

Perceptions and Processes of Virtual Teamwork Involving Japanese Undergraduate Students

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Abstract

In this paper we examine the virtual teamwork processes by focusing on the perceptions of undergraduate students when they transition, take action and build interpersonal relationships during an intensive multi-university learning project carried out at the time of COVID-19 pandemic. The participants (n=20) were Japanese undergraduate students from three universities enrolled in a synchronous online course in international organizations. The study employed inductive content analysis of students' e-Portfolios completed during the course. It builds on the three-tier model of team processes (Marks, Mathieu & Zaccaro, 2001) as its theoretical framework. The findings are in line with previous research suggesting that virtual teams are multitasking entities that transition through multiple processes simultaneously and consequentially to achieve team goals. We conclude with implications for online teaching and collaborative learning.

Keywords: Japanese Undergraduate Students, Virtual Teamwork, Team Processes, Multi-University Course

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Introduction

Virtual teamwork is becoming an important element of undergraduate education, providing students with the opportunity to acquire essential team working skills. Previous research has extensively addressed teamwork in a conventional face-to-face environment involving college students (Hansen, 2006). These studies focus on various dynamics related to student teams, such as team cohesiveness (Bravo, Catalán & Pina, 2019), teamwork outcomes, goal attainment and learning satisfaction, teamwork experiences (Wilson, Ho & Brookes, 2018), as well as performance measurement and assessment (Britton et al., 2017). It was argued in previous studies that compared with face-to-face collaborative learning, virtual collaborative learning is more demanding for students as the online context involves different tools and methods of communication and collaboration (Kopp, Matteucci & Tomasetto, 2012).

Collaborative learning among students can take place in various online settings using learning communities, wikis, blogs, discussion prompts and other *virtual taskwork*, where students are assigned to a group to share their experiences or engage in the course material with each other (Page, Charteris & Berman, 2020). However, studies suggest that *virtual teamwork* is different from conventional collaborative online learning in that the former involves teams with clear tasks to perform, interdependent members, and shared outcomes. Also, communicating with other members electronically does not transform a group of students into a virtual team (Gibson & Cohen, 2003).

By thematically synthesizing and examining the perceptions of students of their virtual teamwork participation, this study aims to map out the occurring team processes along transition, action and interpersonal dimensions. Following the team processes model developed by Marks, Mathieu and Zaccaro (2001), this study builds on the assumption that virtual teamwork is based on a multiphase and time-based interaction among team members working together to accomplish concrete and shared outcomes.

Literature review

Despite ongoing debates about the degree of virtualness needed in the making of virtual teams, many researchers agree that these teams are functional units whose members meet and work using technology as their primary medium of communication to achieve shared goals (Bell & Kozlowski, 2002). Compared to conventional face-to-face teams, members of virtual teams are not constrained to the same geographic location and can be located anywhere in the world (Montoya-Weiss, Massey & Song, 2001). Members of a virtual team may belong to the same organization but physically dispersed across different geographic locations or may be affiliated with different organisations and work at the same geographic location (Martins, Gilson, & Maynard, 2004).

Virtual teams often have no choice but to communicate electronically in order to perform their tasks and effectively coordinate their activities (Gibson & Cohen, 2003). Therefore, teams whose members are dispersed across different locations must choose optimal technology to replace in-person interaction (Martins, Gilson, & Maynard, 2004). They may use various communication technologies that range in media richness and sophistication (Workman, Kahnweiler & Bommer, 2003), as well as in the degree to which they enable real-time versus asynchronous teamwork (Riopelle et al., 2003).

It is likely for a virtual team to include members from multiple disciplines, functions, organizations, countries, and cultures or to consist of members from the same profession, organization, and culture (Gibson & Cohen, 2003). The greater the geographic distance between the virtual team members as well as their organizational diversity, the higher the likelihood that the team will include members from different professional, cultural and socio-linguistic backgrounds (Chudoba, Wynn, Lu, & Watson-Manheim, 2005).

