A LITERATURE PERSPECTIVE OF KEY FACTORS INFLUENCING CREATIVITY AND A CONCEPTUAL MODEL FOR VIRTUAL LEARNING TEAM WORK

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Abstract

Creativity is one of the values and sustainable skills that is often included as a learning objective in the context of online higher education. This competency enables learners to survive in the complex world we live in and to adapt to new settings and circumstances. Educational institutions, therefore, play a pivotal role in the development of essential cognition of learners, including the development of creative skills sets. However, identifying the best method of promoting and developing creativity among learners is a challenge for practitioner-educators. This paper provides a framework for educators to use in overcoming the challenge of creating effective teams that promote creative thinking in virtual environments. The key factors influencing virtual team creativity were explored by searching for research articles from five electronic databases: Scopus, ScienceDirect, ProQuest Dissertations & Theses Global, SpringerLink, and ResearchGate published from 2000-2017. Twenty-one research articles that relate to the key factors influencing virtual team creativity and to the objective of this study were analyzed and synthesized. The researchers propose six perspectives that provide a framework that can guide educators to foster creativity among learners in virtual team environments: Inter-Peer Trust and Attitude, Team Background and Size, Participation and Communication, Objectives, Leadership and Roles, and Experiential Factor. The study employed

nine experts' reliability examination methods, including three creativity experts, three virtual world experts, and three instructional experts, using a semi-structured interview.

Keywords: Literature perspective; creativity conceptual model; virtual learning team work

Introduction

Nowadays, society and environment around us continue to rapidly change due to information and communication technology development; so much that perhaps not everyone can keep up with the pace of rapid evolution, leading to people being confronted with ever more complex situations. Thus, one of the competencies which enables people to survive in this world is thinking, especially creative thinking, and educational institutions play a key role in developing the cognitive processes of learners. According to Ferguson (2011), creativity is an important skill that should be enabled and developed in educational institutions. Likewise, Zhou (2018) discussed the value of creativity as a sustainable skill for higher education. In addition, Romero and Barberà (2014) asserted that creativity has been set as one of the many strategic learning objectives in higher education in both face-to-face and online contexts. These great changes demonstrate that creative thinking is considered to be an essential element in the strategy for future citizens' success in the increasingly complex world.

In recent times, great attention has been paid to team creativity than to individual creativity since teams are primarily responsible for management activities (Choi et al., 2013). Furthermore, globalization and the availability of information and communication technology these days help facilitate collaboration between team members through the use of technology-mediated communication tools. Furthermore, this collaboration helps teams to solve complicated situations by allowing them to exchange different and various points of view during team working. It is clear that team creativity is very important when team members work together to create new ideas (Jeoung et al., 2017). Moreover, team creativity also allows divergent thinking within teams, which reflects ideational fluency. That is to say, creative idea generation within teams is related to social context (Yeh, 2012). The team is a group of people working together to accomplish common goals, and one vital characteristic of the team is interdependence through interaction.

With the rapid growth of computer technology and the Internet, online virtual activities are increasingly popular nowadays. People no longer only communicate with each other through text-based communication tools; they are

able to participate in online teamwork activities through the use of highly immersive online collaborative and communicative tools (Qiu et al., 2009), which allow a more immersive creative experience. One type of interactive and immersive online tools is known as virtual worlds. Berger et al. (2016) defined virtual worlds as computer-generated virtual environments that rely on three-dimensional graphics, and which can be accessed through virtual bodies called "Avatars". In these virtual worlds, physical spaces are recreated virtually as landscapes, buildings, and other objects; hence, the three-dimensional space is visually displayed on the computer screen. This new creation not only offers spatial structures taken from real life and converted to online spaces, but also offers communicative activities and some of the affordances that come with virtual experiences. Consequently, the combination of globalization and technological change is a challenge for higher education institutes. The Internet, websites, and applications are phenomena that have transformed workplaces into modern electronic workspaces. Also, new economic pressures are driving most organizations to be more dynamic, to improve competitiveness and to survive by using innovative approaches. In many cases, new virtual structures are replacing traditional physical management methods. It is necessary to develop boundless network organizations by replacing face-to-face and same time and space coordination methods with virtual teams for team collaboration (Coronas et al., 2015).

Creative learning is related to instructional processes aimed at developing individuals' creative abilities. Collaborative creative learning generates results from interaction and collaboration among learners, while team creativity may be improved by providing instructional environments in the appropriate contexts (Moise et al., 2014). In particular, information and communication technology can enhance collaborative creativity, so collaborative creativity has become one of the most important elements of integrating learners into the knowledge society in order to support their strong socio-emotional development and internal motivation (Anastasiades, 2017). It may be said that it is important to equip learners in the 21st-century with modern technology skills, collaboration, and creativity in an appropriate climate and educational context. Using collaborative virtual environments, team members

are physically separated and lacking mutual social context, and only interact through information and communication technology. For this reason, fostering good collaborative working environments, reducing anxiety and stress, and building successful relationships are necessary for fruitful collaboration in virtual teams (Chae, 2016). These are also useful for tackling obstacles such as production blocking, evaluation apprehension or fear of criticism, free riding, and social loafing that are likely to occur during the creative processes of virtual teams. When complex situations require creative solutions, a proper team approach is beneficial because team members' points of view and ideas are needed (Siemon and Robra-Bissantz, 2016; Han et al., 2017) in order to produce novel, useful and appropriate ideas or relevant solutions. However, while team interaction can lead to more and better ideas, team creativity is unavoidably influenced by individual team members' creativity and other factors, such as team interaction, team characteristics, and team processes. Creativity does not occur primarily by individuals working in isolation, but through interaction. Because a team is about combining and integrating input from multiple individuals in the team, these actions create new knowledge and deeper understanding (Chamakiotis et al., 2010; Chamakiotis, 2014).

