

〔Article〕

The Potential of Project-Based Teaching in Virtual Teams in Universities: Educational Benefits Expected in the Post-Pandemic Era

Azusa Ebisuya and Gayan Prasad Hettiarachchi

INTRODUCTION

Online and virtual education played an important role before and during the COVID-19 pandemic and has shown educational benefits even after the pandemic. Even before the COVID-19 pandemic, the significance and necessity of online education had already been highlighted in the academic field. This is shown by the fact that many universities and educational institutions have so far offered massive open online courses (MOOCs) through platforms such as Coursera, edX, and Khan Academy (Bralić & Divjak, 2018; Lan & Hew, 2020; Sinclair, 2016). These platforms have enabled students around the world to access quality education for free or at low cost. Tools such as videoconferencing systems (e.g., Zoom, Google Meet), learning management systems (LMS) such as Moodle and Blackboard, and other digital resources have already been used in online education before the pandemic. On the other hand, most of them were often perceived as a complement to face-to-face education, not a replacement for it (Gamage, Ayres & Behrend, 2022; Mpungose & Khoza, 2022; Salcido-Cibriána, Ramosb, Jiménez & Blancab, 2019).

When COVID-19 became a pandemic, schools, universities, and other educational institutions around the world had to immediately close their physical campuses and fully resort to online teaching and learning. This period is often referred to as the “Emergency Remote

Teaching” period (Bond, Bedenlier, Marín, & Händel, 2021; Rubtsova, Semenova, Kats & Zheleznyakova, 2023). Many instructors and students were forced to adapt to the digital learning environment with little preparation, which sharply exacerbated inequalities in education between those who had ready access to the necessary technology (e.g., laptops, tablets, stable Internet connections) and those who did not (Jafar, Ananthpur & Venkatachalam, 2023). In addition, many instructors were not trained in digital teaching and were forced to urgently implement online education in this state, which also affected the quality of education (Richards & Thompson, 2023; Zhang, 2023). Even when the infrastructure for online education was in place, distractions and lack of face-to-face interaction often made it challenging to keep students engaged in the virtual classroom (Sato, Condes Moreno, Rubio-Zarapuz Dalamitros, Yañez-Sepulveda, Tornero-Aguilera, Clemente-Suárez, 2024; Wut & Xu, 2021).

During the long pandemic, faculty and students have become accustomed to the online education system, and its benefits have become apparent. In addition, without making the digital infrastructure that was developed out of necessity during the pandemic a thing of the past, educational institutions in many countries are still using a hybrid model that combines both online and face-to-face education, even after the pandemic is over (Angwaomaodoko, 2024; Bralić & Divjak, 2018; Thahir, Widiawati, & Baitillah,

2023). This is also referred to as a “blended” course, where students can choose to attend lectures in person or online according to their own schedule (Hill & Smith, 2023; Kömür, Kılınc & Oku, 2023). Some institutions are also considering and implementing artificial intelligence and virtual reality to further pursue effective education offered online (Alshahrani, 2023; Cabrera-Duffaut, Pinto-Llorente & Iglesias-Rodríguez, 2024; Hassan, Devi & Ray, 2022).

Thus, while online education was a supplementary tool before the pandemic, it evolved into a necessity during the pandemic, and now, after the pandemic is over, it offers flexibility, accessibility, and new ways for faculty and students to interact. It indicates that the online education, in its various forms and methods, will possibly become a permanent method used in educational settings worldwide moving forward.

On the other hand, the learning effectiveness of online education and maintaining sufficient student engagement in learning remain essential issues. Among them, difficulties in communication and interaction among class participants and in building trust among members are often cited as serious problems (Bhatia, 2012; Donelan & Kear, 2024; Papadopoulou, Andreou, Kanellis & Martakos, 2000; Pitts, Wright, & Harkabus, 2012). These problems arise from the dependence on interaction among class participants. It shows that in education offered online, the critical problems are likely to be more apparent when project-based classes are conducted as virtual groups or virtual teams rather than one-way delivery of lectures from the teacher. Project-based activities of virtual teams is a central function in the industry, especially after the pandemic. Many organizations continue to allow hybrid work-styles to their employees, hence, virtual teams working on projects has become common place. The ability of students to learn and accustom themselves to

project-based activities in virtual teams is expected to play a useful role in their success as industry professionals after graduation.

Therefore, this paper will conduct a literature review of cases of project-based educational practices that have been provided in virtual environments in universities, targeting university education where project-based teaching is presumed to be participant-driven and can be practiced autonomously. The literature review will include both pre-pandemic and post-pandemic COVID-19 practices. In doing so, we aim to gain a foothold in identifying universal challenges for project-based teaching management in virtual environments at universities.

