International Collaboration in Higher Education: A Reflection of Student and Lecturer Experiences

Carinda Christien Williams, North-West University, South Africa
Clarise Mostert, North-West University, South Africa
Marieta Jansen van Vuuren, North-West University, South Africa

The European Conference on Education 2022
Official Conference Proceedings

Abstract
The influence of international collaboration opportunities on student and lecturer experience in higher education is unmistakable. Not only do international collaboration projects provide the opportunity for internalisation, the improvement of cultural sensitivity and understanding, as well as problem-solving in culturally diverse teams, it also provides a reflection opportunity for lecturers on current lecturer teaching practices and how teaching practices can be improved. As a result, most higher education institutions are starting to include international project-based learning projects. This paper is based on one of the international teaching mobility projects of the NWU, Centre for Teaching and Learning, that focuses on transforming university teaching, learning and research, which is in line with the National Framework for Enhancing Academics as university teachers (DHET, 2018), the UCDG (Draft Ministerial Statement 2012-2023) and the NWU Annual Performance Plan (APP). The project entailed that students from different international universities, including students from Indonesia, South Africa, the Netherlands, and Canada, work together in teams on a 24-hour design thinking project. This paper outlines the international collaboration project, provides the background of the project, a reflection on the student and lecturer experiences, and concludes with an action plan for future international collaboration projects.

Keywords: International Collaboration, Project-Based Learning (PBL), Internationalisation of Teaching and Learning, Higher Education

Introduction

The difficulties faced by many students in higher education are understandable; not only are they faced with demanding academic ability (hard skills), but they also need to improve their soft skills before entering the real world of work after completing their studies (Indrawan et al., 2018). Over the last couple of years, the topics of modernisation in the higher degree education environment have brought about a particular focus on the introduction of project-based skill mastering activities where students are empowered to develop their competencies and skills, which enables them to complete complex projects and initiatives (Veselov et al., 2019). According to Vogler et al. (2018), higher education institutions have been increasingly focused on providing students with the opportunity to develop soft skills (problem-solving & teamwork ability) and hard skills (cognitive knowledge and professional skills). Similarly, Barak and Usher (2019), and Wu & Wu (2020) explain that Project-Based learning (PBL) is a prominent instructional approach in higher education that promotes meaningful learning opportunities and deep comprehension of theory as it allows active student engagement in the factual investigation of real-world problems or practices in small groups. Students tend to be more motivated to share ideas, provide feedback, engage in reflection and extend their knowledge when they work in small groups with their peers (Uziak, 2016).

The benefits of project-based learning (PBL) are boundless, and evidence suggests that PBL is beneficial for both students and lecturers (Thomas, 2010). PBL has the potential to improve student understanding of theoretical content and the development of critical 21st-century skills by engaging students in real-world problems within projects and activities (Han et al., 2015; Kokotsaki et al., 2016). PBL also takes students' various learning styles and learning preferences into account and provides students with the opportunity to discover who they are, as they experience increased independence, an enhanced attitude towards learning and feelings of commitment and ownership of the learning that takes place (Han et al., 2015; Thomas, 2010). According to Kuo et al. (2019) and Sasson et al. (2019), PBL projects also have the benefit of improving students' higher-order thinking skills and motivation to learn and engage with peers.

Various definitions exist to describe PBL in theory (Aksela & Haatainen, 2019). Han et al. (2015) define PBL as an interdisciplinary project or activity that is student centred with clearly defined outcomes. PBL is defined by Veselov et al. (2019) as the distinct, planned student activity or project that is limited in time and specifically aimed at solving a real-life problem that results in the development of a final product/artifact. The central notion of PBL is that real-world problems are provided in the form of a collaborative project or activity which captures the interest of students and motivates critical thinking as the students obtain and apply contextualised knowledge in a problem-solving setting, where the lecturer plays the role of facilitator and students develop social skills through experience (Indrawan et al., 2018). PBL is also defined by Blumenfeld et al. (1991) as an approach to teaching and learning that is unambiguously planned to engage students in the investigation of real-world problems and practices. PBL is therefore categorised as activities that are problem orientated, which means that the problem or question serves to drive the learning activity (Aksela & Haatainen, 2019). Similarly, PBL is defined as a well-structured pedagogical approach that motivates active student engagement and collaboration in the investigation of real-world problems (Sasson et al., 2018).

PBL is characterised as activities where students develop independence by conducting constructive investigations, setting clear goals within the project, collaborating and communicating with others and reflecting on the project that deals with real-world problems and practices (Kokatsaki et al., 2016). According to Aksela & Haatainen (2019), this is beneficial as PBL places students in contextualised, real-life problem-solving environments where they have the opportunity to debate, reflect on and extend their knowledge and revise their solutions or ideas that can serve to bridge the gap between theory and real-life experiences. In contrast to traditional learning methods, literature has indicated that students are empowered by PBL projects to become interactive role-players in the construction of knowledge through exploration (Indrawan et al., 2018). As a result, PBL is viewed as an effective educational approach that focuses on constructing new knowledge and skills by motivating students to think creatively and solve real-world problems whilst interacting with their peers (Indrawan et al., 2018). In order to create a successful PBL project, a shift needs to be made in the definition and expectation of the lecturer by breaking away from the traditional "lecturer and student model", where the role of the lecturer involves collecting information, facilitating, and inspiring students to think critically and creatively in order to solve real-world problems and develop their skills (Pan et al., 2021; Prince & Felder, 2007).