Therefore, organizing and utilizing virtual teams is one of various strategies which can be used to foster creativity. These days, such strategies include utilizing technological strengths to enhance the efficiency of virtual team work (Hahm, 2017) because a team, which is a group of individuals working together, is expected to bring together members with sufficiently diverse knowledge, skills, and experience in solving problems to outperform the creativity of individuals working alone (Yeh, 2012). Nevertheless, many studies aimed at investigating the success factors of virtual teams find that the visual settings are less effective than face-to-face settings since virtual team creativity may need various conditions, such as a psychologically safe environment or sufficient capability for exchange between team members (Han et al., 2017), and other factors that appear to play a role in virtual team creativity. Coronas et al. (2015) point out that, in virtual contexts, creative thinking has been an ignored variable. There are significant differences in contextual factors between traditional team work and virtual team work. Thus, virtual team creativity

development is an essential challenge. Researchers done work aimed at exploring and presenting the framework of key factors that influence virtual team creativity and which are required by virtual teams if they are to enhance collaborative creativity in virtual learning environments. Practitioner educators should actively seek to integrate the results of such studies into development of curricula and teaching practices in an effort to enhance the effectiveness of online team collaboration in the future.

Literature Review

Virtual teams today are an important work structure, including those at educational institutions. In virtual teams, members are geographically dispersed to work on interdependent tasks, and they communicate exclusively through an internet-based information technology platform for virtual team collaboration in an effort to accomplish shared goals (Alahuhta et al., 2014; Chae, 2016; Hahm, 2017; Humala, 2017). Furthermore, collaborative creative activities such as brainstorming, discussion, and problem-solving situations that are conducted remotely using various technologies are becoming increasingly common in higher education (Fominykh et al., 2014). According to the sociocultural perspective, creativity correlates strongly with the co-construction of new meaning and collaborative activities (Sullivan and Barbosa, 2017). Creativity, the process of generating something novel, appropriate, and useful in response to a task at hand, has been connected to both individuals and teams (Humala, 2017; Vreede et al., 2017). Virtual team creativity is defined here as the collaborative process of geographically dispersed team members using Internet and technology-mediated collaboration tools in order to generate novel, appropriate, and useful ideas, products, processes, or solutions through interactions and interdependent participation of members.

The sociocultural theory of the Russian psychologist Lev Vygotsky (as cited in John-Steiner and Mahn, 1996) suggests that human activities occur in cultural contexts and are mediated by language and other symbol systems; in other words, the nature of the interdependence between individual and social processes in the construction of knowledge can be clarified by examining three major themes:

1) Individual development, including higher mental functioning, has its origins in social sources.
2) Human action, on both social and individual planes, is mediated by semiotic (signs and symbols, including language).
3) The first two themes are perfectly examined through genetic (developmental) analysis (John-Steiner and Mahn, 1996).

This suggests that team creativity is potentially a multi-leveled process that involves creative mental processes of individuals and creative collaborative processes of the team (Sawyer, 2012). However, joining together the individual and the social dimensions to support the connection of individual learning for creativity and social creativity and learning is the essential challenge for education.

The social dimension is inserted in creativity, and creativity is embedded in interaction. Collaborative creativity, creative learning, intersubjectivity, and co-construction of knowledge are the focus of the sociocultural approach (Biasutti, 2015). Cognitive development is promoted by social interaction involving cooperative or collaborative dialogue. Therefore, creative collaborators are team members who are interacting with others to explore new ways of thinking and doing something new together (Stockleben et al., 2017). Essentially, team creativity is highly associated with the climate established for the team and it is strongly influenced by the collaborative environment that is established. A suitable collaborative team environment will motivate individuals to work together in order to produce novel, useful and appropriate ideas (Berthold, 2015); creativity has a special added value when it occurs in collaborative environments (Anastasiades, 2017). In online social interactions, especially those involving problem-solving, creative cognition and communication are essential for virtual teams in order to achieve creativity (Humala, 2017). A study by Wang (2014) proposed a module-based learning analytics system for Facebook-supported collaborative creativity learning. She points out that casual and frequent social interaction among individuals of diverse backgrounds and knowledge are factors that encourage collaborative creativity. Research by Sousa et al. (2014) found that trust promotes positive actions and creative

contributions in online learning communities. They used synchronous meetings to establish group bonds and trust commitment in the performance of a specific task. Recently, Hahm (2017) showed that authentic leadership, sharing team climate, and psychological empowerment can enhance information sharing and creativity through the respective roles of virtual team members. Moreover, he concurs that information sharing directly fosters creativity. Consequently, creativity is mostly the result of a complex system in which various factors interact; it is not only a result of employing techniques or following a problem-solving model (Coronas et al., 2015).

Methods of the Study

The researchers analyzed and synthesized research articles related to key factors influencing virtual team creativity. The study was carried out by following a number of steps, as follows:

1. Search for research articles from five electronic databases; Scopus, ScienceDirect, ProQuest Dissertations & Theses Global, SpringerLink, and ResearchGate by using keywords as Virtual team creativity, Collaborative creativity, Virtual collaboration, Social creativity, Group creativity, and Creative collaboration. Two hundred and nineteen research papers and articles were downloaded after skimming titles and abstracts published from 2000-2017. The reason for this specific date range is because, according to Powers (2018), although the rise in telework and virtual teams has been fueled by new technologies throughout the 20th century, when the Internet explosion began, it was in the early 21st century that there were signs indicating that growth in the use of virtual teams was on the rise. So, information and communication technology infrastructure has been developing sufficiently to support the broad adoption of virtual teams most especially during this time period.