Being geographically distant, using communication technology and working at different organisations do not make a group of individuals a team. Any team, including a virtual team, needs to have a solid task to perform as well as interdependent members with shared responsibilities and outcomes (Hertel, Geister & Konradt, 2005). Task interdependence occurs when the members of a virtual team need to coordinate their activities regularly so that the input from one member significantly affects the output by other team members (Thompson, 1967). Studies suggest that the higher the level of goal, task and outcome interdependence, the greater the degree of team’s motivation, communication, cohesion, and overall effectiveness of teamwork (Hertel, Konradt, & Orlikowski, 2004).

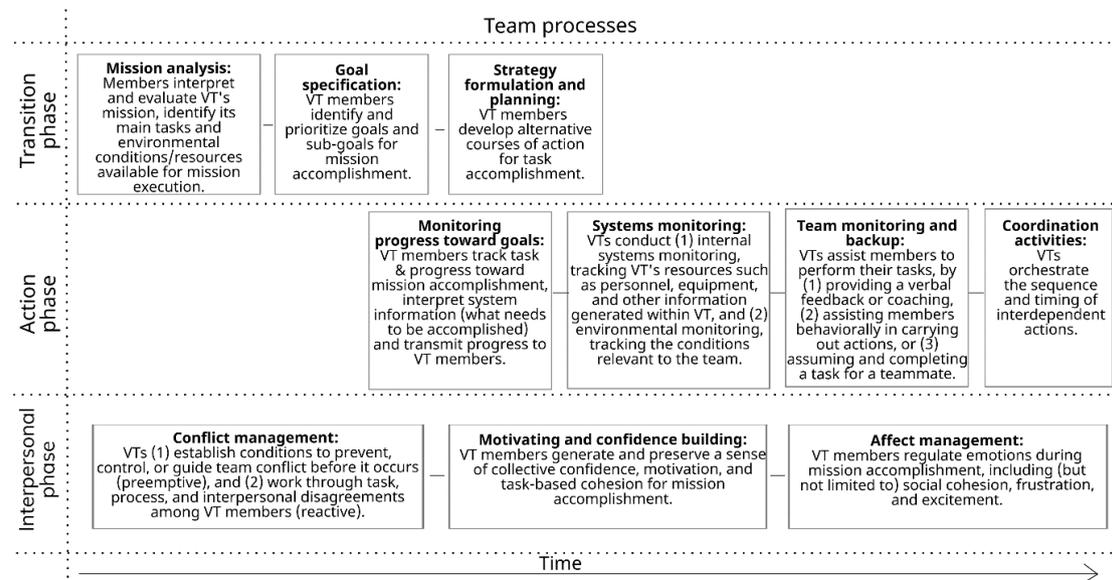


Figure 1: The taxonomy of team processes (adapted from Marks et al 2001)

Previous research on virtual teamwork suggests that virtual teams are complex social entities and many factors determine their functionality and effectiveness (Gibson & Cohen, 2003). The prevailing framework often mentioned in the studies of virtual teams is referred to as input-process-outcome (I-P-O) model (Martins, Gilson, & Maynard, 2004). According to the I-P-O framework, inputs represent the physical and organisational characteristics of a team, including member ‘knowledge, skills, abilities and other characteristics’ referred to as KSAOs (Krumm et al., 2016) as well as team size, the nature of task performed, the type of communication technology used, and whether or not the members have prior collaborative work experience (Kirkman et al., 2004). Team processes are defined as members’ interdependent acts that convert inputs to outcomes through cognitive, verbal, and behavioral activities directed toward organizing taskwork to achieve collective goals, and are inclusive of three distinct

processes: (1) transition, (2) action, and (3) interpersonal (Marks, Mathieu & Zaccaro, 2001)

Virtual teamwork and relationships among its dimensions were extensively studied from the business and organizational perspectives. Also, there is a plethora of studies focusing on virtual collaborative learning and teamwork in the higher educational context, notably in pre-COVID period. However, one can also observe that there has been little research to date on the process-oriented dynamics of virtual teamwork in a multi-university setting. In this study, we aim to address some of these gaps in the literature.