Based on the above-mentioned, it is clear that the PBL strategy is grounded on the constructivist learning approach as students are expected to construct their own knowledge (Doppelt, 2003). This is further supported by Savery (2006), who states that PBL is consistent with a constructivist learning environment where students are expected to experience uncertainty and cognitive disequilibrium as students have the opportunity to choose how they want to approach the project in an independent manner.

Consequently, PBL projects have the potential to create exciting and meaningful learning experiences that add value to student learning due to the life-skills-oriented, competency-based learning nature of these projects (Indrawan et al., 2018). Additionally, it is becoming more and more important for higher education programmes to prepare students for a professional career outside the borders of their own country, culture, or language (Freeman et al., 2009). According to Brandon et al. (2021), intercultural learning supports students in obtaining skills that improve their employability and therefore, in the 21st century, the provision of an opportunity for intercultural learning is essential in higher education. The international classroom provides an excellent opportunity to educate interculturally competent professionals and leaders of the future (de Hei et al., 2020). Interestingly, international encounters can occur between people of different cultural backgrounds across national borders or even within the same country (Hofstede et al., 2010).

According to Darun et al. (2019), it is a trending and important practice for universities to conduct international collaborations in the form of student or lecturer mobility projects and exchanges, including joint research projects. Similarly, PBL may also involve establishing partnerships between universities or business schools in order to enhance innovation and improve social and global educational outcomes for students (Seow et al., 2019). As a result, the conducted PBL project included a strong international collaboration basis, where students were challenged to work in groups on the project and also transfer and receive the ideas to and from groups of students at other international partner universities.

International collaborative PBL project

Design thinking has become a popular and widespread concept in education worldwide, gaining popularity due to the impact on and the development of student skills (Lim et al., 2020). As a result, especially for university students, it is becoming increasingly important within the employment landscape to anticipate and prepare students for future skill requirements (Lim et al., 2020; Shute & Becker, 2010). As a result, a design thinking PBL project was introduced with international collaboration that was focused on a real-life problem, with the aim to develop soft and hard skills, critical thinking and student motivation in a global context. With this in mind, the international collaboration PBL project was designed from a design thinking basis where students worked in teams and needed to collaborate with groups from other international universities in order to address a social cause (design challenge), based on the sustainable development goals to develop a solution that is practical, marketable, and sustainable (Lim et al., 2020).

The 24-hours international collaboration PBL project included students from North-West University in South Africa, Binus University in Indonesia, InHolland University of Applied Sciences in the Netherlands, and Durham University in Canada. All students were prepared to understand how to incorporate the design thinking process during this collaborative activity. The project challenged students to develop an online game, specifically designed to express the notion of internationalisation. The aim of the development of the online games was to provide the player with the opportunity to learn from other cultures and countries and to create cultural sensitivity and understanding during the time that the player is playing the online game. The students could develop any game that they could imagine, with the end goal to have a playable online demo game completed within a 24-hour cycle. Students were required to work in groups and transfer their ideas to the next group of students at the other participating universities.

The project was divided into three development phases, each with an 8-hour time limit. Participating universities had an equal number of student groups participating in the online game development, which resulted in seamless transfer of work at scheduled time slots. Indonesia and Canada had a total of 20 groups, South Africa had 13, and the Netherlands had 7. During the first 8-hour cycle, students from Indonesia were expected to start the ideation process. They needed to create concepts for online games with a theme of internalisation, globalisation or cultural diversity. At the end of their time 8-hour ideation process, a game development idea transfer took place to the student groups in the Netherlands and South African via Microsoft Teams. The transfer to these two countries took place at the same time as they share the same time zone. The South African student groups and the groups in the Netherlands continued with the design thinking cycle by choosing the best idea and developing it further into a working prototype of the online game. At the end of the second 8-hours cycle, the South African student groups and the Netherlands student groups transferred their ideas to the Canadian student groups via Microsoft Teams. The Canadian groups had the task to finalise, test, and refine the online game prototype and create a presentation video of the final product within the next 8-hour cycle. Once the project was complete, (24 hours later), a session was arranged via Microsoft Teams, where the student groups had the opportunity to see the final products and to reflect on the process.

Research questions

The following research questions were identified from the international collaboration PBL project:
RQ1: What were the student expectations prior to the international PBL project?
RQ2: What were the expectations that lecturers had prior to the international PBL project?
RQ3: What were students' experiences with the international PBL project?
RQ4: What were the lecturers' experiences with the international PBL project?

