Social Interaction in Virtual Teams: An Exploratory Study of Students Undertaking Business Simulation

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Abstract: In recent times, the usage of virtual teams has been accelerated, and virtual teams are being used exponentially in higher education and industry - driven by, and in response to, the Covid-19 pandemic - aided by developments in innovative technologies and globalisation. Teams have suddenly become an essential and necessary approach for collaborative learning as well as task completion. In examining the components of social interaction and its respective distinguished components, this paper positively points to virtual teams being an appropriate means for social interaction and team performance, albeit with some challenges. This qualitative study brings to the fore constructive and affirmative themes, along with various challenges that virtual teams present and also highlights areas for further research.

Keywords: virtual teams, business simulation, higher education, social interaction, e-learning

1. Introduction

In recent years, team work has become an essential part of organisations operating in global economies, and so the business environment has created an imperative for higher education institutions (HEIs) to modify educational programmes in order to prepare students to be effective team players. There is an increased upward trend in the number of universities incorporating a team experience into their curricula (Neumeyer and McKenna, 2016). Even more so now is the pronounced and accelerated usage of virtual teams, utilised by industry and higher education alike, driven by, and in response to, the Covid-19 pandemic; aided by developments in innovative technologies and globalisation. Teams have suddenly become an essential and necessary approach for experiential and collaborative learning as well as task completion.

There are numerous personal, functional, and social benefits associated with team learning, for example, improvement of students' management skills, development of a clear vision of the team culture, understanding different team roles, and increased flexibility at individual and team levels. Further benefits include improved interpersonal skills development, communication, and creativity skills. Conversely, team learning, particularly in an online format, can be challenging due to lack of effective training, communication, and assessment measures. Studies have shown that students do not always have a positive attitude toward team work due to the perceived relationship between team work and effective performance and the lack of social interaction. Other studies highlight the associated challenges of online team work including communication and technical difficulties, levels of social interaction, unequal participation, and an unfair share of responsibility. Current technologies for learning are often designed for functional collaboration (e.g. sharing documents, communicating, etc.) but fail to support social interaction, learning, and understanding group dynamic processes. Research demonstrates that learning and understanding in virtual teams is difficult and the level of communication and learning is different to that of face-to-face. Researchers posit that with virtual tasks, neither the task nor the task environment (i.e. online environment) require leaners to engage in reflective behaviour which give rise to higher levels of learning through social interaction, thus bringing to the fore the focus of this paper – *social interaction in virtual teams*. Social interactions influence a team's ability to be successful (Muethel et al, 2012) in terms of developing good and strong social relationships, which in turn positively impact the teamwork and teambuilding.

2. Social interaction and virtual teams

Social interaction in teams is analogous to 'Teams Mental Modes' (TMM) where team members tend to rely on one another in a cognitively interdependent manner. Theory and research around the concept of social interaction centre on the quality and quantity of interaction and emphasise communication as a key component, often using social interaction and communication interchangeably (Ryan et al, 2013). Social interaction theories provide clear evidence of the importance of developing social interactions for effective team work, with research indicating that social interaction has a generally positive outcome (Bicchieri et al, 2010) and that the type of social interaction matters. The literature (e.g., Mortensen & Hinds, 2001; Hinds & Mortensen, 2005) evidences that trust and strong social identity are essential factors for social interactions to result in a positive outcome.

However, the mechanisms that facilitate either trust or social identities or other identifiers of positive social interactions, and not the least, whether these mechanisms are similar for virtual teams, are not clearly defined, and so… the focus of this particular paper.

Over the years, 'teams' as an organisational concept are discussed in different functions and contexts (Cohen & Bailey, 1997; Helfert, 1998; Hoegl, 1998). Hoegl (1998) defines a team as "*a social system of three or more people, which is embedded in an organization (context), whose members perceive themselves as such and are perceived as members by others (identity), and who collaborate on a common task (teamwork)*". Similarly, Dyer (1987) defines a team as "*a collection of people who must collaborate, to some degree, to achieve common goals"*. Research about team and group dynamics highlights that teams display a high level of interdependency and integration among members (Powell et al, 2004), while in contrast, Cameron & Green (2019) suggest that team members do not rely on each other, but instead perform group activities interactively. In conventional teams, members are located close to each other, allowing for immediate face-to-face communication, thus having an impact on social interaction. Having defined the term 'team' above, virtual teams consider two aspects separately. As stated, the term 'team' describes *"a small number of people with complementary skills who are equally committed to a common purpose, goal"* (Ale Ebrahim et al, 2011). The term 'virtual team' extends this definition defining virtual teams as "*geographically and organizationally dispersed members assembled using a combination of telecommunications and information technologies to accomplish an organizational task"* (Hacker, Johnson, Saunders, & Thayer, 2019). Virtual teams are often formed due to the colocation or dispersion of team members in time and place, operating across multiple, even temporal boundaries. Commonly, virtual teams are coined by a lack of physical and personal contact (Pinto, 2018), thus demanding the use of information and communication technologies to interdependently collaborate toward a joint objective or ask completion. Bell & Kozlowski (2002) distinguished traditional and virtual teams based on two overarching components, namely spatial distance and communication (Bell & Kozlowski, 2002). Virtual teams display a distributed team whose connection is based on technological mediated communication mechanisms (e.g. Microsoft Teams, Zoom, E-mail).