Methodology

The participants in this study included 20 undergraduate students who were enrolled in a multi-university online course in international organizations taught during the summer of 2020. The students were from a humanities-specialized and two technical universities in the Tokyo area which were part of an inter-university agreement allowing their students to attend courses and earn credits outside their respective institutions. The cohort consisted of 14 females (70%) and 6 males (30%). The participants' ages ranged from 19 to 23 years ($M = 20.4$, $SD = 1.3$). 17 students (85%) were Japanese and 3 participants were international students from Northern Europe, South-East Asia and East Asia, respectively. The study used virtual ethnography to examine fifteen unique combinations of virtual teams working on three tasks. This qualitative approach allows an in-depth and real-time observation of processes emanating from the recordings of student perceptions. Because “virtual worlds are multi-user in nature and they exist as shared social environments with synchronous communication and interaction” (Boellstorff et al., 2012: 7), virtual ethnographic approach helps to explore broader cultural, social and other dynamics within online media practice.

The primary data were collected through observation and analysis of e-Portfolios created by students during the course using shared Google Docs files. E-portfolio is a personal digital record that contains evidence about one's accomplishments in the form of artifacts and reflection on learning” (Balaban et al., 2013). Qualitative data was coded and analyzed using MAXQDA version 2020 (Figure 2).

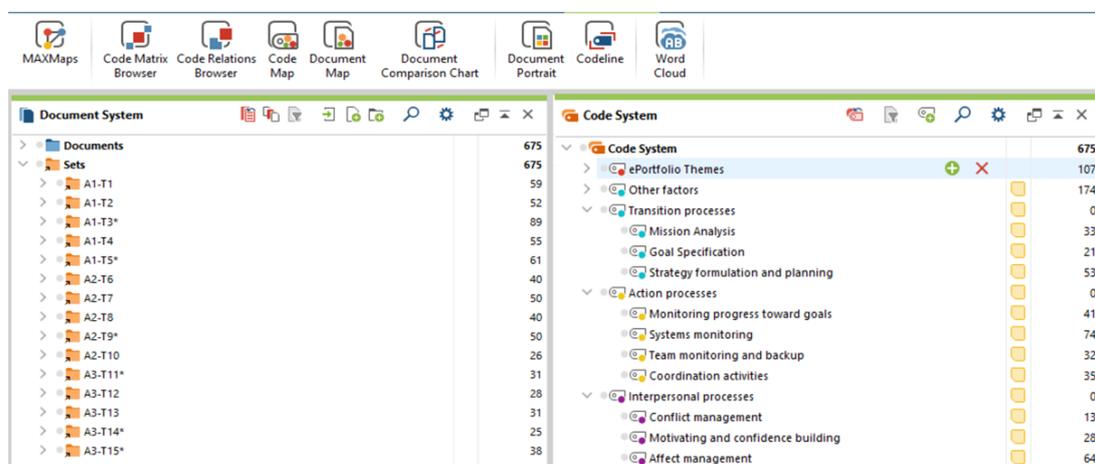


Figure 2: E-Portfolio analysis and coding in MAXQDA Ver.2020

Results

A total of 63 pages of students' e-Portfolio entries related to the three main virtual taskwork have been analysed (Figure 3). Teams 1-5 worked on assignment 1 and their members' entries produced 316 units of meaning related to their teamwork dynamics, whereas teams 6-10 and teams 11-15 worked on assignments 2 and 3, producing 206 and 153 units of meaning, respectively. Twenty e-Portfolios yielded 675 units of meaning in total, from which 394 units (58.4%) have been found to be directly related to team processes.