Research methodology

The purpose of the study was to address the research questions mentioned above through a reflection of student and lecturer experiences regarding the international collaborative PBL project. The research method used comprised of the qualitative approach, where data was collected by means of an online reflective questionnaire after the international PBL project was completed. The online reflective questionnaire comprised of open-ended questions that provided the participants with the opportunity to share their ideas anonymously. The data was further examined by employing the standards for evaluating observation objects and indications (Braun & Clarke, 2006).

Data analysis

An inductive constant comparative analysis was used to define, appraise, and establish shared themes by participants. The inductive constant comparative analysis method is an iterative process of reducing the data through constant recording (Glaser & Strauss, 1967). This process commenced with open coding to develop categories after the first round of data reduction, followed by a further reduction to make it possible for core categories to emerge (Glaser & Strauss, 1967).

During the induction stage of the data analysis, each participant's answers were coded to avoid recurrence. This was done by means of the AtlasTi^{tm} software programme. During this stage, the researchers considered both codes and categorisations and enabled the identification of themes from each of the participant responses to each of the research questions (Liu, 2016)

Participants

The qualitative analysis included two groups of participants of which 43 were students and four were lecturers from four international universities across different time zones. The participating groups were from South Africa, the Netherlands, Indonesia and Canada, and had to work in teams to complete an artefact during a 24-hour cycle applying design thinking principles.

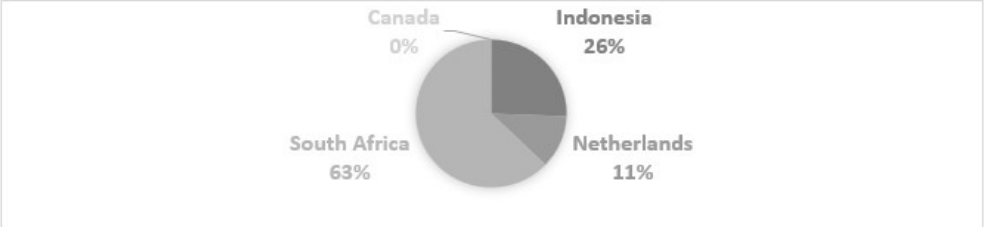

Figure 1: Student participants from the different countries.

As Figure 1 indicates, none of the Canadian students who participated in the project completed the online reflective questionnaire. The most participants comprised of South African students (63%), followed by Indonesian students (26%) and students from the Netherlands (11%).

Next, participants were asked to indicate whether they have ever worked with students from one of the other countries on any project-based learning project. The findings are presented in Figure 2.

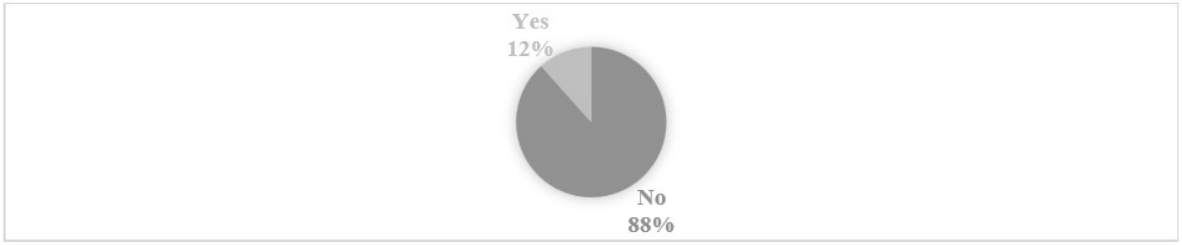

Figure 2: Experience in working with students of the other countries that participated in the international PBL project.

As indicated in Figure 2, most participants (88%) indicated that they have not worked with students from one of the other countries that participated in the international PBL project, while only 12% of the participants indicated that they have had the opportunity to work with students from the other countries that participated in the project.

As this study is aimed at providing a reflection of the student and lecturer experience with regard to the international PBL project, it is important to note that the 4 lecturers also completed the reflective online questionnaire.

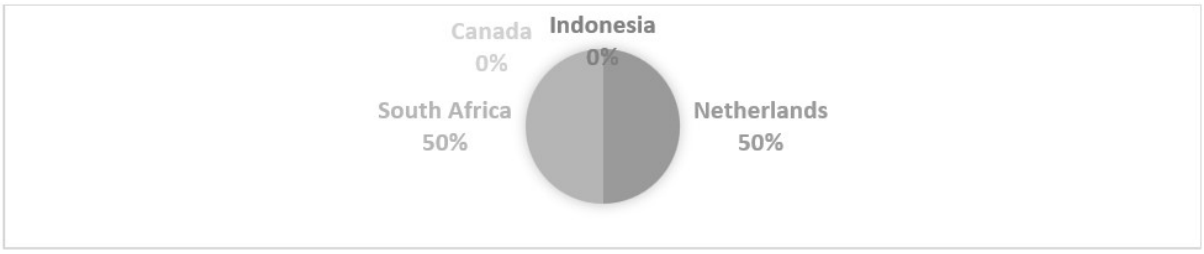

Figure 3: Lecturer participants from the different countries.