2. Deeply read and, by using data collection form, record the main points from these research articles which are related to factors influencing virtual team creativity, and then synthesize the key factors influencing virtual team creativity. There were twenty-one journals investigated which were obviously

about key factors influencing virtual team creativity and related to the objective of the study.

3. Critically examine the synthesized factors influencing virtual team creativity. This was done by asking nine experts, including three creativity experts, three virtual world experts, and three instructional experts, to examine and assure reliability of the research method using a purposive sampling technique. The research tool was a semi-structured interview.

4. Conclude the synthesized factors influencing virtual team creativity.

Results

The results of the study which analyzed factors influencing virtual team creativity from the twenty-one research articles are shown in Table 1. The key factors influencing virtual team creativity found in these research articles were 1) Team trust, 2) Adequate Communication, 3) Diversity, 4) Information sharing, 5) Individual and Joint participation, 6) Common goal and clarity of roles, 7) Leadership/Team leader, 8) Open-mindedness, 9) Team size, and 10) Challenge and Playfulness. The study also found that the trust factor is the most frequently mentioned factor affecting collaborative creativity in virtual team work environments.

According to the results, these key factors appear to play a role in virtual team creativity in a relatively large number of perspectives. Consequently, the key factors influencing virtual team creativity can be grouped into six major areas, which are presented in the Conceptual Model (The Six Perspectives Framework of the Key Factors Influencing Virtual Team Creativity): 1) Inter-Peer Trust and Attitude, including Team trust and Open-Mindedness, 2) Team Background and Size, including Diversity and Team size, 3) Participation and Communication, including Individual and joint participation, Adequate communication, and Information sharing, 4) Objectives, including Common goal, 5) Leadership and Roles, including Leadership and Clarity of roles, and 6) Experiential Factor, including Challenge and Playfulness. As illustrated in Figure 1, each of the factors has been placed within these six perspectives.

Table 1: The Perspectives and Key Factors Influencing Virtual Team Creativity

Perspectives	Factors	Sources
Inter-Peer Trust and Attitude	Team trust	Vreede et al., 2017; Chae, 2016; Siemon and Robra Bissantz, 2016; Berthold, 2015; Coronas et al., 2015; Pifarré et al., 2014; Chamakiotis, 2014; Paulus et al., 2012; Aragon and Williams, 2011; Bodiya, 2010; Chamakiotis et al., 2010; Godar and Ferris, 2004; Nemiro, 2000
	Open-Mindedness	Han et al., 2017; Coronas et al., 2015; Paulus et al., 2012;
Team Background and Size	Diversity	Berthold, 2015; Bettoni et al., 2015; Chamakiotis, 2014; Alahuhta et al., 2014; Settles and Dow, 2013; Paulus et al., 2012; Dennis and Williams, 2010; Chamakiotis et al., 2010
	Team size	Berthold, 2015; Paulus et al., 2012
Participation and Communication	Individual and joint participation	Siemon and Robra Bissantz, 2016; Settles and Dow, 2013; Paulus et al., 2012; Aragon and Williams, 2011; Dennis and Williams, 2010; Nemiro, 2000
	Adequate communication	Chae, 2016; Coronas et al., 2015; Bettoni et al., 2015; Bhagwatwar et al., 2013; Settles and Dow, 2013; Aragon and Williams, 2011; Dennis and Williams, 2010; Godar and Ferris, 2004
	Information sharing	Hahm, 2017; Vreede et al., 2017; Bettoni et al., 2015; Moise et al., 2014; Bhagwatwar et al., 2013; Bodiya, 2010; Nemiro, 2000

Table 1: (Continued)

Perspectives	Factors	Sources
Objectives	Common goal and clarity of roles	Siemon and Robra Bissantz, 2016; Bettoni et al., 2015, Pifarré et al., 2014, Aragon and Williams, 2011; Godar and Ferris, 2004; Nemiro, 2000
Leadership and Roles	Leadership/Team leader	Han et al., 2017; Chamakiotis, 2014; Paulus et al., 2012; Bodiya, 2010; Chamakiotis et al., 2010
	Common goal and clarity of roles	Siemon and Robra Bissantz, 2016; Bettoni et al., 2015, Pifarré et al., 2014, Aragon and Williams, 2011; Godar and Ferris, 2004; Nemiro, 2000
Experiential Factor	Challenge and Playfulness	Coronas et al., 2015; Nemiro, 2000