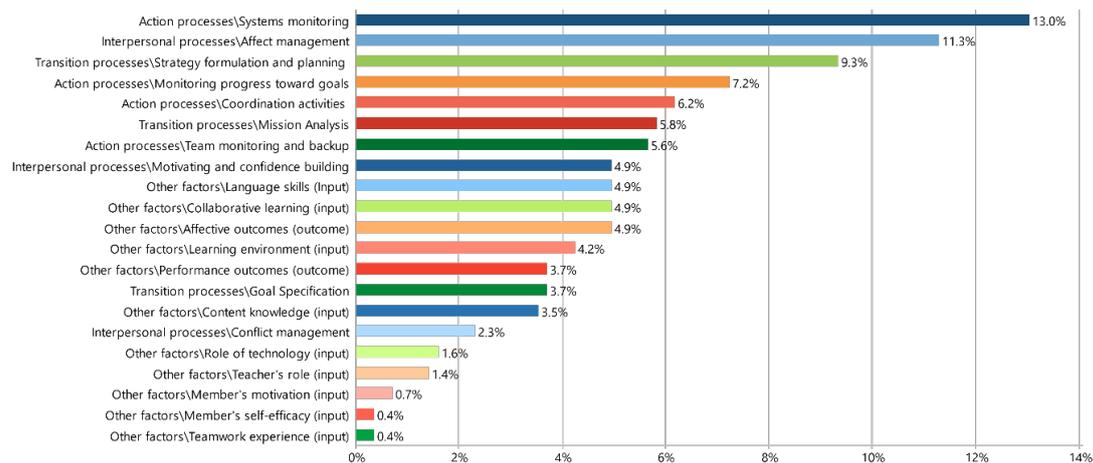


Figure 3: Frequency distribution of themes across e-Portfolios

Analysed e-Portfolio content (Figure 3) indicated that across all Input-Processes-Outcomes (I-P-O) themes, Systems monitoring/Action processes (13.0%), Affect management/ Interpersonal processes (11.3%) and Strategy formulation and planning/ Transition processes (9.3%) have been crucial in invigorating virtual teams toward task accomplishment. In addition, themes related to Action processes, such as Monitoring progress toward goals (7.2%) and Coordination activities (6.2%) have often been highlighted by virtual teams. On the other hand, themes related to Goal specification/Transition processes (3.7%) and Conflict management/Interpersonal processes (2.3%) have been least frequently reflected in data. To various degrees, e-Portfolio data also seem to highlight the role of team inputs (e.g., language skills, collaborative learning, general learning environment, technology, etc.) and outcomes (i.e., affective and performance) during virtual team's task accomplishment.

How do Japanese undergraduate perceive virtual team processes?

Below we provide detailed description and discussion of team processes across fifteen teams (see Figures 4-6).

Mission analysis. Results suggest that several virtual teams, especially those with diverse memberships, have been actively involved in the interpretation and evaluation of their teams' mission. (*Each of our members introduced their articles, and then we decided which one article we would use for our project [sic]. A1-T3*). These teams also attempted, though sometimes unsuccessfully, to identify their main tasks as well as the environmental conditions, available team resources and time constraints (*For a long time we discussed how to present and who should do each part. The problem was that*

we couldn't easily decide on how to perform a puppet or music show on the Zoom [sic]. A2-T6).

Code System	A1-T1	A1-T2	A1-T3*	A1-T4	A1-T5*	SUM
Transition processes						0
P1-Mission Analysis	■	■	■	■	■	8
P2-Goal Specification	■			■	■	4
P3-Strategy formulation and planning	■	■	■	■	■	10
Action processes						0
P4-Monitoring progress toward goals	■	■	■		■	17
P5-Systems monitoring	■	■	■	■	■	22
P6-Team monitoring and backup	■		■	■	■	13
P7-Coordination activities	■	■	■		■	12
Interpersonal processes						0
P8-Conflict management		■	■	■	■	4
P9-Motivating and confidence building	■	■	■	■	■	11
P10-Affect management	■	■	■	■	■	25
Σ SUM	21	20	42	20	23	126