Of the four lecturers who participated in the reflective online questionnaire, only two lecturers from South Africa (50%), and two lecturers from the Netherlands (50%) participated in the study. Therefore, no reflection was received from the lecturers from Indonesia (0%), or Canada (0%).

Next, the lecturers were also asked to indicate whether they have ever worked with other lecturers from one of the other countries on any project-based learning project. The findings are presented in Figure 4.

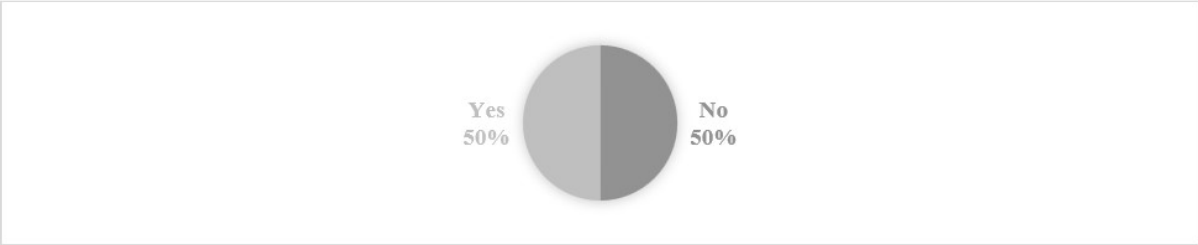

Figure 4: Experience in working with lecturers of the other countries that participated in the international PBL project.

As indicated in Figure 4, 50% of the lecturers have had the opportunity to work with other lecturers from the other countries that participated in the project, and 50% have not yet had the opportunity to work with other lecturers from other the other countries before this international PBL project.

Findings and discussion

The findings and discussion are divided into two sections based on the specified research questions. The first section provides insight into the participants' expectations prior to the international PBL project, followed by a reflection on the student experience and lecturer experience. After each section, a short discussion of the findings is provided.

RQ1: What were the expectations that students had prior to the international PBL project?

The main expectations students had prior to the international PBL project are indicated in the Word cloud below.

Figure 5: Student expectations prior to the international PBL project.

As illustrated in Figure 5, the words that were associated with the international PBL project prior at the start of the project included words such as: interaction, collaboration, fun, intercultural, communication, team, opportunity, collaboration, and work. When comparing this to the expectations from the lecturers' word cloud, Figure 6, words such as unique, out of the box, one-of-a-kind, learning, opportunity, interesting, value, communication and experience are associated.

RQ2: What were the expectations that lecturers had prior to the international PBL project?

The main expectations that lecturers had prior to the start of the international PBL project is indicated in the Word cloud below.

Figure 6: Lecturer expectations prior to the international PBL project.

RQ3: What were students' experiences with the international PBL project?

As illustrated in Figure 7, the main positive experiences from the international PBL project were intercultural interaction and idea generation and development. The students enjoyed meeting and interacting with students from different countries and cultures, listening to how the other countries communicate, seeing how students across the globe handle situations and how ideas are interpreted by them. The students mostly enjoyed working with students from different countries and cultures. This is closely followed by idea generation and idea development, where students indicated that they enjoyed the creative part of the process, collaboratively generating new ideas, sharing the ideas with the different students and brainstorming with them to identify multiple solutions and possible scenarios, elaborating on the ideas, and creating unique solutions to the problem. They enjoyed developing a new online game, experiencing first hand how quickly and in-depth a concept can be developed within 24-hours, and seeing the idea come to life.

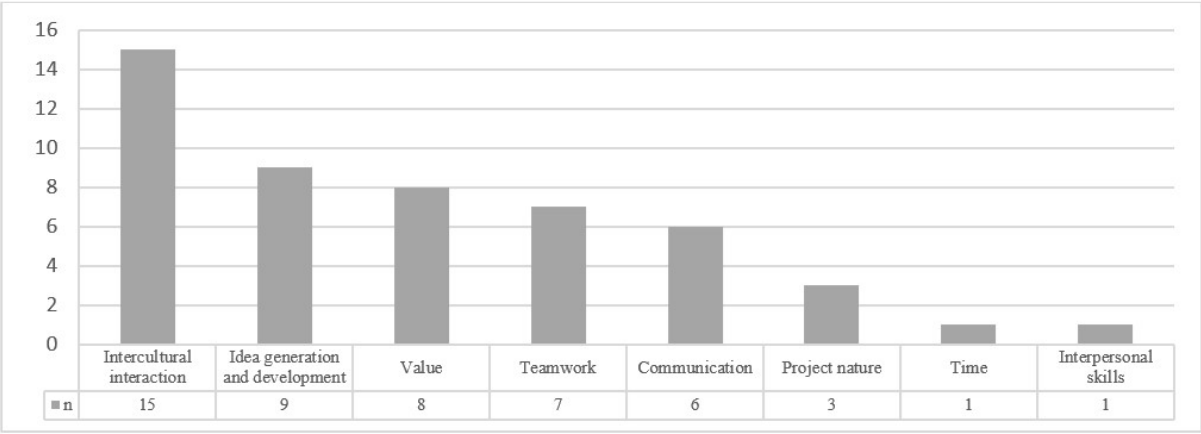

Figure 7: Positive student experience of the international PBL project.