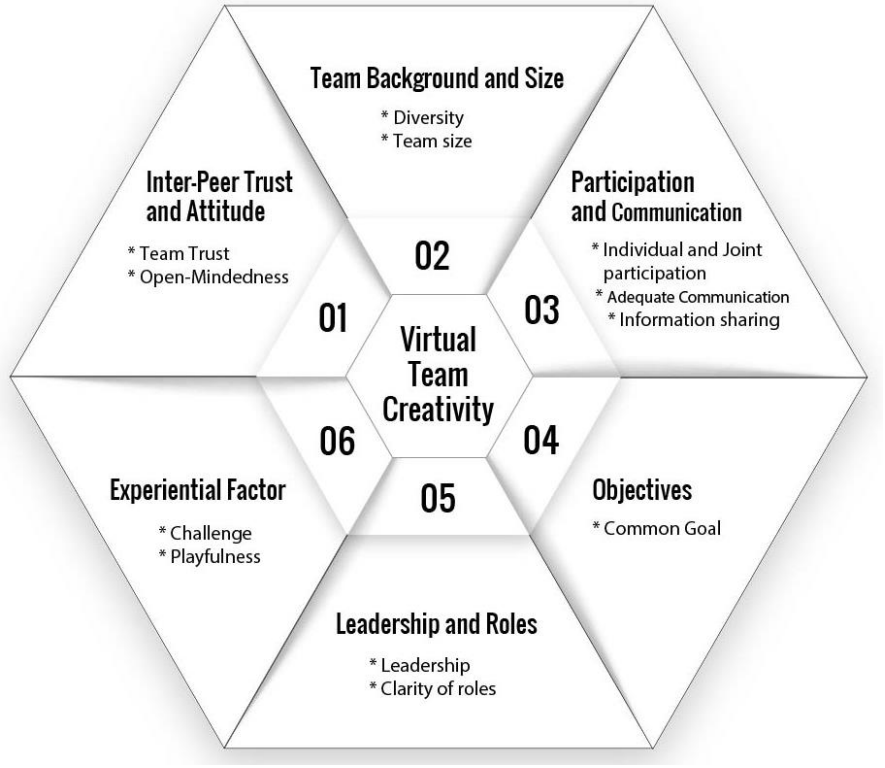

Figure 1: Conceptual Model: The Six Perspectives Framework of the Key Factors Influencing Virtual Team Creativity

Discussion

According to our research and based on the synthesis of factors influencing virtual team creativity, six perspectives of the key factors influencing virtual team creativity were identified, and are described below:

1. Inter-Peer Trust and Attitude

Inter-peer trust and attitude are important elements in a virtual diverse team since they can foster team creativity and collaboration. The effective collaboration and collaborative creativity of virtual teams can be increased by team trust and open-mindedness. A lack of trust or a poor attitude in virtual teams can lead to poor communication, responsibility, and co-creation.

Team trust means the degree of confidence of virtual team members in the words, actions, and decisions of another, such as the faith that team members will do their assigned tasks within the specified time frames, trust in the accuracy of information provided electronically by other members in virtual team, belief that honest and constructive feedback on ideas, opinions, and creative efforts will be given by team members, and trust in the ability and expertise of other team members to work effectively in online creative collaboration. So, the greater the degree to which virtual team members trust other team members, the more those team members share information and knowledge effectively. Moreover, trust also promotes interpersonal relationships between virtual team members. It was discovered that trust is the most commonly discussed, and possibly most critical, factor found in the research articles; it may be said that trust is a basic necessary factor for humans to effectively collaborate with others. In other words, when team members trust each other, it increases the likelihood of effective collaboration and collaborative creativity of virtual teams. Likewise, Chae (2016) identified trust as an important factor in developing relationships and building confidence in the effectiveness of team work, and said that trust is critical for teams who are geographically distributed, allowing members to collaboratively work with other members via electronic channels, and that it was critical because of the lack of face-to-face interactions. Berthold (2015) also indicates that without the trust factor, virtual collaborative teams may be unsuccessful and fail to generate new ideas, or fail to encourage team creativity. Based on those studies, it seems that trust tends to help to develop team creativity, and that, without the social glue that binds teams together, it may be difficult to accomplish common goals. Furthermore, trust plays a factor as a facilitator, supports interpersonal relationships, and encourages cooperation among team members in a virtual team, leading to a more collaborative culture. It should be clear that trust positively correlates with team performance and creativity, and that trust requires and reveals mutual respect and helps build an environment in which every team member's voice and opinions are equally respected. Consequently, building team trust is necessary, and one way to build trust in a team is by enhancing team emotional intelligence. This means that highly effective creative teams have the ability to manage emotional processes by using norms

to enhance collaboration. Every team member is aware of his or her own and other's emotions, which helps to reduce conflicts and build better interaction and stronger relationships. Furthermore, trust increases the motivation resulting from collaboration, leading to happiness and satisfaction in accomplishing a common goal (Siemon and Robra-Bissantz, 2016). In addition, more trust helps team members share information and knowledge more effectively (Vreede et al., 2017). So, trust and participation are the most important factors in increasing team creativity (Coronas et al., 2015).

Open-Mindedness refers to the degree to which team members of a virtual team feel that the team is open-minded and supportive of the expression of new ideas in their virtual team. This factor is developed through supporting and encouraging collective understanding among virtual team members in order to be open to receiving feedback from other team members and accepting other teammates' opinions and mistakes. Moreover, virtual team members should encourage each other to express new ideas or perspectives and accept team conflicts in order to promote the generation of new ideas creatively. Additionally, open-mindedness should enable team members to check or evaluate each other's efficiency of work reasonably. Therefore, feeling safe and supported by leaders and teammates is important for creativity. Open-mindedness is one of the several factors found in this study that influences virtual team creativity. It seems that feeling safe and secure are basic human needs in communities, stimulating members to have the courage to express ideas and opinions without fear of negative criticism or judgment about their ideas from other team members. If team members feel that virtual teams are receptive to their ideas, it helps the virtual teams to generate various and novel ideas from their team members. Han et al. (2017) indicate that psychological safety shows that team members emphasize the importance of the skills and talents of each team member, along with information sharing and discussing mistakes with no fear of retribution or consequence. Thus, creativity may be fostered by team leaders since it positively correlates to psychological safety, which may lead to increased participation in creative work. On the other hand, if there is a low participative safety in a virtual team, team members may feel helpless, which may obstruct the attempts of team members to generate creativity. Likewise, Godar and Ferris (2004) said that participative safety is critical for team

creativity because it encourages participation in a supportive environment, which is important for virtual teams to achieve individual and team creativity. Consequently, virtual team members feeling safe and secure in supportive environments helps to foster open-mindedness of participants and encourages information and expertise sharing. In fact, original and appropriate solutions probably are raised by openly sharing information and various ideas from team members without the fear of negative comments, and this may lead to achieving team creativity through effective creative collaboration.