Having defined the concept of 'teams' and 'virtual' teams, we have chosen and applied the theoretical concept of social interaction proposed by Hoegl (1998) in Lechlner (2001), p.268, in the context of virtual teams with a view to ascertaining how social interaction and its components impact on the quality of virtual teamwork. In a rigorous and comprehensive study, Hoegl (1998) measured and demonstrated the quality of teamwork, defined as the collaboration within teams, or the quality of social interaction within the teams. This research distinguishes six components of social interaction: (1) communication, (2) cohesion, (3) work norms, (4) mutual support (5) co-ordination and (6) the balance of member contributions. *Communication* provides the vehicle for information exchange among team members (Pinto & Pinto, 1990) and the quality of communication depends on frequency, formalization, structure and openness of the information exchange (Hoegl, 1998). *Frequency* refers to how often and extensively team members communicate; *formalisation* relates to how much preparation is required before communication occurs in the team (Katz, 1982); *the structure of communication* depends on whether there is direct communication between team members or if the information is communicated through mediators (e.g. team leader); *openness* refers to how openly team members share information in the team. Team cohesion describes the degree to which team members desire to remain in the team. Mullen & Copper (1994) explain three pivotal aspects of cohesion: interpersonal attraction, commitment to the team task and group pride/team spirit. Several authors agree it is unlikely to achieve high team performance without an adequate level of team cohesion (Hoegl, 1998; Mullen & Copper, 1994; Helfert, 1998) as it is imperative for effective team performance. However, research suggests that technology for virtual teams does not provide the same visual, sensory, and olfactory cues that face-to-face interaction does, and therefore may not enable students to synchronize in the same way, and achieve cohesion in the same way as traditional face-to-face teams allow. Norms are defined as shared expectations within a team regarding the behaviour of team members (Levine & Moreland, 1990). Essentially, they are a set of rules that shape team members behaviour and interactions. An understanding of group norms is essential for effective teams as they establish clear, agreed upon behaviour, set out what work need to be done and how it will be done. Furthermore, it sets out the expectations that team members can expect from each other – all key for team success. Mutual support is also considered essential for teamwork (Tjosvold, 1995). The collaboration of team members depends on cooperation rather than competition (Hoegl, 1998). Coordination equally plays a significant contribution within the process of task fulfilment with many activities being delegated within the team. In the main, team members work parallel on different subtasks. These contributions need to be harmonised and synchronised by clearly defining time frames, budget and deliverables. The way in which the team controls these activities influences

the quality of social interaction and also reduces team conflict by balancing members' contributions (Hoegl, 1998). Conflict resolution is also important in terms of social interaction as it refers to the style with which the team handles rising conflicts in situations of high pressure and dynamic contexts. This impacts on how the team resolves potential conflicts before they unfold and negatively impact overall team performance.

3. The research approach

The aim of this study is to explore the components of social interaction in virtual teams in the context of a business simulation game. This section describes the background of the study and the simulation game used, how the data were collected, and the characteristics of the respondents (students).

