A Design Framework for Enhancing Virtual Team Learning

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Abstract. This paper builds on existing theoretical and empirical studies in the area of virtual team learning in the workplace. Based on prescriptive theory building for instructional system design, a design framework is proposed to include social presence, swift trust, and conflict attribution components to enhance virtual team learning. This design framework intends to augment existing instructional system design models that are lacking emphasis on social and affective processing during virtual team learning in the workplace. Proposed implications for the use of this framework, suggestions for further research, and limitations of the design framework are discussed.

Keywords: Virtual teams, social presence, trust, conflict

Introduction

Workplace learning enables employees to gain appropriate knowledge and skills to improve their job performance. Team learning is a critical component of workplace learning. Teams often are the units of the operation to solve problems and to acquire and share knowledge in order to optimize their performance on tasks (Bennett & Bierema, 2010). For team learning to occur, however, the organizational environment needs to provide adequate learning opportunities for all team members (Clarke, 2005). To create such supportive workplace learning environments, organizations have adopted instructional system design (ISD) to help members of the team gain the appropriate knowledge and skills (Tennyson, 2010). As technology advances and globalization expands (Orlikowski, 2008; Watson-Manheim, Chudoba, & Crowston, 2012), organizations are facing new challenges to ensure that workplace learning environments can efficiently afford the intended learning processes for their employees who are increasingly becoming members of virtual teams. As Lepsinger and DeRosa (2010) indicate, as many as 50% of employees belong to some sort of virtual team within their organizations.

Various definitions of virtual teams exist within the literature and may encompass the following three components: 1) geographic distribution (e.g. different place, space, and/or time), 2) communication technological techniques (e.g. virtual spaces), and 3) completion of the tasks (Mesmer-Magnus, DeChurch, Jimenez- Rodriguez, Wildman, & Shuffler, 2011; Pazos, 2012). For the purposes of this paper, a virtual team is defined as collaboration amongst telecommuting employees that use various forms of technology to communicate and share knowledge in order to complete a task in a timely manner. Virtual teams are popular among organizations because they create collaborative environments regardless of physical barriers, allow for employee flexibility, and are inexpensive to organize as managers do not have to spend funds on travel and per diems (Guo, D'Ambra, Turner, & Zhang, 2009). Additionally, virtual team members who work collaboratively, out of necessity, are more likely to gain valuable knowledge to develop their expertise hence optimizing their performance (Ebrahim, Ahmed, & Taha, 2011; Liu, Magjuka, & Lee, 2008). Virtual teams as economical operational units in the workplace, however, are not without disadvantages. Two themes that repeatedly appeared in the literature are fragile trust and unresolved conflicts among virtual team members due to their inability to sense and create social presence within the virtual envi-

ronment, which impacts the intended learning and performance outcome (Bennett & Bierema, 2010; Liu et al., 2008; Mesmer-Magnus et al., 2011). A viable solution, to overcome these limitations, is to facilitate team learning through the effective use of communication strategies within a virtual environment (Levi, 2014; Mayer, 2010; Mesmer-Magnus et al., 2011).

Communication strategies that have been noted to improve discussion amongst team members, for example, are social networking and virtual spaces (Ebrahim et al., 2011; Mesmer-Magnus et al., 2011; Schachaf, 2008; Warkentin, Johnston, & Shropshire, 2011). Schachaf (2008) discovered global teams that met in a team virtual space noted improvements in team collaboration due to the ability to socialize and share knowledge. Warkentin et al. (2011) reported that learning was enhanced if employees socially interacted with one another through social networking sites. Clearly frequent communication among virtual team members could encourage knowledge sharing that leads to learning and performance improvement in the workplace.

To entice communication among virtual team members, it is necessary to implement systemic and systematic approaches to align organizational interventions with intended communication outcomes. To do so, the ISD thinking should guide the identification of design solutions due to ISD's capabilities to increase and maintain learners' interactions with other learners and interactivity with the organizational learning systems (e.g., Hannafin, 1989; Sims, 1997).

Purpose of the Paper

ISD has been a necessary component when creating workplace learning environments to allow virtual team members to learn from anywhere and at any time (Rothwell & Kazanas, 2011). Prior research, however, has not clearly identified an ISD framework that can reduce virtual team's limitations such as fragile trust and unresolved conflicts among team members to enhance workplace learning. The purpose of this literature review, therefore, is to devise a design framework that focuses on virtual team members' opportunities to develop social presence, build trust, and resolve conflicts in virtual workplace learning environments.