A Comprehensive Perspective on Virtual Teams

Virtual teams refer to team formations in which geographically dispersed team members communicate using Internet networking systems and electronic devices to work together to achieve common objectives and goals (Klitmøller & Lauring, 2013; Mattarelli, Tagliaventi, Carli & Gupta, 2017; Oertig & Buerger, 2006). When teams with dispersed members collaborate in a virtual format, there would be an advantage in being able to flexibly manage the team without being constrained by physical location. On the other hand, it would be disadvantageous in that the different work locations of each member and time differences make it difficult to share information directly and discuss freely among team members (Ryssen & Godar, 2000; Stolovitsky, 2012).

To date, most reviews of practical cases of the use of virtual teams have focused on teams composed in companies and other non-academic organizations (Abarca, Palos-Sanchez & Rus-Arias, 2020; Cagiltay, Bichelmeyer, & Akilli, 2015; Dulebohn & Hoch, 2017; Ebrahim, Ahmed & Taha, 2009; Espinosa, Slaughter,

Kraut, & Herbsleb, 2007). In recent years, teams have increasingly been formed by convening members from multiple companies through strategic alliances, mergers, and acquisitions (Abarca et al., 2020; Dulebohn & Hoch, 2017). Such teaming is considered useful from a managerial, strategic perspective because it allows individual organizations to bring their diverse and unique skills into a new organizational form (Ebrahim et al., 2009). On the other hand, when such teams operate in a virtual environment, especially when they are formed for short-term, high-end projects with time constraints, there is often not enough time or freedom for members to have sufficient ice-breaking opportunities and personal relationships with each other. Therefore, each member tends to attempt to collaborate with the others based on their own developed understanding of business practices and project process models (Dhani & Sharma, 2019; Ebisuya, Sekiguchi, Hettiarachchi, 2021; Ellis, 2006; Greenspan, 1989; Lenaghan, Buda, & Eisner, 2007; Sharma, Dhar & Tyagi, 2016).

Proposition 1: In both companies and higher education institutions, the common characteristics of virtual team projects would be limited opportunities for communication among team members and a lack of opportunities for interaction that is not directly related to the execution of objectives. In addition, the limited communication methods and lack of additional interaction may make it difficult for members to get to know each other and build trust within the virtual team. Nevertheless, the type and content of communication and interaction required to achieve objectives are expected to differ between virtual teams in companies and virtual teams organized as part of university education. These differences may also lead to differences in the consideration of solutions for overcoming challenges and in the methods used to implement those solutions, so they need to be dis-

cussed separately.

For this reason, this paper will review previous studies of virtual team projects implemented as part of online courses in university education to compare with strategies for dealing with communication and communication problems that are necessary in virtual teams composed of members in companies. This process will provide a better understanding of the virtual education required for virtual teams composed of students who do not have strong financial and/or social interests in each other.

Cases of Virtual Team Project-Based Teaching at Universities

Pre-pandemic cases

As noted above, pre-pandemic online education and the accompanying practice of virtual team projects were not a substitute for face-to-face team collaborative teaching but, in many cases, were positioned only as a complement to face-to-face teaching (Gamage et al., 2022; Mpungose & Khoza, 2022). Therefore, in many cases, they were introduced for the purpose of stimulating team collaboration and as part of the pursuit of convenience. As an example, Oyelere et al. (2020) examined the usefulness of virtual laboratories (VLabs) in ICT (information and communication technology) courses in university education; VLabs allow students to conduct experiments and practical work online without having access to a physical laboratory and therefore have flexibility in terms of time and location. This is an advantage because VLabs allow for this, whereas physical labs limit the ability of multiple students to access the same resource at the same time. Nevertheless, the authors point out that VLabs cannot completely replace the need for human interaction in education. They also noted that VLabs are highly technology-dependent and, therefore, cannot be expected to be effective in educating stu-

dents who do not have access to the Internet or appropriate hardware, as has been pointed out in previous studies (Jafar et al., 2023; Richards et al., 2023; Sato et al., 2024; Wut & Xu, 2021; Zhang, 2023).