Business simulation games are representations of real business situations in a virtual environment/world. Business simulation games enhance learning experiences (Matute & Melero, 2016) by providing a context in which students are "learning by doing" (Caulfield et al, 2012). Students perceive that business simulation games help them to develop a range of skills that are highly valued in education and the business world. Some skills are generic competences, such as decision-making, working with uncertainty, and processing and analysing information (Fitó-Bertran et al, 2014). Of relevance to this study, students report enhanced communication skills (Loon et al, 2015), as well as team-working skills, problem-solving, and adaptation to virtual contexts. A strong feature of simulation is its team-based approach, connecting student teams with each other, and to the outside world, allowing individuals and teams to act upon their knowledge and skills, resulting in deep learning. Such pedagogy extends the notion of real-world learning and immerses students in the realities of managing the interlinked functions of managing themselves AND a team. It allows students to apply leadership, and understand the role of strategies in uncertain and unpredictable environments, and the associated cognitive and non-cognitive competencies necessary for success in a virtual team environment (Cooper et al, 2004; Kirby, 2004; Heinonen & Poikkijoki, 2006; Pittaway & Cope 2007; Blenker et al, 2008; Vanevenhoven, 2013). Furthermore, simulations allow students to immerse themselves in the 'real' world of work (Akola and Heinonen, 2006; Lähteenmäki & Uhlin, 2011), forcing them to engage and interact socially with team members in real-time. Simulation also addresses an important dimension of the ever-changing landscape of how businesses operate and in particular the benefits and use of ICT/digital as a learning tool, and as a means of how to use technology in a virtual world to assist in cross functional communications (Tanuri, 2010; White & Le Cornu, 2011; Rai et al, 2012; Bharadwaj et al, 2013).

The business simulation game *(SimVenture)* is introduced to students through a series of online live lectures and seminars conducted through Microsoft Teams in order to provide both the business and technical requirements for simulation completion. Students also attend practice online laboratory sessions to gain familiarity with playing the game. One-to-one team meetings are also organised allowing students to discuss strategy development and report on progress. Each team is also subscribed to a dedicated Microsoft Teams channel - used as the virtual learning space where students can 'share', 'chat', 'upload files', 'meet' and 'send messages', promoting task co-ordination and social interaction.

This study adopts a qualitative approach, gathering data from the class cohort through interviews using a fully standardised questionnaire with open questions at the end of each section. The questionnaire itself was divided into two parts, (1) investigating the profile of respondents, and (2) the components of social interaction. All students (n=48) were invited to participate in the interviews of which 22 students volunteered. Interviews were conducted on an individual basis.

The background profile of respondents was represented by a diverse group of interdisciplinary students across science (4%), engineering (88%) and business (8%). The majority of respondents were male (67%) while 33% were female. The age profile was represented by the largest majority aged 26-30 (47%), followed by 40% aged 20-25. The remaining were aged 31-40, with 10% representing those aged 31-35. A small minority were 36-40. The majority (98%) had previous work experience, with the highest percentage having 3-5 years' experience. While all respondents were completing the programme virtually, 55% were physically located in Ireland. The remaining students were located abroad in India, the United States, China and the UK. Interestingly, all respondents indicated they had previous experience of teamwork, with a significant majority already having virtual teamwork experience.

4. Research findings

The exploration of the empirical results gathered is guided by the components of social interaction proposed by Hoegl (1998), under the key themes of *communication, cohesion, work norms, mutual supports, co-ordination, and balance of members' contributions*.

4.1 Communication

Communication emerged as a distinguishable component of social interaction, with the majority placing significant importance on this. Specific positive responses included: *"communication is the cornerstone of effective teamwork"*; "*managing communication is so important, …Mismanagement of communication leads to misunderstandings"; "honest, open and shameless communication makes for a better team".* The responses highlight respondents recognise the paramount importance of communication (and indeed miscommunication) and its impact on effective teamwork. Open exchange of information is important in terms of social interaction and building effective teams. Challenges regarding communication were also cited, centred around the numerous and various communication mediums available for virtual teams e.g. *"For effective and transparent communication with fellow team members it was necessary to use efficient tools and techniques to communicate…….our team decided to use the following platforms for communication WhatsApp, Trello, Google Data Studio, Sway, Realtime Board, Miro, and Meet"*. Some students felt there were "*too many platforms available", "people have different preferences in terms of how they want to communicate…..some prefer Teams, others Zoom, and others just WhatsApp and e-mail".* This led to tensions and conflict in the team at the outset of the project, and additional tasks for effective team collaboration. Individual comments included: *"we had to choose a platform that suited everyone…..this was difficult as everyone wanted to use different ones"; "I lost a lot of time at the outset of the project as we were all using different ways to communicate which really just caused confusion"; "team members were really frustrated at the start as people were arguing about which platform was the best to use".* Instead of starting team development on a positive note, the communication medium caused tension, whereby members had the added task of choosing a medium that suited all i.e. *"we had to call a meeting with all members to decide on the best way to communicate".* The opportunity to communicate 'live' and 'not live' also presented challenges. Some welcomed the component of live and scheduled communication/meetings, e.g. *"easier to have a live meeting where everybody can talk and discuss project issues together*", "*great to be able to actually communicate with people live…..easier to get your point across".* In contrast, others had a preference for "*logging in when it suits me"* and "*receiving project updates via email",* citing that 'live' meetings were "*very long and time consuming*". Additionally, the communication timing had an impact on the team, mostly attributable to time differences and locations e.g. *"time zones are a big problem in trying to organise a time that suits all team members"*; *"I am working very late into the night in order to meet my team members*".