2. Team Background and Size

Team background and size are two more factors that impact the creativity of learners in virtual learning environments. Creativity can be enhanced if virtual teams have a moderate number of team members from different backgrounds, with different sets of skills and experiences. Hence, virtual teams comprised of members with diverse backgrounds tend to be more creative since they may come up with better solutions that those developed homogeneous virtual teams.

Diversity is the degree of heterogeneity or diversity of members in a virtual team, which are necessary for team creativity. Each member of a virtual team should have a different variety of skills, expertise, knowledge, and experiences that lead to constructive conflicts and activate discussion for creative ideas and brainstorming. The diversity factor is vital to virtual team creativity. It may be said that team collaboration requires interdependence, and that, through the difference in skills, abilities, knowledge, or other qualifications of virtual team members, it is possible to increase collaborative effectiveness by exchanging various ideas and perspectives based on each member's experience, inspiring new ideas within a virtual team. Likewise, according to Paulus et al. (2011), one of the benefits of bringing team members together in order to do creative tasks is to make use of the team's diversity. Diversity implies the differences between team members' personal characteristics. The members may be different in demographic or personal characteristics: race, gender, age, position, characteristics, values or beliefs, knowledge, experience, or expertise. Each of these characteristics might make interaction with other team members more challenging, so, there may be a social bias against heterogeneous teams

and for homogenous ones since team members probably prefer to interact with team members who are similar to themselves. Hence, enhanced performance in teams does not relate to overall diversity. However, researchers also point out that, in achieving this diversity, it is important for team members to have a positive attitude about interacting in diverse teams, and have intrinsic and extrinsic motivation to take advantage of the diverse information shared within the team. Importantly, demographic diversity is less likely to lead to team creativity than intellectual or cognitive diversity. These findings are congruent with the study by Pluut and Curşeu (2013), which found that team members who have diverse life experiences have gathered a rich knowledge base that seemingly increases the creativity of the team; similarly, the team's knowledge pool is increased by demographic diversity of the team. Therefore, the high diversity of knowledge, which is enhanced by individuals integrating ideas and knowledge of these various team members, leads to more collaborative creativity. Similarly, Dennis and Williams (2010) found the diversity of team members is positively correlated with higher-quality team decision making and team creativity. Beyond this, from the perspective of decision-making, it has been suggested that teams with diversity possibly outperform homogeneous teams because diversity leads to a wider range of task-relevant knowledge, skills, and abilities that are distinct and non-redundant (Chae et al., 2015), and should also lead to constructive conflicts that help to provoke discussion of creative ideas and opinions (Alahuhta et al., 2014). However, in virtual environments, it may be necessary to have additional initial training for team members in terms of using the specific technology tools to increase efficiency and effectiveness of collaboration for team creativity.

Team size is the number of virtual team members that creatively work together through computer-mediated tools, and it is important to virtual team creativity. With small teams of members working together, they are more likely to trust in each other, collaborate, and rely on each other in order to achieve expected goals. It may be said that creative collaboration outcomes are the product of the cooperative interaction of team members in a virtual team; hence, if there are too many team members on the team, it may negatively impact their teamwork through poor habits such as social loafing and production blocking. Likewise, having too few team members in a virtual team may be a barrier to

the generation of new ideas and thoughts based on various perspectives from participants. Consequently, the proper size of team members is a factor that affects virtual team creativity. Still, Paulus et al. (2012; 2011) suggest that team size can be varied, depending on the task scope and complexity. Complex problems typically require various knowledge and expertise of team members. Because team members' different points of view and skills are likely included in larger teams, these larger teams are associated with more opportunities for innovation. However, the extent to which each of the team members feels accountable or essential to the rest of the team may be reduced by larger teams, and this may lead to decreased motivation of each team member, social loafing, or free riding in virtual teams. Moreover, production blocking is possibly found in the brainstorming of a larger sized team. Nijstad et al. (2003) point out that an important cause of productivity loss in brainstorming teams comes from production blocking, which arises because turns must be taken when expressing ideas in the team. That is to say, it is not always possible to express ideas when they come to mind as team members have to wait for their turns. Therefore, keeping the team as small as possible is the best way to brainstorm effectively, while still providing the extent of expertise needed (Paulus et al., 2011). Furthermore, Kratzer et al. (2010) assert that the smaller teams tend to have greater contact among team members than do larger teams.

3. Participation and Communication

Participation and communication are important for virtual team members in generating team creativity because virtual team members are located at a distance from each other and conduct their tasks through communications technology. Therefore, adequate communication and fuller participation can lead to more sharing of information, which can encourage more ideation.

Individual and joint participation is the amount of individual effort and participation exerted in collaborative creativity. Equal levels of collaboration and contribution among virtual team members enhance shared ownership of ideas in virtual teams. So, virtual team members should be supported in feelings of cohesion and pride in their virtual team. Moreover, virtual team members have to pull together and work comfortably side by side

to complete a team's task. They should also believe in self-efficacy and be their own selves in collaboration. If there is social loafing within a virtual team, then the motivation of team members may fall. Virtual team creativity is influenced by the individual and joint participation factor, which is important for virtual teams. It may be because creative collaboration apparently needs to rely on all virtual team members' joint efforts and individual participation with strength and tenacity in their collaboration to lead to creative success. Therefore, a positive working environment is an important factor in creating an environment in which all team members make the effort and commit to working together; it is necessary for teams, especially virtual teams, in which each team member works collaboratively from a different geographic location and relies on communication technology. Berthold (2015) concurs that team creativity is an outcome of a positive collaborative environment and related to the morale and climate established for the team. Therefore, the collaborative environment that is established influences team creativity; the appropriate team collaborative environment will activate team members to work intently together to generate original and useful ideas. However, Settles and Dow (2013) point out that team members' efforts are often unbalanced, leading to social loafing, which describes a situation in which an individual does not work as hard as other members. In other words, certain team members exert less effort to achieve a goal when they work in a team than when they work alone. The perception of this type of imbalanced effort will decrease cohesion and motivation within the team.