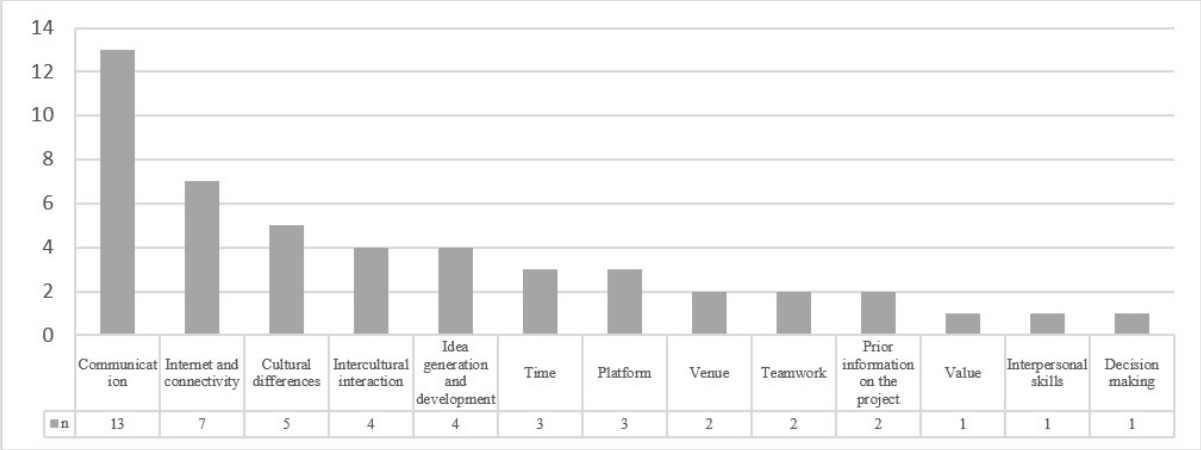

Figure 8: Challenging student experiences of the international PBL project.

From Figure 8, it is clear that students mostly struggled with communication, internet connectivity and cultural differences. The communication was challenging as they sometimes found it difficult to understand and communicate during the transfer of the game concept. It was also challenging to communicate and transfer the concept to the next group in another country. Communicating with complete strangers who speak with a different accent and vocabulary as well as poor internet connectivity seemed challenging and required staying patient and focus in explaining the idea and clearly articulating expectations and expectations to the student group in the next country. Not being able to communicate thoroughly and efficiently was frustrating. One of the biggest challenges was related to the lack of stable internet connectivity and students indicated that this resulted in not being able to reach students at the given transfer time, or that communication was hampered. The time of transfer in a time zone (afternoon for the groups in South Africa and the Netherlands), as well as language, pronunciation and cultural differences were reported to be challenging factors as well Students felt tired when their eight-hour cycle concluded late afternoon or early evening. Table 1 outlines each of these findings in comparison to each other.

Table 1: Reflection of student experience with the international PBL project.

Positive experiences			
Theme	**Code**	**N, %**	***Representative words, phrases, statements***
Interaction with others	Communication	6, 13.95%	To communicate with different people with different backgrounds, communicate our idea, discussing and listening, explain the work and the expectations
	Teamwork	7, 16.28%	Working together as one team, working with students who are not around you, in different countries towards a common goal, working with my team.
	Intercultural interaction	15, 34.88%	Meeting and interacting with students from different countries and cultures, listening how the other countries communicate, to see how they handle situations, working with people around the world, see how the ideas are interpreted by them
Problem solving	Interpersonal skills	1, 2.32%	Motivating each other
Creativity of thinking	Idea generation and development	9, 20.93	The creativity part of the process, coming up with new ideas together, sharing the ideas with the different students, and brainstorming with them to come up with multiple ideas, elaborating the idea, coming up with a unique solution to the problem, developing a new online game, to see how quickly and in-depth a concept can be developed within 24-hours, seeing the idea come to life

Table 1: Reflection of student experience with the international PBL project (continued).