One area that entered relatively early into teaching in virtual environments involving student-to-student interaction is language learning courses; Vinagre & Esteban (2018) explored the use of distance collaboration in language learning, particularly among students from different cultural backgrounds, and how virtual exploring and interacting among international students enhances language skills and cultural understanding. The study was conducted as part of a language course for university students, in which students from different countries were paired with each other for cross-cultural communication. The authors noted that this remote collaboration project led to significant improvements in students' language skills, especially communication skills. Participated students attributed this to the fact that authentic interaction with native speakers and students from different linguistic backgrounds provided realistic practice and allowed participants to understand better the cultural context of the language they were learning.

On the other hand, Vinagre & Esteban (2018) observed situations where coordinating across time zones and managing different academic schedules was a challenge, which led to less interaction between students. In addition, some students struggled to incorporate the technology required for virtual collaboration, and frustration was observed in some cases, which led to a decrease in participation, as has been pointed out in Oyelere et al. (2020) other related studies (Jafar et al., 2023; Richards et al., 2023).

Taking the virtual team project a step further, Tras et al. (2013) evaluated the effectiveness of Global Virtual Collaboration (GVT) as a

tool in international management education. In this project, more than 6,000 students from 80 universities in 43 countries participated and worked in the assigned GVTs for two months to develop business proposals for real or virtual client companies. The project aimed to provide participating students with real-life experience of cross-cultural and virtual collaboration by simulating a global work environment; according to Tras et al. (2013), the GVT project contributed to developing students' intercultural communication skills. Results of surveys conducted during and after the project showed that students became more aware of cultural differences, collaborated effectively with peers from diverse backgrounds, and improved their teamwork. Participation in the project also exposed students to the challenges and complexities of working across cultures and time zones. It provided practical insights that can be applied in real business situations.

Nevertheless, the GVT project by Tras et al. (2013) also identified several challenges, including a lack of understanding and skills in the use of technology among participating students, language and cultural barriers, and different attitudes toward participation in the project. One of the most serious challenges identified was the coordination of interaction methods among the team members, as Vinagre & Esteban (2018) that is introduced above also mentioned. Students initially expected cultural and language differences to be the most significant challenge, but later reported that coordinating tasks and communication among members proved to be more difficult than expected. As a result, the more motivated members of the project tended to feel frustrated after extended periods of uncertainty about the team's roles and expectations.

Similar to Tras et al. (2013), Ferreira-Lopes & Rompay-Bartels (2020), as an example of a virtual project that required deeper interaction

between participating students, conducted a collaboration between students from Deusto Business School (DBS) in Spain and Arnhem Business School (ABS) in the Netherlands. The project aimed to develop students' intercultural competencies and strengthen their ability to adapt to intercultural work environments through joint projects on cultural analysis and international business. The results of the project showed that the project improved the cross-cultural awareness and teamwork skills of the participating students, as the study of Tras et al. (2013) also suggested. On the other hand, some of the participating students felt that the workload was too much, and miscommunication repeatedly occurred among the team members regarding the management of work time slots and expectations, which was pointed out as a problem. These issues have been similarly pointed out in the previous studies mentioned above.

Thus, although online education and project-based courses with virtual teams had been incorporated even before the pandemic, many challenges still remain. The study of Noteborn, Carbonell, Dailey-Hebert and Gijsselaers (2012), who investigated students' willingness to participate and learning outcomes for online classes that include interaction, pointed out the importance of real-time interaction among students in enhancing the effectiveness of virtual classes in university education. Even in a virtual environment, real-time interactions among students are expected to strengthen their trust in each other, and thus, interaction is expected to be more effective.

Cheng, Fu, Han and Zarifis (2016) who investigated trust formation in virtual team interactions, analyzed trust formation among members of each group after grouping them into face-to-face and online formats. The results indicated that, although there were individual differences, students tended to take longer to build trust

due to technical problems with the online platform and miscommunication that interfered with collaboration, and they also had problems maintaining the trust that they had built. Students with higher levels of trust in their group members tended to perform better in both the mid-term and final evaluations of the project, suggesting that building trust among members is key to the success of team projects. As pointed out in the aforementioned study (Noteborn, 2012), although it can be possible to build trust to some extent through real-time interaction even in a virtual environment, it is still more difficult to do it in a virtual environment than in a face-to-face classroom.

Proposition 2: Similar to the problems faced by virtual teams formed among employees in a company, virtual teams in university education face difficulties in building trust among members due to limited communication and interaction compared to face-to-face collaborations. However, online courses, as practiced prior to the pandemic, were primarily a complement to classes conducted in person. In the pre-pandemic period, the virtual team project-based courses served to diversify the educational experience by providing students with an additional, open online environment that could be enjoyed face-to-face in a closed, physical classroom. Therefore, although the quality of learning should have been compromised when students participated in the virtual team project due to the degree of adaptation to the technology and communication difficulties on the part of the students, both faculty and students were able to selectively avoid the issues because of the face-to-face educational options available to them.