Nemiro (2000) offers another opinion; specifically, that in achieving high creativity levels, intrinsic motivation is instrumental. Nemiro suggests that intrinsic motivation links to high creativity levels of members within teams. An internal locus of control, a sense of being self-driven, an excitement about the work, and a commitment to an idea are the characteristics of intrinsic motivation, which are similar to a sense of dedication, high involvement, and commitment to collaboration that were found among some virtual team members in highly creative groups in his study. Hence, raising motivation of team members to achieve collaboration is complex, and different in every context. The collaboration will be enhanced if certain team fundamentals are present. Trust is one important collaboration fundamental that enhances

teamwork in various ways (Siemon and Robra-Bissantz, 2016), and another principle of collaboration in virtual teams is the joint effort and commitment of participants in order to accomplish tasks on their own. So, team task performance may be predicted, at least in part, by the level of the task commitment component. Teams that could be expected to be more motivated are those that have strong interpersonal relationships, shared commitment to the task, and pride in their own team (Paulus et al., 2012). Lastly, Nemiro (2000) suggests that working together, or collaboration, is a method that leads to a win-win outcome that is achieved by all team members working together, and that every team member benefits from the shared successful result.

Adequate communication refers to the level of communication frequency between virtual team members. Virtual team creativity is most successful with a moderate frequency of communication, which is a factor in developing relationships; furthermore, regular interaction in the team enhances relationships and trust between team members. In virtual team creativity, communication is a very important factor. One might say that communication is the basis of mutual understanding among virtual team members who work together from different geographic locations, so electronic communication technologies are necessary and important for successful collaboration in virtual teams. A basic process in virtual team creativity is communication among team members and with other teams. While the process seems to be related to team creativity -- and it appears that too much communication may distract members' focus on irrelevant tasks -- too little communication may obstruct team creativity. Therefore, modest communication density supports team creativity (Chae, 2016; Paulus et al., 2011; Zhang et al., 2011).

The findings of these studies are consistent with the study conducted by Kratzer et al. (2010), who authored, "The social network among engineering design teams and their creativity: A case study among teams in two product development program". This research found that very frequent interaction may decrease creativity rather than increase it. Moreover, Leenders et al. (2003) indicated that communication facilitates idea generation and dissemination of ideas, but a high level of team interaction possibly reduces team creativity because team members may not fully use their cognitive ability to investigate various possible solutions before making a final choice of creative solution.

Additionally, distracted team members tend to distract other members, negatively affecting their creativity. The whole team may spiral down to a low creativity level as well. Thus, it is very necessary for virtual team members to maintain a tolerable level of communication in order to build interpersonal trust and manage emotional conflicts and relationship issues.

Similar results have been reported by Hong (2013), who states that communication for shared understanding among team members is important as it allows each team member to comprehend, criticize, discuss, remain open-minded, or integrate opinions and knowledge provided by other members into team creativity. Hong also points out that lack of shared understanding of different opinions among team members may cause conflicts to arise within virtual teams; on the other hand, different opinions based on shared understanding have the potential to result in novel solutions. However, communication within collaborative creativity relates to continuous and constant conversation processes among team members who choose to use various types of technologies to support and enhance collaboration. This conversation process works well in shared workspaces (including virtual places), which helps to generate new knowledge by building a shared idea community through the creative practices and actions such as deep and active listening, continuous and apparent communication, shared leadership, mutual respect and trust, and the use of a variety of methods to show ideas, concepts and creative outputs (Oppenheimer, 2011).

Furthermore, Qui et al. (2009) point out in their study that a high level of trust and better virtual collaboration was found in teams with initial face-to-face communication. By contrast, teams in non-face-to-face interactions are likely to have low social control and increased feelings of loneliness or dissociation. Thus, it is ideal for face-to-face communication to occur at the start of the creative endeavor in order to develop positive relationships and teamwork norms.

Information sharing refers to the behaviors that virtual team members engage in for the purpose of exchanging or providing information to each other. The degree of information shared by each member of a virtual team becomes an important part of the information resources for the virtual team. Moreover, when members of a virtual team get a variety of new, up-to-date, and diverse

information, they are able to access new points of view and wider range of different ideas, and make better team decisions. Regarding the information sharing factor, it is essential to virtual team creativity because the new idea generation process relies on diverse information in order to help teams expand or broaden aspects of thinking, and to think outside of the box. Thus, information sharing by each team member is an important part of inspiring the team's ideas and accomplishing shared goals. Paulus et al. (2011) suggest that, while team members share ideas, their memory or knowledge base for relevant information or ideas is needed in order to fully explore them. When team members share these ideas in a team, team members stimulate others to think about related issues. Hence, sharing ideas together may expand the range of issues that are discussed and facilitate opportunities for mutual stimulation of ideas.