The proposed design framework follows the process of building prescriptive theories commonly seen in developing instructional design theories and aims to articulate critical components of design in order to achieve the ideal state of activities in a focused area (Reigeluth & Carr-Chellman, 2009). In particular, the design framework centers on instructional resources that can afford virtual teams' learning processes in the workplace. The following literature review sections will (1) synthesize literature on social presence, trust building, and conflict resolution, and (2) propose a design framework based on this synthesis that aids in facilitating virtual team learning and performance in the workplace. This proposed framework intends to augment ISD models in creating conducive virtual workplace learning environments that can support effective communications among virtual team members.

Literature Review

Social Presence Theory for Enhancing Social Presence

In virtual team environments, sensing the presence of one another may be difficult compared to face-to-face environments. In a face-to-face environment team members may see each other on a regular basis, thus ability to read each other's verbal and non-verbal cues may become straightforward. However, depending on the system virtual teams are using to communicate, team members observing one another's verbal and non-verbal cues may be limited (Cheshin, Rafaeli, & Bos, 2011; Gunawardena & Zittle, 1997). This hinders team members' abilities to socially sense the presence of one another, which may lead to a situation in which learning and performance on the task is dampened (Montoya, Massey, & Lockwood, 2011; So, 2009). One theory, Social Presence Theory developed by Short, Williams, and Christie, explains individuals' awareness to one another and the social interaction that takes place through telecommunications (Short, Williams, & Christie, 1976). They suggested social awareness can be achieved through two primary means: intimacy and immediacy. Intimacy depends on verbal and non-verbal cues such as eye contact and facial expressions (e.g., smiling). Immediacy is the physical distance between individuals and can be achieved through both verbal and non-verbal communications such as physical proximity and facial expressions. Social presence theory has been used to improve the design of virtual environments (e.g., virtual world) and as a result communication and learning amongst virtual team members has improved (Cheshin et al., 2011; Montoya et al., 2011; So, 2009). Focusing on enhanced communication within the collaborative environment, So (2009) discovered virtual teams that communicated on a frequent basis increased their sense of social presence and knowledge to improve their job performance. Montoya et al. (2011) discovered a collaborative virtual world environment increased the sense of social presence among virtual team members, which lead to improved communication and knowledge sharing. In summary, communicating frequently with team members in the virtual environment can enhance members' ability to sense one another's social presence, which has a cascade effect-learning occurs and performance improves. Moreover, if virtual team members have a sense of social presence, trust building may occur rapidly.

Swift Trust Theory for Trust Building

The benefits of virtual team members building trust quickly are immense as they would be able to share knowledge frequently and complete tasks (Sarker, Ahuja, & Kirkeby, 2011; Webster & Wong, 2008). Trust, however, is difficult to build in virtual teams for two reasons. First, communication among virtual team members is inconsistent. In face-to-face environments, it is easier to build trust than in the virtual environment because team members see each other physically, which may encourage them to communicate frequently (Kahi, 2008). By communicating frequently, team members are able to learn about one another both personally and professionally, leading to a trusting relationship that optimizes a team's performance (Crisp & Jarvenpaa, 2013; Kahi, 2008). Second, communication among virtual team members is deficient in personal and social connections. In comparison with teams in face-to-face environments, virtual team members' communication focuses more on work-related tasks than non-work matters. Without knowing virtual team members outside of the workplace, trust building would require more effort (Levi, 2014; Sarker et al., 2011; Webster & Wong, 2008).

The Swift Trust Theory developed by Meyerson, Weick, and Kramer (1996) is based on the notion that temporary groups are able to trust one another from pre-existing stereotypes as building trust via traditional means are limited. Mai and Raybaut (2010) expanded this theory to a virtual group. They created modeling systems to understand the relationship between trust, performance, and organizational feature (i.e. knowledge sharing). Their models indicated virtual community performance could be explained by the level of reliability or mistrust in the rate of individual participation, not necessarily by the pre-existing stereotypes held to form a swift trusting relationship. In other words, in the virtual environment swift trust occurs and is maintained through the life of the project by actions taken by individuals within the team (Xu, Feng, Wu, & Zhao, 2007). These actions are primarily achieved through informal knowledge sharing, completing tasks in a timely manner, communicating frequently, and respecting one another (Crisp & Jarvenpaa, 2013; Dube & Robey, 2008; Rusman et al., 2009; Sarker et al., 2011). Rusman et al. (2009) concluded that if virtual team members felt a sense of social presence and learned about different aspects of the project by communicating with each other frequently, trust could be built and lead to high quality performance. Sarker et al. (2011) concluded, at least for global student teams, trust mediates the relationship between communication and an individual's performance. This essentially means if an individual has a high level of trust they will effectively be able to communicate, which will result in good performance. However, if an individual has a low level of trust they will not effectively communicate, which results in poor performance. Essentially, building a trusting relationship among virtual team members may also allow them to work collaboratively to resolve conflicts.