Post-pandemic cases

The pandemic made online classes mandatory for both faculty and students and the lack of alternatives further exacerbated the imbalances

identified earlier as problematic regarding participants' accessibility to the Internet and possession of digital devices, as well as their skills in using them (Jafar et al., 2023; Richards et al., 2023; Sato et al., 2024; Wut & Xu, 2021; Zhang, 2023). This also led to the identification of inequality in the education enjoyed by individual learners as a serious problem (Sato et al., 2024; Wut & Xu, 2021).

On the other hand, various online student-to-student activities that were merely complementary to education before the pandemic also became essential to learners during the pandemic. For example, Huang (2024) examined the usefulness of virtual communities of practice (vCoPs) used by doctoral students. The results revealed that vCoPs are effective in significantly improving networking opportunities for doctoral students, enabling them to build professional relationships and collaborate across institutions. In addition to this, the vCoP also noted that such communities also provide emotional and psychological support for the students who use them, helping to alleviate the isolation and stress that doctoral students may have as they continue their research during the pandemic. Such online communities allow students to easily access resources and peer feedback, thereby enhancing and maintaining academic quality and efficiency even in an environment with limited physical interaction.

As faculty members became more familiar with online teaching methods and acquired new skills during the pandemic, and students became more comfortable with digital tools, they were able to implement team projects flexibly and effectively in a fully remote environment. As an example, Donelan & Kear (2024) reported on the use of global virtual teams in a technical communication project. In this project, students from several institutions collaborated to create and translate technical documentation. The program allowed students to improve their techni-

cal communication skills, cross-cultural understanding, and effective use of online tools while being aware of language and time zone differences. On the other hand, as many of the related studies up to that point have pointed out (Jafar et al., 2023; Richards et al., 2023; Sato et al., 2024; Wut & Xu, 2021; Zhang, 2023), some students struggled with the lack of face-to-face interaction, which affected team cohesion and overall project quality and the authors suggested the need for more preparation in advance and further support during the project to facilitate communication among the members.

As the period of time during which education could only be achieved through online interaction dragged on, research also progressed into bringing the virtual learning environment as close as possible to the real environment. For instance, Hassan et al. (2022) conducted a systematic review of the potential educational applications of Educational Virtual Reality Games (EVRGs), which are designed to enhance learning through interactive and immersive experiences. The authors analyzed the technical, pedagogical, and gaming characteristics of various VR games used in educational contexts and found them effective in enhancing student learning and engagement, and interact with others through trial and error and, ultimately, experimentation. The authors, therefore, suggested that EVRGs could be a breakthrough educational tool that leads to deeper understanding and knowledge retention than virtual team projects in traditional online education.

While the Hassan et al. (2022) initiative is innovative, as with other VR applications, EVRG requires VR headsets and compatible devices, which limits its use if they cannot be arranged. In addition, before introducing VR games, faculty members need to fully consider whether the use of EVRGs is consistent with their educational goals and whether there are potential negative factors such as excessive immersion in

games and learning distraction, that could be brought to students' attention.

In another study aimed at exploring the potential for implementing VR into university education, Cabrera-Duffaut et al. (2024) conducted a systematic literature review examining the role of VR in enhancing competency development in university education. VR captures students' visual and auditory senses and it can create a three-dimensional digital space and provide a more profound psychological and physical experience. This immersive experience is expected to allow students to engage more deeply with the content and facilitate their understanding of even complex subjects. The study of Cabrera-Duffaut et al. (2024) indicated that VR is particularly effective in developing competencies that require hands-on experience, such as technical skills in fields such as engineering, medicine, and architecture. The authors noted that VR provides the simulation of real-world scenarios, allowing students to practice and hone the necessary skills in a controlled environment. In addition, the immersive nature of the work will enable students to explore content in greater depth while maintaining their attention span, which is expected to improve student knowledge retention and understanding, as well as engagement.

While stating that the incorporation of VR into education can be effective, Cabrera-Duffaut et al. (2024) noted that funding for VR implementation can be a challenge, as Hassan et al. (2022) also pointed out. Incorporating VR into university education requires significant investment in both hardware and software, as well as ongoing maintenance and updates. It would also require a comprehensive VR training program for faculty, as faculty must be able to effectively utilize VR technology in advance. This also will require financial, time, and other resources, so VR implementation will potentially be a risky decision for the university adminis-

tration.