However, a social stimulus in the idea sharing process may possibly be used to increase team members' efforts in trying to produce more and better ideas. Vreede et al. (2012, 2017) indicate, for example, that individual knowledge not only affects individual creativity but also the amount of knowledge sharing in a team. Specifically, the research found that knowledge sharing rises when team members exchange information voluntarily with the intention to reach a broader understanding of the team's goal and its success. Therefore, team creativity is driven by expressing opinions, using the sharing of knowledge-based views as a tool for integrating the diverse explicit and tacit knowledge among team members. The unique knowledge of each team member, based on each member's area of ability, is very significant to team creativity. Teams that are able to consider more information from various resources tend to reach better solutions than individuals working alone; on the other hand, inadequate information sharing leads to less problem solving because each team member has less to work with in evaluating a problem because of the limited information.

All information related to problems need to be considered, and team members have to be enthusiastic in sharing information together so that team members are able to access this information. However, team creativity is not a direct result of team members sharing knowledge, though knowledge sharing contributes to shared mental model development, which in turn influence team

creativity. Therefore, sharing information, knowledge, and opinions within virtual teams is an important factor affecting team creativity and influencing highly effective collaboration, as well as increasing the capability of problem-solving since each team member has diverse knowledge and shares this information, meaning that information will be more diverse and creativity will increase. Finally, team members may not only be exposed to new points of view, but they can also learn more and consider a wider range of ideas, which in turn motivates team creativity (Choi et al., 2013; Glassman, 2007; Hahm, 2017).

4. Objectives

A virtual team needs common goals. Otherwise, it may become a group of learners with their own separate destinations. If the virtual team's goals are clearly defined and its directions carefully set, those goals will be accomplished sooner and better. So, common goals can contribute to team creativity because they bring team members together and promote collaboration and communication in the achievement of complex tasks.

Common goals refers to the level of awareness about common goals among virtual team members working to accomplish those goals. One of the factors that influences virtual team creativity is the common goal, it may be said that the factor is essential to virtual teams because any work or even collaborative creativity of virtual teams needs to set goals for the success, so team members have to understand their purpose with strength and clarity. In simple terms, Virtual team members need to have clear common goals in order to work together.

Siemon and Robra-Bissantz (2016) point out that a key factor of collaboration is having a common goal which motivates team members to work together. For virtual teams, the common goal seems to be essential in order for geographically dispersed diverse virtual team members to build loyalty and trust with each other. It may be said that the common goal is indispensable or essential, and the best predictor of virtual team success (Nemiro, 2000). Therefore, these common goals combined with having sufficient trust in each other to participate in the shared endeavor (Pifarré et al., 2014) are part of the team’s success. Furthermore, working with other team members to achieve a common goal can support social, motivational, and emotional benefits (Settles

and Dow, 2013). Moreover, it can lead to the production of more new ideas and result in an improvement of team creativity. In fact, increasing the number of common goals in a virtual team not only leads to increased creativity, but also increases the team members' engagement in the creative process (Vreede et al., 2017). So, virtual learning tasks can be done comfortably with virtual team members working together to strive towards a common goal through the use of information and communication technology. Thus, virtual team members should display mutual respect, make every effort to grant assistance to other team members when needed, and help develop other team members' ideas and value contributions to achieve a common goal.

5. Leadership and Roles

The leadership and roles of participants are significant factors for a team working together in virtual learning environments. Leadership plays an important role in enhancing virtual team creativity and creating an appropriate climate where team members share and build upon each other's ideas. Virtual team members need to have clarity of roles and responsibilities, which helps to reduce confusion and conflict and allows team members to utilize their individual strengths.

Leadership comprises the specific characteristics of an individual in a virtual team that actively encourage other team members to generate novel ideas and support members in their collaboration with each other in order to achieve a shared goal. As the head of the virtual team, the person in charge is responsible for encouraging and facilitating team members to demonstrate their abilities, reduce team conflicts, assign roles and responsibilities to team members, schedule collaborative virtual team time, enhance positive emotion among team members, and activate team members to express their new ideas.

A virtual team leader is an important factor that affects virtual team creativity. It may be because the team members are in different physical locations, so it is necessary for a virtual team to rely heavily on the virtual team leader, who is called upon to manage the whole team effectively and efficiently. Consequently, the virtual team leader is an important driver of smooth collaboration among virtual team members.

Such findings are in congruence with the study by Paulus et al. (2012) which found that leadership, or a team leader, is significant in providing both the task and the relational context for team work environments. The leaders who provide a supportive environment are the most effective leaders for creativity; the result is minimization of social conflicts, and effective management of cognitive conflict.

Similarly, Han et al. (2017) have pointed out that team creativity is enhanced by shared leadership when conducted by team processes. Shared leadership is divided into two categories. The first is task-oriented shared leadership, which focuses on the task-oriented process, including many activities that team members intend to work on in order to achieve their goal. In this case, team members are concerned about maintaining the effectiveness of work at a good level. Hence, task-oriented shared leadership duties include coordination activities, such as assigning a task to team members and explaining rules and basic regulations. It is necessary for team leaders to build a structure initially for team members to enable them to coordinate and work together. Moreover, obvious communication supports task processes and effective team performance. The second category of shared leadership is relation-oriented shared leadership, which refers to team processes focused on relationships that enhance cohesion and trust among team members in order to support team performance.

It should be clear that positive team attitudes are created by the emotional strengths of a team, leading to increased team performance in terms of relation-oriented processes. In addition, a variety of socio-emotional behavior is used by effective team members. Examples include supporting team members, being friendly, showing consideration for the needs of team members, and caring about the personal feelings of team members. Therefore, shared team leadership may be an important factor for virtual teams that possibly leads to team creativity. Chamakiotis et al. (2010) indicated that, "E-leadership can be shared, rotating, shifting, [or] distributed." In the same way, Pifarré et al. (2014) found that leadership is a reciprocal social process; it is not the property of an individual. So, the leadership responsibilities are shared within the team.