Conflict Attribution Theory for Conflict Resolutions

Conflicts arise in organizations due to misalignment among individual opinions and actions. Conflicts, however, are not all bad for the workplace (Liu et al., 2008). A typical conflict in a team would include two or more people, team members feeling a sense of struggle, latent participation among team members (i.e., some team members are not actively involved for many reasons), and various team members are powering over or attempting to influence decisions (Montoya-Weiss, Massey, & Song, 2001). Conflict tends to occur more often in virtual teams due to employees may feel a lack of social presence and a lack of trust (Kankanhalli, Tan, & Wei, 2006-7; Pazos, 2012). One solution to resolve conflict is via Conflict Attribution Theory (Kankanhalli et al., 2006-7). This theory proposes that teams can reduce conflicts through three ways: (1) Integrative (2) Distributive or (3) Avoidance. The integrative approach is when team members work collaboratively to resolve the conflict. The distributive approach is when a team member is charged to resolve the conflict of the entire team. The avoidance approach is when team members ignore the conflict at hand and move on. To resolve conflict in virtual teams, the integrative and distributive approaches appear to improve team performance as team members may discuss issues. In the avoidance approach, team members do not leave conflicts unresolved (Montoya-Weiss et al., 2001). Ehsan, Mirza, and Ahmad (2008) indicated that if virtual teams increase their communication via computer-mediated communication (i.e. e-mail and/or instant messaging), conflicts can be lessened and resolved. In investigating virtual teams and performance outcomes based upon conflict management, Pazos (2012) indicated that teams who actively work on preventing and solving conflicts as they arise improve their commitment towards the teams' goals and ultimately performance on the task. In absence of shared trust and communication, however, conflict resolutions among virtual team members would be rather difficult if not impossible.

The Proposed Design Framework

The literature review serves as the foundation of an emerging design framework, the Social Presence, Trust Building, and Conflict Resolution (STC) framework. The framework synthesizes three theories to enhance the virtual team learning environment in the workplace: (1) social presence based on Social Presence

Theory, (2) trust building grounded in Swift Trust Theory, and (3) conflict resolution derived from Conflict Attribution Theory. See Figure 1 for the conceptual relationship among the three components.

The framework pictured in Figure 1 provides a solution to reduce issues commonly observed in virtual teams in the context of workplace learning. Specifically this framework intends to increase trust level (swift trust theory) and to effectively resolute conflicts (conflict attribution theory) via increasing social presence among virtual team members. Based on past literature, the framework recognizes how improvement in communication within virtual team members could achieve the aforementioned objectives.

The STC framework follows the linear order of social presence, trust building, and conflict resolution. Social presence is a necessary component for virtual team members to trust each other and to collaboratively resolve conflicts as team members are able to feel that their peers are on the "same page" (Cheshin et al., 2011; Liu et al., 2008; Montoya et al., 2011; So, 2009). Additionally, social presence is the critical factor in improving communication effectively and efficiently and improves knowledge sharing among virtual team members. Trust building is the next in the sequence because if trust is built within the virtual team, then conflicts can be resolved quickly (Dube & Robey, 2008; Kankanhalli et al., 2006-7; Liu et al., 2008; Montoya-Weiss et al., 2001; Rusman et al., 2009; Sarker et al., 2011). Finally, conflict resolution is listed as the "outcome" component as it is built upon the foundation of frequent social presence and a trusting relationship among virtual team members (Dube & Robey, 2008; Ehsan et al., 2008; Pazos, 2012).