Proposition 3: During the pandemic, online courses became a complete alternative to face-to-face classes due to the urgent and serious need. Therefore, in order to maintain the quality and benefits of education, activities and projects involving student interaction, which are usually incorporated in face-to-face classes, had to be conducted in a virtual environment. Initially, both the faculty members provided team collaboration opportunities in the virtual environment, and the students participating in the classes struggled with communication and interaction within the teams. However, as both sides adapted to the technology, they gradually became able to effectively facilitate real-time communication and overcome the challenges to a certain extent.

Proposition 4: Even as the pandemic is being settled, there are studies that focused on the benefits of virtual team project-based classes from the perspective of providing international educational opportunities and expanding students' perspectives. Therefore, while education in physical classrooms is being resumed, some institutions are also operating online classes in parallel. On the other hand, despite the advantages of online classes that do not require physical travel, it remains a challenge that relationships and trust among members, which are established in face-to-face classes, are still difficult to build in virtual team projects. To tackle this challenge, the possibility of introducing VR into the educational environment is currently being explored but has yet to become a reality due to concerns about the practicality of financing the introduction of the VR system and the negative educational side effects of its introduction.

DISCUSSION:

The Significance of Incorporating Virtual Teams into Education in a Post-Pandemic World

This paper presented four meaningful propositions by reviewing prior research on 1) the use of virtual teams, 2) virtual team project practices prior to the pandemic, and 3) virtual team project practices after the pandemic. Through the review of 1), we pointed out the difficulty of building trust among members due to limited communication and interaction as the universal issues for virtual teams (Proposition 1). The review of 2) tells us that virtual education before the pandemic was complementary and just another option in educational styles (Proposition 2). Based on the review of 3), we have come to understand that even as faculty and students have become accustomed with online teaching/learning than in the past, the issues related to building trust among virtual team members have not yet been resolved (Proposition 3). The recent research have proposed introducing VR into education as a solution to this problem, but the feasibility is not yet convinced (Proposition 4).

Reassessing in terms of their relevance and causality, the presented four propositions can lead to the following three suggestions. First, although the degree of individual members' skills in using technology and the limitations of communication among members can be an issue in virtual team projects, they are easier to implement if they are conducted as a complement to face-to-face classes. In other words, if communication within a team is not smooth due to a particular member's lack of skills in using digital tools, opportunities to meet face-to-face outside of class can be utilized because students can easily spend face-to-face time outside of class, both on and off campus. By allowing members to get to know each other well enough

on such occasions, the team members can build the relationships necessary to accomplish the virtual team project during the course. When using this "semi-virtual team" format in constructing online classes, the advantages of conducting classes online can be combined with the advantages of face-to-face interaction to optimize the promotion and management of the course. This advantage cannot be realized in virtual teams, such as international or global teams in a company, which are actually composed of those at a distance from each other.

Second, when it is impossible to take advantage of opportunities to meet face-to-face, such as when students collaborate on international projects that are geographically distant from each other, it will be more difficult to build trust among team members than when such opportunities are provided. In teams that must collaborate completely remotely, interaction among team members is limited, and real-time communication is also difficult when time differences are large. Therefore, when such fully virtual teams are used, more advanced preparation and extra care for students are required on the part of the faculty than when classes are run by semi-virtual teams. In this regard, a virtual team in a company can plan a business trip to meet face-to-face with specific virtual members if it is necessary. On the other hand, in the case of university education, it is impractical for faculty to lead students to visit universities outside of their home country to provide opportunities to get acquainted with the collaborating students. Therefore, in a fully remote virtual team project class, instructors should provide ample time for ice-breaking among students, and must ensure that all participating students benefit from the opportunity. Allocating more time for icebreaking may be easier to achieve in university education than in corporate virtual teams, where project deadlines are more restrictive.

However, this disadvantage also opens the

door to providing further skill development on the part of the students. In other words, since communication is more difficult in a fully virtual team than in a physical, virtual team or a semi-virtual team, students will have to be creative in order to facilitate the project in such a difficult environment and continue to interact with other members, communication skills can be improved further. In this respect, the current online education is considered to have greater educational significance than the education using VR, which has been under consideration in recent years.