4.2 Cohesion

Three pivotal aspects of cohesion were explored. Regarding interpersonal attraction, positive comments were received demonstrating positive team cultures and team attraction e.g. *"Building trust among team members is an important aspect while working with virtual teams, however this wasn't a concern in our team since a good rapport was formed within the team in a short span of time; "The team fostered shared leadership and transparent communication leading to increased engagement and productivity";* "*The best part of working as a virtual team with our team was everyone was patient and had that urge to do better in each new quarter run, we never shy away from trying out new things, making new mistakes, carefully mending the previous ones too".* Further, there was a strong sense of commitment to completing the task, evidenced through: "*A collaborative effort from all team members to make key decisions and complete the task at hand to the best of our ability*"; and "*our team had people with specific roles who consistently gave high level of commitments for the purpose of the business simulation*"; Thirdly, group pride/team spirit was an emergent theme, with respondents indicating they *"really enjoyed the process because of the team they were working with… felt great when we made the right decisions".* Added to this was the sense of unity whereby one respondent indicated that *"the team was able to stick together throughout the process and continuously helped each other".* Overall, it appears that there was a strong sense of cohesion amongst the teams, however it should be noted that some respondents cited a lack of '*socially interacting*', being "*deprived of a professional office culture*", the "*online environment was distracting*" and the "*inability to see people's immediate reaction" and "can't see the person and body language*".

4.3 Work norms and co-ordination

In examining the work norms and co-ordination within the team, a varied approach across the teams was evident, with some adopting a formal and structured approach in establishing work norms: "*we had a meeting to set out the overall vision for where the team wants to go together as a unit and set out a solid framework for operation of team activities"; "we drew up a team contract and schedule of activities and deliverables… all team members had to sign this"*. Similarly, another respondent indicated that *"progress meetings were scheduled on a weekly basis, whereby each member presented their key achievements so we all knew what everyone was doing".* Others indicated they had a "*shared folder, which each member was expected to update at the end of every cycle in the game"; "we appointed a team lead who did all the organising around the activities and provided regular updates via e-mail"*. In contrast, some teams appeared to adopt an unstructured approach, perhaps attributable to the fact they were familiar with each other and had established effective group norms through previous projects: "*we all knew each other and how we work together so everyone knew each other's style and that everyone would do the work on time".* Another respondent stated that "*we all want to do well and we know what we have to do… we split the work by asking everyone what they wanted to do",* allowing people autonomy and flexibility over their work. Furthermore, a respondent indicated that "*we are all doing a master's programme so everyone knows the standard of work that is expected and when it needs to be completed",* adding *"no one needs to be babysat… people should be allowed to work to their pace once the task is completed",* echoing previous comments on autonomy and flexibility within teams. Whilst both formal and informal approaches appeared to work, some respondents indicated that co-ordination was hindered by the flexibility that online platforms allow, highlighting that the *"extra flexibility with online can sometimes create scheduling difficulties that impact on productivity as people are working to their own schedules… going to the gym, childcare, etc., and so we had to establish core hours that team members must be available*". This was echoed by another respondent who indicated that "*different individual schedules can lead to meetings at 'unusual' times (outside 9am-5pm) and I felt I had to be available all the time, which wasn't great".*

4.4 Mutual support

Team level support was very strong across all respondents, which was attributed to the team success. This was evidenced through numerous positive comments: "*never felt that I was working on this alone, which really helped";* "*all team members were great to work with and could reach out to someone, day or night if I was stuck"; "good to know you could always WhatsApp someone with a question and one team member would always get back to you really fast"; "found all team members very helpful"; "all our team had a willingness to work/succeed…..we had constant open and honest communication. Every voice is heard and expected to be heard. Sometimes we had to have very long meetings to ensure that all team members are on the same wavelength of understanding".* Only one team expressed negativity in terms of mutual support, highlighting that "*one bad egg spoilt our batch… by not responding to messages, e-mails, meeting requests… offered no help at all - so we just got on with it ourselves".*

4.5 Balance of members contributions

All respondents, with the exception of one individual indicated that all team members made an equal contribution to the completion of the simulation: "*everyone puled their weight on this"; "overall, all team members made an equal contribution to the project… sometimes people were busier than others in the team and we helped each other out"; "everyone did their best on this and supported each other throughout the project to make it successful"; …overall, I felt everyone played an equal part and made an equal contribution".* Conversely, one respondent indicated that "*one person just coasted along and expected everyone else to do their work... working online made it harder to contact this person as they just would not respond".*

Section 5 discusses the findings with a view to drawing relevant conclusions and making some recommendations for educators using virtual teams.