One ongoing process that needs to be present in order for the above framework to help virtual team members enhance workplace learning is frequent communication. Frequent communication is defined differently depending on the organization and the virtual teams' task. A common acceptance is communicating on a daily basis at a specific time during the traditional eight hour work day via various methods (e.g. phone calls, instant messaging, google chats) (Mayer, 2010; Lepsigner & DeRosa, 2010; Levi, 2014). Frequent communication is defined here as communicating on a daily basis for a minimum of thirty minutes through the life of the project. To improve communication within virtual teams, the workplace learning environments should provide technological infrastructure such as virtual spaces (Ebrahim, Ahmed, & Tahan, 2009; Mesmer-Magnus et al., 2011; Schachaf, 2008), and social networking such as macro- and micro-blogging to improve communication and information sharing amongst virtual team members (Razmerita, Kirchner, & Nabeth, 2014; Reynard, 2013; Turban, Liang, & Wu, 2011; Warkentin et al., 2011). Macro-blogs allow team members to process the information and to collect their thoughts individually prior to communicating to the entire team (Reynard, 2013). This may be effective in the early stages of the learning cycle when individuals reflect upon the task at hand and then share their knowledge and expertise with other team members to complete the task successfully. Micro-blogging (e.g., Twitter or instant messaging), on the other hand, allows all team members to communicate on an on-going basis throughout the life of the project (Reynard, 2013). This form of blogging may efficiently strengthen communication and knowledge sharing amongst the virtual team members. Furthermore, the structured system of social networking creates opportunities for virtual team members to sense the presence of one another, which tends to be a prerequisite for trust and resolving conflicts (Bente, Ruggen-

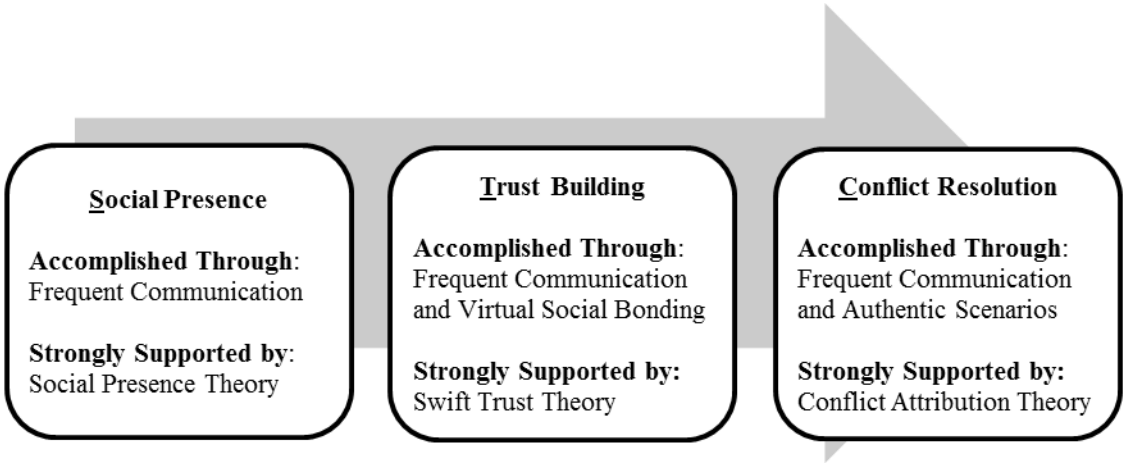

Figure 1. The STC Framework

berg, Kramer, & Eschenburg, 2008; Reynard, 2013; Turban et al., 2011).

Other technological applications can be used to enhance the frequency of communication within virtual teams such as collaborative virtual worlds and game-based learning systems. Collaborative virtual environments, such as virtual worlds, are used to increase collaboration, communication, and knowledge sharing amongst virtual team members (Huang, 2013; Montoya et al., 2011; Raybourn, 2007). Virtual worlds are built to mimic real-life interactions and relationships among participants in various situations, which are useful for small (three members) or large (ten members) teams. Virtual worlds are essentially created to provoke group collaboration such that if all team members work together to solve problems and provide solutions, the entire team will move forward to reach the end goal (Montoya et al., 2011; Mueller, Hutter, Fueller, & Matzler, 2011; Thomas & Brown, 2009). Mueller et al. (2011) conducted a qualitative study with employees apart of virtual teams to investigate the current and potential uses of virtual worlds. Results indicated two reasons employees use virtual worlds are 1) the ease of building relationships and 2) the ability to trust team members due to the presence of avatars and ability to communicate frequently. Thus, virtual worlds may be able to assist virtual team members in completing their tasks within a timely manner.