The third is the importance of continuing to use the skills gained by not giving up educational delivery during the pandemic to continue project-based teaching with virtual teams at universities when many universities forced “Emergency Remote Teaching.” The pandemic has brought about the development of digital tools that both faculty and students can use to improve their skills in the use of digital tools and to make their literacy useful. Online classes remain a viable and effective educational method even now that the pandemic is under control, especially when natural disasters or changes in social conditions make it difficult for both instructors and students to get together at a classroom. Therefore, there is value in continuing online education with virtual teams to ensure that students do not lose their digital literacy and that instructors who developed such skills can train the next generation of digital education instructors. Many previous studies predict that the globalization of business will lead to companies increasingly using virtual teams for product development, marketing, and other activities (Ebisuya, et al., 2021; Gibson, Huang, Kirkman, & Shapiro, 2014; Gilson, Maynard, Young, Vartiainen & Hakonen, 2015; Hertel, Geister, & Konradt, 2005). Therefore, it is highly significant to continuously introduce virtual team projects into the education of univer-

sity students who are in the stage before they enter the workforce as practitioners.

CONCLUSION

This paper reviewed the cases of virtual-team project-based education that have been practiced, both before and after the pandemic. The results indicated that online education using virtual teams is still effective even after the pandemic and significant to use in combination with traditional face-to-face classes. To further clarify the educational methods needed specifically for virtual teams-project courses, more cases of team projects practiced in face-to-face courses and more cases dealing with project-based teaching with semi-virtual teams should be reviewed in the future. Examining these cases and comparing them to the four propositions presented in this paper will make it possible to identify management problems specific to entirely virtual teams and recommend appropriate measures to address them. Such measures will be useful in training students to successfully handle potential issues when working in virtual teams in the industry.

REFERENCES

- Abarca, V. M. G., Palos-Sanchez, P. R., & Rus-Arias, E. (2020). Working in Virtual Teams: A Systematic Literature Review and a Bibliometric Analysis. *IEEE Access*, 8:168923- 168940.
- Alshahrani, A. (2023). The impact of ChatGPT on blended learning: Current trends and future research directions. *International Journal of Data and Network Science*, 7:2029-. International Journal of Data and Network Science, 7:2029- 2040.
- Angwaomaodoko, E. A. (2024). A Review of Blended Learning after the COVID-19 Pandemic. *International Research in Education*, 12(1):86. DOI: 10.5296/ire.v12i1.21849
- Bhatia, G. (2012). A Study of family relationship in relation to emotional intelligence of the students of sec-

- ondary level. *Research Publications*, 2(12): 54–61.
- Bond, M., Bedenlier, S., Marín, V.I., & Händel, M. (2021). Emergency remote teaching in higher education: mapping the first global online semester. *Education*, 18(50). Available at: <https://doi.org/10.1186/s41239-021-00282-x>
- Bralić, A., Divjak, B. (2018). Integrating MOOCs in traditionally taught courses: achieving learning outcomes with blended learning. *International Journal of Educational Technology in Higher Education*, 15(2). Available at: <https://doi.org/10.1186/s41239-017-0085-7>
- Cabrera-Duffaut A, Pinto-Llorente A. M. & Iglesias-Rodríguez, A. (2024). Immersive learning platforms: analyzing virtual reality contribution to competence development in higher education—a systematic literature review. *Frontiers In Education*, 9:1391560. doi: 10.3389/feduc.2024.1391560
- Cagiltay, K., Bichelmeyer, B., & Akilli, G. K. (2015). Working with multicultural virtual teams: critical factors for facilitation, satisfaction and success. *Smart Learning Environments*, 2(11). DOI 10.1186/s40561-015-0018-7.
- Cheng, X., Fu, S., Han, Y. & Zarifis, A. (2016). Investigating the individual trust and school performance in semi-virtual collaboration groups. *Information Technology & People*. 30(3): 691–707. DOI 10.1108/ITP-01-2016-0024.
- Dhani, P., & Sharma, T. (2019). Emotional intelligence and personality traits as predictors of job performance of IT employees. In *Human performance technology: concepts, methodologies, tools, and applications* (pp. 1604–1619). Business Science Reference/IGI Global.
- Donelan, H., & Kear, K. (2024). Online projects in higher education: persistent challenges and implications for practice. *Journal of Computing in Higher Education*, 36:435–468.
- Dulebohn, J. H., & Hoch, J. E. (2017). Virtual teams in organizations, *Human Resource Management Review*. <http://dx.doi.org/10.1016/j.hrmr.2016.12.004>
- Ebisuya, A., Sekiguchi, T., & Hettiarachchi, G. P., (2021). Narrowing the communication gap in internationally distributed teams: the case of software-development teams in Sri Lanka and Japan. *Asian Business & Management*, 22: 354–378. DOI: 10.1057/s41291-021-00169-9.
- Ebrahim, N. A., Ahmed, S., & Taha, Z. (2009). Virtual Teams: a Literature Review. *Australian Journal of Basic and Applied Science*, 3(3):2653–2699.
- Ellis, A. P. J. (2006). System breakdown: The role of mental models and transactive memory in the relationship between acute stress and team performance. *Academy of Management Journal*, 49(3), 576–589.
- Espinosa, A., Slaughter, S., Kraut, R., & Herbsleb, J. D. (2007). Team knowledge and coordination in geographically distributed software development. *Journal of Management Information Systems*, 24(1), 135–169.
- Ferreira-Lopes, L. & Van Rompay-Bartels, I. (2020). Preparing future business professionals for a globalized workplace through intercultural virtual collaboration. *Development and Learning in Organizations*, 34(2):21–24. <https://doi.org/10.1108/DLO-08-2019-0194>
- Gamage, S.H.P.W., Ayres, J.R., & Behrend, M.B. (2022). A systematic review on trends in using Moodle for teaching and learning. *International Journal of STEM Education*, 9(9). Available at: <https://doi.org/10.1186/s40594-021-00323-x>
- Gibson, C. B., Huang, L., Kirkman, B. L., & Shapiro, D. L. (2014). Where global and virtual meet: The value of examining the intersection of these elements in twenty-first-century teams. *Annual Review of Organizational Psychology and Organizational Behavior*, 1, 217–244.
- Gilson, L. L., Maynard, M. T., Young, N. C. J., Vartiainen, M., & Hakonen, M. (2015). Virtual teams research: 10 years, 10 themes, and 10 opportunities. *Journal of Management*, 41(5): 1313–1337.
- Greenspan, S. I. (1989). Emotional intelligence. In K. Field, B. J. Cohler, & G. Wool (Eds.), *Learning and education: Psychoanalytic perspectives* (pp. 209– 243). International Universities Press, Inc.
- Hassan, J., Devi, A., Ray, B. (2022). Virtual Laboratories in Tertiary Education: Case Study Analysis by Learning Theories. *Education Sciences*, 12:554.