Theme	Code	N, %	*Representative words, phrases, statements*
Project experience	Time	1, 2.32%	Complete the project in time
	Value	8, 18.6%	It was a really good experience, exciting, amazing, nice, enjoy, fun time, good stress to experience
	Project nature	3, 6.97%	The complexity of it all, something different than the usual task and group work, creative problem solving
Negative experiences			
Interaction with others	Communication	13, 30.23%	Difficulty in understanding and communicating the received idea from the first country, communicating, and transferring the idea to the next group (country), communicating with complete strangers, not hearing the other country during the handover, staying patient, and explaining the idea and what is expected to the next group, not being able to communicate thoroughly, inefficient commendation, hard time understanding
	Cultural differences	5, 11.62%	Time difference, being in different time zones, being tired at the time of transfer, difficulty understanding the Indonesian group, language differences
	Teamwork	2, 4.65%	Challenging working with group members not doing their part
	Intercultural interaction	4, 9.30%	The uncertainty, and not knowing what to expect from the other country, getting the information from the Indonesian group, challenging to manage time because of the different time zones.
Problem solving	Decision making	1, 2.32%	Making the decision, deciding on a game that everybody will know and enjoy
	Interpersonal skills	1, 2.32%	Difficult to make the Canadian students enthusiastic
Creativity of thinking	Idea generation and development	4, 9.3%	Creating the game, coming up with the rules for the game, picking the platform for the game was hard, deciding on which idea to use, difficulties in thinking about a fun game that would not be too complicated
Project experience	Time	3, 6.97%	The time was limited, more time would have been appreciated, time went by too fast, better timing than just a week, we did not have enough time
	Venue	2, 4.65%	The noise in the background from the main zoom channel, and students trying to get their ideas and info across, more privacy would have been appreciated
	Prior information on the project	2, 4.65%	Not knowing exactly what was expected of us, having very little knowledge about games
	Internet and connectivity	7, 16.27%	Connections to the other countries was poor, connection and communication wasn't good, frustrating communicating over a bad network on teams call, slow internet connection, internet connection was unstable and difficult to get hold of other participants, bad internet connection as it also affects the voice of someone who is talking
	Platform	3, 6.97%	Challenge with the communication channel, not clear, technical difficulties with the MS Teams meetings
	Value	1, 2.32%%	Difficult to stay calm

Table 1 outlines the reflection of student experiences based on what they have enjoyed and what they considered to be challenging regarding the international PBL project. Some of the main themes that were highlighted included interaction with others, problem solving, the creativity of thinking and the project experience. It is also valuable to consider the project

experience from the lecturer's perspective. The following section will focus on the fourth research question, to explore the potential benefits and challenges the lecturers experienced during the international PBL project.

RQ4: What were the lecturer's experiences with the international PBL project?

As illustrated in Figure 9, the main positive experiences from the international PBL project for lecturers were: teamwork, value, intercultural interaction and idea generation and development. The lecturers mostly enjoyed experiencing the dynamics between the students and seeing the live moments, it was good se experience how students were working together in teams, and how students collaborated with each other. This is closely followed by value, where lectures experienced the students having a great time designing and collaborating, and how the students embraced the project and the learning and experience that took place. Furthermore lecturers indicated that they also enjoyed the intercultural interaction, experiencing the sessions between the students and international students, and seeing how their ideas were shared with each country. Lecturers also had a positive experience with idea generation and development by experiencing the students' creativity and how the teams thought about the concept and the final product.

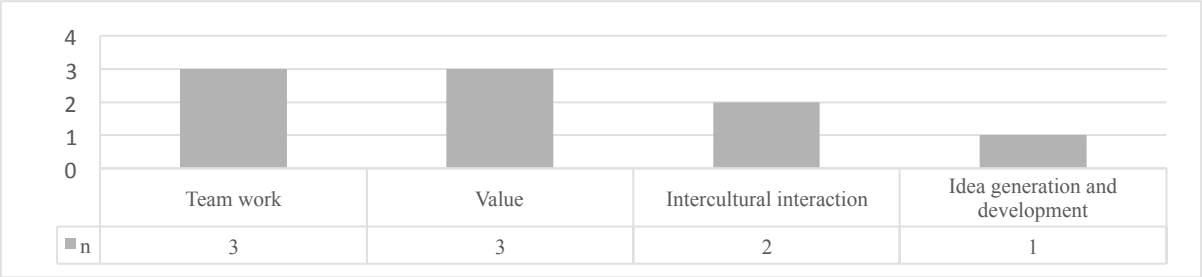

Figure 9: Positive lecturer experience of the international PBL project.

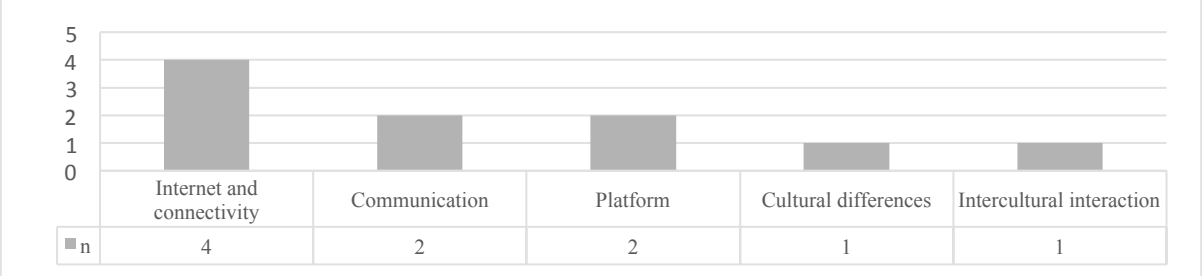

Figure 10: Challenging lecturer experiences of the international PBL project.