Figure 4: Matrix overview of team processes in virtual teams #1-#5 in MAXQDA

Goal specification. During goal specification process virtual teams sought to identify and prioritize their goals and subgoals for mission accomplishment. E-Portfolio analyses indicate that half of the teams went through this process to develop and assign overall mission goals and subgoals (*We set up several goals, such as a) making the presentation as short as possible, b) using less specialized term, c) using less politics/treaty/agreements, more real-life examples/solutions, d) making it visual, such as using background videos on Zoom, e) doing something different to attract the viewers' attention [sic]. A2-T9).*

Code System	A2-T6	A2-T7	A2-T8	A2-T9*	A2-T10	SUM
Transition processes						0
P1-Mission Analysis	■	■	■	■	■	9
P2-Goal Specification	■	■	■	■	■	10
P3-Strategy formulation and planning	■	■	■	■	■	30
Action processes						0
P4-Monitoring progress toward goals	■	■	■	■	■	13
P5-Systems monitoring	■	■	■	■	■	33
P6-Team monitoring and backup	■	■	■	■	■	11
P7-Coordination activities	■	■	■	■	■	12
Interpersonal processes						0
P8-Conflict management	■		■	■	■	5
P9-Motivating and confidence building		■	■	■	■	9
P10-Affect management	■	■	■	■	■	23
Σ SUM	34	37	28	38	18	155

Figure 5: Matrix overview of team processes in virtual teams #6-#10 in MAXQDA

Code System	A3-T11*	A3-T12	A3-T13	A3-T14*	A3-T15*	SUM
Transition processes						0
P1-Mission Analysis	■	■	■	■	■	16
P2-Goal Specification	■		■	■	■	7
P3-Strategy formulation and planning	■	■	■	■	■	13
Action processes						0
P4-Monitoring progress toward goals	■	■	■	■	■	11
P5-Systems monitoring	■	■	■	■	■	19
P6-Team monitoring and backup		■	■	■	■	8
P7-Coordination activities	■	■	■	■	■	11
Interpersonal processes						0
P8-Conflict management	■		■			4
P9-Motivating and confidence building	■	■	■	■	■	8
P10-Affect management	■	■	■	■	■	16
Σ SUM	26	17	25	21	24	113

Figure 6: Matrix overview of team processes in virtual teams #11-#15 in MAXQDA

Strategy formulation and planning. E-Portfolio entries suggest that many teams have been active in the formulation of alternative courses of action for mission accomplishment. This process involved decision making about how team members should achieve their missions (*Rather than deciding on the topic through headlines search, we thought it would be efficient first to choose the topic which we were familiar with, and later research it separately and more extensively [sic]. A1-T5*) as well as discussing expectations and relaying of task-related information (*We knew that using the theories to make a presentation would bore the listeners. With this in mind, we decided to make it more like storytelling [sic]. A2-T10*).

Monitoring progress toward goals. We observed that several teams were actively tracking their progress toward mission accomplishment by interpreting the current situation in terms of what needed to be accomplished for goal attainment (*During the group meeting as we all got deeply involved in the lecture's contents and specific examples of organizations, however overall, we were struggling to organize our ideas [sic]. A2-T12*). Some team members tried to provide feedback to their team on its goal accomplishment status so that members could determine their progress and take action if necessary (*We have experienced running out of time during planning and not being able to present the issue properly earlier, so I tried to monitor time and keep the team informed [sic]. A1-T5*).

Systems monitoring. Systems monitoring appears to be the most frequently mentioned process-related characteristic of virtual teamwork in this study. From the data, one could observe that many teams tracked their internal resources and other environmental conditions during taskwork. Some teams focused on internal systems monitoring, by tracking team resources, such as skills, equipment, and other information that was generated within the team (*Fortunately we had good English speakers, so we didn't have any big problems with this assignment. Everything went smoothly [sic]. A2-T6*).