5. Discussion, conclusion, recommendations

The overall aim of this study was to examine the components of social interaction amongst virtual team members completing a business simulation game as part of their master's programme. The experience of virtual teams was a positive student learning experience with encouraging feedback emerging across all components of social interaction, with clear indications that social interaction did take place during task completion. However, students also presented the many challenges they experienced, drawing attention to key

considerations for virtual teamwork, and its facilitation. Communication emerged as a distinguishable component of social interaction on a number of levels including communication platforms choice, 'live' communication, and timing of communication. The choice of communication platform appeared to cause conflict amongst some groups in terms of which platform to choose in order to accommodate *all* student preferences. Thus, it brings to the fore whether students should be mandated to use a prescribed platform selected by faculty/programme co-ordinators. This would be beneficial from a number of perspectives. Firstly, it would reduce the time taken at the outset in making decisions on which platform to use, enabling the task-proper to commence earlier. Secondly, it would allow for standardised communication for all students, and also allowing standardised functionality and features across the virtual platform in which students are working. In addition - and related to platform choice, the respondent data highlights that a variety of formal (e.g. Microsoft Teams, Zoom) and informal (i.e. WhatsApp) platforms are being utilised, begging the question of where is the learning and social interaction *actually* taking place? Is it taking place on formal and monitored platforms (e.g. Microsoft Teams) recommended by the programme co-ordinator or is it taking place in less structured and more informal online settings such as WhatsApp? – an issue that merits exploration in much more detail.

The timing of social interaction also presents varied challenges for students with regard to 'live' communication. Evidently, some students prefer the flexibility that virtual learning offers in being able to engage at a time that suits individual schedules. Others felt that 'live' online communication was more beneficial. Interestingly, the findings note that the increased flexibility that virtual learning affords actually caused more disruption in that all team members' schedules had to be accommodated, resulting in people working outside the norm of core working hours (i.e. 9am-5pm), resulting in some individuals feeling obliged to be available at all times - perhaps having a negative impact on team cohesion. Based on the findings, a proposal to implement a core learning time policy in the programme design to accommodate and manage student expectations could be considered by the programme co-ordinator. This may assist in accommodating all team members' schedules, alleviating potential conflict, leading to improved team cohesion and co-ordination.

Team cohesion was very positive with findings highlighting high levels of collaboration and commitment within the team and to the task at hand, with students displaying a strong sense of unity. However, on reflection, the online environment presented challenges for some students, which impact on social interaction. Students did not have the benefit of seeing people's reactions, body language, or facial expressions and felt they were *"deprived*" of face-to-face contact. This issue may be linked to the choice of virtual platform and the team norms and could be alleviated by setting expectations from the outset that students in virtual teams engage in 'live' sessions, with cameras switched on in an effort to simulate face-to-face team experience as much as possible. With regard to work norms and co-ordination, students adopted both formal and informal approaches in terms of establishing work norms and co-ordinating the project. Students who adopted a more formal approach established team charters and contracts, while some, dedicated 'project managers' to co-ordinate tasks and activities. For teams that adopted an informal approach, it would appear this was effective as a result of trust, and having the benefit of familiarity with team members from previous projects. This informal and less structured approach may not be effective in newly formed teams, hence it may be valuable for educators to encourage students (more especially in newly formed teams) to formalise work norms and task co-ordination through written team contracts/team charters setting out statements of work and responsibility matrix, thus providing clear expectations from the outset for all team members. In addition, the findings demonstrate very high levels of mutual support and commitment coupled with an equitable balance of members' contributions across the teams. It is clear from the responses that there was a strong sense of commitment to both the task and individual team members.

Having examined the components of social interaction and its distinguishable components, the research positively points to virtual teams being an appropriate means for social interaction and team performance, albeit presenting some challenges. This research has brought to the fore constructive and affirmative themes, along with various challenges that virtual teams present. The research also highlights areas for further research, which include a more in-depth investigation of the online learning environment where student interaction takes place (i.e. in this case *Microsoft Teams' individual team channels*). It would be interesting to see the level, frequency, features, and functionality that individual students and their teams use to complete the task at hand.

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