communication media usage for the sharing of time-sensitive data. With p-values of less than 0.05 ($p < 0.05$) for audio chat and email, the null is rejected and the alternate hypothesis is accepted. This result indicates there is a relationship between gender and the selection of communication media to share time-sensitive data within virtual teams.

In conclusion, this research does show the need for further training of employees to use CMC technologies to consistently and effectively share time-sensitive data within his or her virtual team to prevent data decay and promote successful outcomes for the organization in which he or she is employed. With the ever-increasing usage of virtual teams in business, further research into this area is vital to ensure its continued growth and success. The results from this research may serve as a component for building a best-practices model to improve communication and data sharing within virtual teams.

VII. REFERENCES

[1] Gajendran, R., & Joshi, A. 2012. "Innovation in Globally Distributed Teams: The Role of LMX, Communication Frequency, and Member Influence on Team Decisions". Journal of Applied Psychology, 97(6), pp 1252-1261.

[2] Williams, D., Contractor, N., Poole, M., Srivastava, J., &Cai, D. 2011. "The Virtual Worlds Exploratorium: Using Large-Scale Data and Computational Techniques for Communication Research". Communication Methods & Measures, 5(2), pp 163-180.

[3] Malone, T. 2004. "The Future of Work: How the New Order of Business Will Shape Your Organization, Your Management Style, and Your Life". Boston, MA: Harvard Business School Press.

[4] Peters, L., &Manz, C. 2007. "Identifying Antecedents of Virtual Team Collaboration".Team Performance Management. 13(3/4), pp 117-129.

[5] Chhay, R., &Kleiner, B. (2013). "Effective Communication in Virtual Teams". Industrial Management, 55(4), pp 28-30.

[6] Hudson, V. F. (2017). Lessons from space for the global virtual workplace. Industrial Management, 59(3), 14-18.

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[7] Maltz, E. 2000. "Is All Communication Created Equal?: An Investigation into the Effects of Communication Mode on Perceived Information Quality". Journal of Product Innovation Management, 17(2), pp 110-127.

[8] Byrne, Z., &LeMay, E. 2006. "Different Media for Organizational Communication: Perceptions of Quality and Satisfaction". Journal of Business and Psychology, 21(2), pp 149-173.

[9] Cameron, A. F., & Webster, J. (2005). Unintended consequences of emerging communication technologies: Instant Messaging in the workplace. Computers In Human Behavior, 21(1), 85-103. doi:10.1016/j.chb.2003.12.001

[10] Daft, R., &Lengel, R. 1984. "Information Richness: A New Approach to Managerial Behavior and Organizational Design". Research in Organizational Behavior, 6, pp 191-233.

[11] Fisher, C. W., &Kingma, B. R. 2001. "Criticality of Data Quality as Exemplified in Two Disasters". Information & Management, 39(2), pp 109-116.

[12] Nyström, C., &Asproth, V. 2013. "Virtual Teams - Support for Technical Communication?". Journal of Organizational Transformation & Social Change, 10(1), pp 64-80.

[13] Fischer, O., &Manstead, A. R. 2004. "Computer-mediated Leadership: Deficits, Hypercharisma, and the Hidden Power of Social Identity". ZeitschriftFürPersonalforschung, 18(3), pp 306-328.

[14] Dobbins, A. M. 1998. "Technology-changing Communication Options: A Study of the Relationship Between Media Perceptions, Personality, Experience and Other Related Variables (Order No. 9911489)". Available from ProQuest Dissertations & Theses Full Text. (304455064). Retrieved from http://74.217.196.173/docview/304455064?accountid=14482

[15] Fulk, J. 1993. "Social Construction of Communication Technology". Academy Of Management Journal, 36(5), pp 921-950.

[16] Olson, J., & Olson, L. 2013. "Virtual Team Effectiveness and Sequence of Conditions". International Journal of Management & Information Systems, 17(1), pp 1-12.

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