- <https://doi.org/10.3390/educsci12080554>
- Hertel, G., Geister, S., & Konradt, U. (2005). Managing virtual teams: A review of current empirical research. *Human Resource Management Review*, 15(1), 69–95.
- Hill, J., & Smith, K. (2023). Visions of blended learning: identifying the challenges and opportunities in shaping institutional approaches to blended learning in higher education. *Technology, Pedagogy and Education*, 32(3):289–303.
- Huang, H-C. (2024). Enhancing doctoral learning through virtual communities of practice: an autoethnographic perspective. *Frontiers in Education*, 9:1347052. doi: 10.3389/educ.2024.1347052
- Jafar, K., Ananthpur, K., & Venkatachalam, L. (2023). Digital divide and access to online education: new evidence from Tamil Nadu, India. *Journal of Social and Economic Development*, 25:313– 333. <https://doi.org/10.1007/s40847-023-00236-1>
- Klitmøller, A., & Luring, J. (2013). When global virtual teams share knowledge: Media richness, cultural difference and language commonality. *Journal of World Business*, 48(3), 398–406.
- Kömür, İ. A., Kılınc, H., & Oku, M. R. (2023). The Rotation Model in Blended Learning. *Asian Journal of Distance Education*, 18(2):63–74.
- Lan, M., Hew, K.F. (2020). Examining learning engagement in MOOCs: a self-determination theoretical perspective using mixed method. *Technology in Higher Education*, 17(7). Available at: <https://doi.org/10.1186/s41239-020-0179-5>
- Lenaghan, J. A., Buda, R., & Eisner, A. B. (2007). An Examination of the Role of Emotional Intelligence in Work and Family Conflict.
- Mattarelli, E., Tagliaventi, M. R., Carli, G., & Gupta, A. (2017). The role of brokers and social identities in the development of capabilities in global virtual teams. *Journal of International Management*. <http://dx.doi.org/10.1016/j.intman.2017.01.003>.
- Mpungose, C.B. & Khoza, S.B. (2022). Postgraduate Students' Experiences on the Use of Moodle and Canvas Learning Management System. *Technology, Knowledge and Learning*, 27:1–16. <https://doi.org/10.1007/s10758-020-09475-1>
- Noteborn, G., Carbonell, K.B., Dailey-Hebert, A.& Gijsselaers, W. (2012). The role of emotions and task significance in Virtual Education. *Internet and Higher Education*. 15: 176–183.
- Oertig, M. & Buergi, T. (2006). The challenges of managing cross-cultural virtual project teams. *Team Performance Management*, 12(1/2), 23–30.
- Oyelere, S. S., Bouali, N., Kaliisa, R., Obaido, G., Yunusa, A. A. & Jimoh, E. R. (2020). Exploring the trends of educational virtual reality games: a systematic review of empirical studies. *Smart Learning Environments*, 7:31. <https://doi.org/10.1186/s40561-020-00142-7>
- Papadopoulou, P., Andreou, A., Kanellis, P., & Martakos, D. (2000). Enabling Trust Formation Within Agent-Mediated Virtual Environment. *Virtual Reality*, 5:149–159.
- Pitts, V. E., Wright, N. A. & Harkabus, L.C. (2012) Communication in Virtual Teams: The Role of Emotional Intelligence. *Journal of Organizational Psychology*. 12: 3(4).
- Richards, K. & Thompson, B. M. W. (2023) Challenges and instructor strategies for transitioning to online learning during and after the COVID-19 *Frontiers in Communication*, 8:1260421. doi: 10.3389/fcomm.2023.1260421
- Rubtsova, A., Semenova, N., Kats, N., & Zheleznyakova, O. (2023). Instructional Framework for Emergency Remote Teaching in Higher Education. *Education Sciences*, 13(6): 613. <https://doi.org/10.3390/educsci13060613>
- Ryssen, S. V. & Godar, S. H. (2000). Going international without going international: Multinational virtual teams. *Journal of International Management*, 6(1), 49–60.
- Salcido-Cibriána, L. J., Ramosb, N. S., Jiménezb, O., & Blancab, M. J. (2019). Mindfulness to regulate emotions: the Mindfulness and Emotional T Intelligence Program (PINEP) and its adaptation to a virtual learning platform. *Complementary Therapies in Clinical Practice*, 36: 176–180.
- Sato, S. N., Condes Moreno, E., Rubio-Zarapuz, A.,