Clarity of roles refers to the level of awareness regarding the roles and responsibilities of virtual team members by each team member. It further extends to the idea that team members follow their identified roles to accomplish the common goals. Virtual team members need to clarify roles and responsibilities clearly within their team, as well as establish some shared ground rules.

One of the factors that influence virtual team creativity is clarity of roles because every team member needs to have clear roles and responsibilities in order to be able to perform tasks effectively, reduce duplication of work, and increase achievement through collaboration. Godar and Ferris (2004) and Nemiro (2000) all discussed the idea that virtual team members are aided in staying focused and oriented to each other and their team's tasks by having rules and role clarity, which appear to be important for successful creative virtual teams, and which may reduce conflict and result in a high level of performance. Role clarity possibly helps geographically separated team members to relate and be able to understand teamwork and being part of a team. Although flexibility is needed for team members in order not to destroy creativity, team members have to clarify and define explicit roles and responsibilities.

It seems clear that greater role clarification and explicit expectations are required in virtual teams, and that providing a profile of what team members are expected to do, along with clear descriptions of the roles of both virtual team members and their team leaders, is the best way to begin virtual team work. Moreover, Mahaux et al. (2013) suggest that clarity of roles ensures work and responsibilities in virtual teams are well distributed, and that it helps the virtual team to understand how they are supposed to interact. However, having roles that are too strictly defined can restrict the freedom to be creative. Still, explicit roles such as facilitator, scribe, or time keeper are useful for effective teams.

6. Experiential Factor

Challenge and playfulness, which comprise the Experiential Factor perspective, relate to freedom-based context and enjoyable environments. Learners can be challenged with stimulating and enjoyable tasks to achieve a common goal in virtual learning environments. Moreover, playfulness can facilitate a creative imagination that can be used to generate creative ideas.

Challenge and Playfulness mean the degree to which team members of a virtual team feel that they desire to do tasks that are meaningful and challenging in order to come up with new ideas and move away from current circumstances with new methods; they are connected to the desire of team members to prove that they are capable of positive confident action when confronted with complex situations or tasks or/and the urgent needs of a specific situation. Virtual teams, then, should be presented with intriguing and playful tasks or situational problems.

So, challenge and playfulness are among the factors found in research articles about virtual team creativity. This may be because virtual team members are motivated by thought-provoking stimulators or tasks to achieve shared goals. A sense of challenge in a freedom-based environment may lead virtual teams to creativity. According to Nemiro (2000), the nature of the work can challenge team members and make them feel creative, especially stimulating, engaging, and enjoyable work. Moreover, it has been observed that, when team members feel they are doing tasks against the odds, those teams tend to be highly creative. For instance, face with a tight time deadline, a team may feel driven to improve their performance.

Wishart and Eagle (2014) explain that time regulation can be a challenge in collaborative creativity because it needs to combine individual and collaborative levels of regulation. In general learning regulation approaches, time regulation is the specific regulation of the academic time that is carried out by the learners in their teams (socially shared time regulation). Hence, a mixture of both seriousness and playfulness is effective in promoting the learning design process.

Mahaux et al. (2013; 2014) add that playfulness is the basis for creative thoughts, so tasks and processes should be enjoyable for team members in order to generate creativity because fun is a key factor in generating creative ideas. Moreover, it may be said that fun is a powerful tool in destroying barriers and releasing team members from psychological inertia. Besides, creativity in collaborative teams is encouraged when the team itself grounds their interactions in playfulness, so fun is a feature of the effective climate of the team and has an effect on learning and creativity within that team (Sullivan and Barbosa, 2017).

Conclusion

Creativity is an important skill that should be developed in educational institutions. It is the role of educators to bring creative experiences to learners. In this study, the conceptual model of key factors influencing virtual team creativity in an online context is presented in an attempt to provide guided support for educators. The conceptual model may be thought of as a guide that assists educators and other in understanding the key factors that facilitate virtual collaborative creativity and solving the problem of creating effective virtual teams to achieve team creativity in virtual environments. For example, virtual worlds such as OpenSimulator, Second Life, and numerous others can be used to support virtual learning teamwork. However, a careful design that incorporates an appropriate learning approach and exploits the advantages of the conceptual model in this study is required to design a creative learning process that enhances virtual team creativity among learners. Educators should take responsibility for forming effective virtual teams and building virtual learning environments for the learners that will help them achieve the team creativity goal because learners commonly cannot form their own diverse teams with their limited experience. In consequence, it is the important role of educators to form effective teams using the key factors influencing virtual team creativity in the conceptual model. Educators who use the model for guidance should find that they are able to integrate various constructivist approaches such as problem-based learning, inquiry learning, situated learning, group discussion, and role-play.

Therefore, according to the conceptual model of the key factors influencing virtual team creativity, virtual collaborative creativity can be enhanced via integration of these key factors and creative processes, which may lead to successful accomplishment of shared goals and creative outcomes. In addition, most researchers seem to have consistent opinions on the importance of fostering virtual team creativity among a group of individuals who participate in common tasks to achieve shared goals from different geographic locations and rely on technological tools; these individuals need to rely on various factors in order to enhance collaborative creativity. Thus, stimulating virtual team creativity can be achieved by using the guidance of this model to build better

teams capable of enhanced creativity in virtual learning environments. Furthermore, other researchers and educators can build upon this conceptual model to generate new knowledge going forward.

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