Game-based learning is another collaborative virtual environment that has been used within organizations to engage and motivate employees in an attempt to expand their knowledge and improve communication (Huang, 2013; Raybourn, 2007). Game-based systems can be used in small or large organizations and can help virtual team members understand complex dynamics (i.e., medical triage teams learning how to be more efficient and effective within the field) (Knight et al., 2010). One such game-based learning environment is the adaptive training system, which can be used for single-user or multi-users (e.g. teams). For single-users, the adaptive training system orientates individuals to the system. During this orientation individuals learn how to navigate and communicate with others. Multi-user adaptive training systems allow virtual team members to learn about each other's strengths and weaknesses and they are able to share problem-solving solutions and strategies (Raybourn, 2007, p. 207). This may lead to higher performance on the real workplace task at hand. Kutlu, Bozanta, and Nowlan (2013) conducted a study to determine the effects of team building in a virtual serious game. Results showed individuals were able to work together as a team as there was communication, a sense of presence, and they trusted one another. Organizations, however, need to consider many factors when employing virtual worlds and game-based learning for their virtual teams such as time to deployment, cost, data security, ability to support employees, and if these technologies would align with organizational goals (Montoya et al., 2011; Mueller et al., 2011).

The proposed STC framework should be considered as an auxiliary system to augment existing ISD models that lack considerations on virtual team members' social and affective needs in workplace learning. In other words, the STC framework prescribes a specific set of design components to create instructional resources (Reigeluth & Carr-Chellman, 2009, p. 8) for virtual team members to enhance social presence, build trust, and resolve conflicts. The following section discusses the implication of the STC framework on the design of workplace learning for virtual teams.

Implications for Virtual Team Learning in the Workplace

Virtual teams are used frequently in organizations due to globalization and an increase of telecommuting employees (Orlikowski, 2008; Watson-Manheim et al., 2012). Therefore, learning challenges derived from social and physical limitations of virtual teams are emerging. Existing ISD models, while considering the attainment of learning outcomes, do not provide sufficient guidance to address virtual team learning issues such as fragile trust and revolving conflicts in distance; therefore, the proposed STC framework articulates design thinking beyond conventional ISD approaches. The implication of the proposed framework is twofold regarding virtual teams' effectiveness in workplace learning. First, at the macro workplace learning system level, in addition to focus on the alignment among learning objectives, learning activities, and learning assessment, it is equally important to consider virtual team members' needs on social presence, trust building, and conflict resolution efficiency. Second, at the micro learning system level, the STC framework asserts the need to systemically integrate frequent communication, member bonding opportunities, and complex conflict resolution scenarios into all learning activities and assessment activities, to enhance the effect of virtual team learning. Such integration should be consistent throughout the entire workplace learning process to help virtual team members internalize desired communication patterns, trust building behaviors, and conflict resolution attribution into their daily learning tasks in the workplace.

Considering the STC framework's role as instructional resources and the aforementioned implications, the framework should be primarily positioned in the learning environment analysis and instructional strategy development stages commonly seen in ISD processes (e.g., Dick, Carey & Carey, 2011; Morrison, Ross, & Kemp, 2004; Smith & Ragan, 2004). In terms

of learning environment analysis, the STC framework can guide the selection and integration of communication infrastructure to design a conducive environment to afford favorable communication and trust building activities among virtual team members. With regard to instructional strategy development, the conflict resolution of the STC framework in particular can support the rationale of including complex and authentic problem-solving opportunities for virtual team members to develop needed skills and understanding to interact with each other.

Limitations and Conclusion

Considering the five stages for theory-building in applied disciplines: conceptual development, operationalization, application, confirmation or disconfirmation, and continuous refinement and development of the theory (Lynham, 2002, p.229), the STC framework is only the first step (i.e., conceptual development) of a lengthy process. Among many limitations derived from the framework's current developmental stage, we recognize two that are the most relevant to the next stage of design theory development. First, the STC framework, at its current stage, cannot provide tangible instructional strategies to specifically target certain STC components. Such outcome must be achieved by empirical studies derived from the framework. Second, considering the techno-centric context that enables virtual teams in the workplace, the STC framework might be inadequate for designing learning systems for face-to-face learning interactions. The conceptual synthesis embedded in the framework, nevertheless, could provide preliminary ideas to advance ISD theories and practices in today's workplace learning that is saturated with technology-enabled teams.

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