From Figure 10, it is eminent that most lecturers agreed that the internet connectivity was a challenge, followed by communication, the platform used to communicate the transfer, cultural differences and intercultural interaction. In terms of the internet and connectivity, lectures indicated that they experienced various technical issues. As a result, they spent a lot of time trying to establish stable connections, especially in South Africa. Furthermore, lecturers identified a lack of communication between the different country groups as another challenge. The Microsoft Teams platform used for communication and idea transfer was also a challenge, as lecturers struggled to get all the group members connected with the correct groups at the correct time. One lecturer also indicated that the cultural differences made the project more challenging, and another indicated that completing the game design was challenging as some student groups failed to connect with their international partner groups for the transfer of ideas.

Table 2 outlines each of these findings in comparison to each other.

Table 2: Reflection of lecturer experience with the international PBL project.

Positive experiences			
Theme	**Code**	**N, %**	***Representative words, phrases, statements***
Interaction with others	Teamwork	3, 75%	The dynamics between the students and experiencing the live moments, seeing how students were working together in teams, and how students collaborated
	Intercultural interaction	2, 50%	Experiencing the sessions between the students and international students, and seeing how their ideas was shared with each country
Creativity of thinking	Idea generation and development	1, 25%	Seeing the creativity and how the teams thought about the concept
Project experience	Value	3, 75%	Seeing the students have a great time, how the students embraced the project, witnessing the learning from the project and experience
Negative experiences			
Theme	**Code**	**N, %**	***Representative words, phrases, statements***
Interaction with others	Communication	2, 50%	Challenging communication, and lack of communication
	Cultural differences	1, 25%	Cultural differences made the project more challenging
	Intercultural interaction	1, 25%	Some international student groups did not show up for the transfer of ideas
Project experience	Internet and connectivity	4, 100%	Technical connections were not perfect, technical issues, spent a lot of time fixing things, the challenges in the South African context regarding connectivity
	Platform	2, 50%	Getting all the group members in the right meeting on the right time, problems with the MS Teams platform

Table 2 outlines the reflection of lecturer experiences based on what they have enjoyed and what they considered to be challenging regarding the international PBL project. Some of the main themes that were highlighted included interaction with others, creativity of thinking and the project experience.

Interestingly, when comparing the student experience to the lecturer experience, it can be noted that both students' and lecturers' positive experiences included interaction with others (teamwork and intercultural interaction), the creativity of thinking and idea generation and development, as well as the project experience (value). However, students differed from lecturers as they indicated that they also enjoyed communicating with the different students, solving the problem, and the project experience (time limit and project nature). In future, it is important to keep these positive experiences in mind, and to make sure that the next international PBL project focuses on meeting these needs. In contrast, the negative experiences when comparing the student and lecturer responses indicated that there was agreement regarding the challenges of interacting with others (teamwork, intercultural interaction, communication and cultural differences) as well as the project experience (internet and connectivity challenges, and the platform, Microsoft Teams, used to transfer ideas). However, students further indicated that they experienced challenges with regard to problem-solving and decision making, creativity of thinking (idea generation and development), as well as the project experience (time limit of the project, the venue, and the prior information about the project).

Most of the challenges and limitations experienced by both lecturers and students can definitely be managed to ensure the success of the next international PBL project. Most of

the students and lecturers were not familiar enough with the platform of delivery and experienced the inability to ensure stable internet connection. Both of these challenges are manageable and will ensure the future success of collaborative international projects.

Conclusions

The benefits of PBL projects in higher education have been motivated in literature and include the development of critical thinking skills, improved motivation to take part in the learning process and increased student engagement to name a few (Kuo et al., 2019; Wu & Wu, 2020).

The above findings support theory on the development of several soft skills as students indicated that they were challenged to collaborate and work in teams in their own country as well as with the teams in other countries involved. They indicated improved soft skills as they were exposed to student groups from different cultures and countries across the globe and were challenged to communicate, solve problems and create new ideas collectively. The students also indicated that they enjoyed being part of the PBL project and that they found the project to be valuable.

This reflection provides us with the opportunity to aim to enhance these positive experiences for the next international PBL project, but also the opportunity to address the challenges, and to make sure that the challenges that can be managed including the venue, internet and connection, and the platform used is improved in order to provide increased value and learning opportunity. The importance of understanding different cultural contexts and the skills to collaborate in a global space needs enhancement.

References

Aksela, M., & Haatainen, O. (2019). Project-based learning (PBL) in practise: Active teachers' views of its' advantages and challenges. *Integrated Education for the Real World*.