- Dalamitros, A. A., Yañez-Sepulveda, R., Tornero-Aguilera, J. F., Clemente-Suárez, V. J. (2024). Navigating the New Normal: Adapting Online and Distance Learning in the Post-Pandemic Era. *Education Science*, 14(19). Available at: <https://doi.org/10.3390/educsci14010019>
- Sharma, J., Dhar, R. L., & Tyagi, A. (2016). Stress as a mediator between work-family conflict and psychological health among nursing staff: the moderating role of emotional intelligence. *Applied Nursing Research*, 30: 268-275. doi: 10.1111/journal.pone.30.268-275.
- Stolovitsky, L. (2012). Strategic project management in global economy: Best practices in managing geographically dispersed project teams, *PM World Journal*, 1(2), 1-4.
- Sinclair, C. (2016). With a personal appearance from an online teacher. *video Journal of Education and Pedagogy* 1(8). Available at: <https://doi.org/10.1186/s40990-016-0010-3>
- Tras, V., Bryla, P., Caprar, D. V., Ordenana, X., Rotig, D., Bode, A., Sarala, R. M., Schuster, A., Zakaria, N., Vaiginiene, E., Zhao, F., Froese, F. J., Jimenez, A., Bathula, H., Wankel, C., Yajnik, N., Lei, W. S., Baldegger, R., Minor, M. E. & Huang, V. Z. (2013). A Global Classroom? Evaluating the Effectiveness of Global Virtual Collaboration as a Teaching Tool in Management Education. *Academy of Management Learning & Education*, 12(3):414-435. <http://dx.doi.org/10.5465/amle.2012.0195>
- Thahir, M., Widiawati, W., & Baitillah, N. (2023). The Post Pandemic Education : A Blended Learning Approach For Teaching And Learning In Higher Education in the New Normal Era. *Sciences and Education Research*, 3(3):99-108.
- Vinagre, M. & Esteban, A. C. (2018). Evaluative language for rapport building in virtual collaboration: an analysis of appraisal in computer-mediated interaction. *Language and Intercultural Communication*, 18(3):335-350, DOI: 10.1080/14708477.2017.1378227
- Wut, Tm., Xu, J. (2021). Person-to-person interactions in online classroom settings under the impact of COVID-19: a social presence theory perspective. *Asia Pacific Education Review*, 22:371-383. <https://doi.org/10.1007/s12564-021-09673-1>
- Zhang, Q. (2023). Harnessing the power of technology: a systematic analysis of challenges, theoretical frameworks, and recommendations for K-12 online learning. *Social Science*, 3(164). Available at: <https://doi.org/10.1007/s43545-023-00715-6>