Team monitoring and back up. Team monitoring and backup processes have been observed across many teams. These and other teams witnessed how their members tried to assist each other to perform taskwork by providing verbal feedback or coaching (*Since I have already known about theories of international relations, I explained them*

to other teammates by using simple real-life examples [sic]. Subaru, A1-T1; Some other members explained clearly by using easy English words [sic]. A1-T3).

Coordination activities. Coordination activities have been mentioned often in students' e-Portfolios. These statements referred to the handling of synchronous activities and involved information exchange and mutual adjustment of action (*So, first, I asked the team members about any current events they knew or might be interested in, and we all agreed to research about the ban of Tik Tok app in the United States [sic]. A1-T5*). This feature of teamwork seems to be closely connected with the taskwork required of the team (*While we had difficulty with deciding our team's topic, I found news about ASEAN and that was when we finalized our search and started our discussion about ASEAN organisation [sic]. A1-T1*).

Conflict management. Although team members seem to have built constructive and friendly relationships with each other, from e-Portfolios one can nonetheless observe two forms of conflict management processes that were used by some members to mitigate conflict. For instance, some members engaged in pre-emptive conflict management which included establishing conditions to prevent or guide team conflict before it occurred (*When we discussed the presentation format. Everyone suggested ideas about how to do it. I think, at that time, everyone showed interest and listened patiently to each other's suggestions so we could avoid conflict [sic]. A2-T6*).

Motivating and confidence building. Motivating and confidence building occasionally occurred during virtual team interactions. These processes were evident in members' intent to generate and preserve a sense of collective confidence, motivation, and cohesion (*We were always in the good mood, which enabled us to say our own opinions more freely. [sic] A3-T11**; *But other students participated in the lesson actively, so I was impressed and motivated [sic]. A1-T4*).

Affect management. Affect management was evident during various taskwork when members regulated emotions related to social cohesion (*Despite the ease of online conversation through the screen, talking with others was tense [sic]. A1-T5**), frustration (*I soon regretted it because there was a lot of research that needed to be done [sic]. A2-T6*), and excitement (*I really enjoyed the groupwork [sic]. A1-T4*).

Implications and Conclusions

The study observed that in the transition processes, virtual teams formulated their mission, specify goals, and strategies to achieve these goals. Previous empirical studies have found that embedded goal-setting structure helped virtual teams achieve stronger collaboration, better team cohesion and commitment as well as better perceived decision quality and more decision alternatives compared to virtual teams without goal-setting structures (Huang, Wei, Watson & Tan, 2003). Researchers also argued that effective virtual teams tend to establish a set of rules that help team members communicate and collaborate productively (Blackburn et al., 2003).

Action processes, on the other hand, could be observed in the degree of coordination, communication, and support among team members, as well as monitoring team's resources and performance (Marks, Mathieu & Zaccaro, 2001). Studies looking into virtual team processes tend to emphasize coordination and communication (Martins,

Gilson & Maynard, 2004), as well as dynamics of engagement, mutual support, and progress monitoring (Costa, Passos & Bakker, 2014).

Interpersonal processes encompassed conflict management, affect, motivation, confidence building and other processes that govern human relationships inside a team (Varela & Mead, 2018). These relationships play an important role in strengthening the team's morale, motivation, trust, and sense of belonging (Blackburn et al., 2003). Some researchers argued that interpersonal processes underlie both the transition and action phase processes (Fisher, 2014). Studies focusing on students' teamwork specifically found that perceptions of improvement in skills and learning, as well as the development of a more positive attitude toward teamwork take place within interpersonal processes (Bravo, Lucia-Palacios & Martin, 2016). In sum, the findings of this study are in line with previous research suggesting that virtual teams are multitasking entities that transition through multiple processes simultaneously and consequentially to achieve team goals.

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