Barak, M., & Usher, M. (2019). The innovation profile of nanotechnology team projects of face-to-face and online learners. *Computers & Education*, *137*, 1-11.

Blumenfeld, P. C., Soloway, E., Marx, R. W., Krajcik, J. S., Guzdial, M., & Palincsar, A. (1991). Motivating project-based learning: Sustaining the doing, supporting the learning. *Educational psychologist*, *26*(3-4), 369-398.

Brandon, R. R., Marsh, R. J., & Cumming, T. M. (2021). International Collaboration in Special Education Teacher Preparation. *Intervention in School and Clinic*, 10534512211047590.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, *3*(2), 77-101.

Darun, M. R., Palm, D., Athinarayanan, R., Hummel, V., & Von Leipzig, K. (2019). The learning factory–a new stimulus to enhance international collaboration. *Procedia manufacturing*, *31*, 290-295.

de Hei, M., Tabacaru, C., Sjoer, E., Rippe, R., & Walenkamp, J. (2020). Developing intercultural competence through collaborative learning in international higher education. *Journal of Studies in International Education*, *24*(2), 190-211.

DHET. (2018) Statistics on Post-School Education and Training in South Africa: http://www.dhet.gov.za/Research%20Coordination%20Monitoring%20and%20Evaluation/6_DHET%20Stats%20Report_04%20April%202018.pdf

Doppelt, Y. (2003). Implementation and assessment of project-based learning in a flexible environment. *International journal of technology and design education*, *13*(3), 255-272.

Glaser, B. G., Strauss, A. L., & Strutzel, E. (1968). The discovery of grounded theory; strategies for qualitative research. Nursing research, 17(4), 364.

Han, S., Yalvac, B., Capraro, M. M., & Capraro, R. M. (2015). In-service teachers' implementation and understanding of STEM project based learning. *Eurasia Journal of Mathematics, Science and Technology Education*, *11*(1), 63-76.

Hofstede, G., Hofstede, G. J., & Minkov, M. (2010). *Cultures and organizations: Software ofthe mind* (3rd ed.). Thousand Oaks, CA.

Indrawan, E., & Jalinus, N. (2019). Review project based learning. *International Journal of Science and Research (IJSR)*, *8*(4), 1014-1018.

Kokotsaki, D., Menzies, V., & Wiggins, A. (2016). Project-based learning: A review of the literature. *Improving schools*, *19*(3), 267-277.

Kuo, H. C., Tseng, Y. C., & Yang, Y. T. C. (2019). Promoting college student's learning motivation and creativity through a STEM interdisciplinary PBL human-computer interaction system design and development course. *Thinking Skills and Creativity*, *31*, 1-10.

Lim, C. W., Shamsuddin, W. N. F. W., Rozee, I. S. M., & Vesudevan, M. (2020). Degree students'self-motivation towards design thinking project. *International Journal of Education and Pedagogy*, *2*(4), 185-192.

Liu, L. (2016). Using generic inductive approach in qualitative educational research: a case study analysis. *Journal of Education and Learning*, *5*(2), 129-135.

Pan, G., Shankararaman, V., Koh, K., & Gan, S. (2021). Students' evaluation of teaching in the project-based learning programme: An instrument and a development process. *The International Journal of Management Education*, *19*(2), 100501.

Prince, M., & Felder, R. (2007). The many faces of inductive teaching and learning. *Journal of college science teaching*, *36*(5), 14.

Sasson, I., Yehuda, I., & Malkinson, N. (2018). Fostering the skills of critical thinking and question-posing in a project-based learning environment. *Thinking Skills and Creativity*, *29*, 203-212.

Savery, J. R. (2015). Overview of problem-based learning: Definitions and distinctions. *Essential readings in problem-based learning: Exploring and extending the legacy of Howard S. Barrows*, *9*(2), 5-15.

Seow, P. S., Pan, G., & Koh, G. (2019). Examining an experiential learning approach to prepare students for the volatile, uncertain, complex and ambiguous (VUCA) work environment. *The International Journal of Management Education*, *17*(1), 62-76.

Shute, V. J., & Becker, B. J. (2010). Innovative assessment for the 21st century. New York, NY: Springer.

Thomas, J. W. (2000). A review of research on project-based learning. San Rafael, CA: Autodesk.

Usher, M., & Barak, M. (2018). Peer assessment in a project-based engineering course: comparing between on-campus and online learning environments. *Assessment & Evaluation in Higher Education*, *43*(5), 745-759.

Uziak, J. (2016). A project-based learning approach in an engineering curriculum. *Global Journal of Engineering Education*, *18*(2), 119-123.

Veselov, G. E., Pljonkin, A. P., & Fedotova, A. Y. (2019, June). Project-based learning as an effective method in education. In *Proceedings of the 2019 International Conference on Modern Educational Technology* (pp. 54-57).

Vogler, J. S., Thompson, P., Davis, D. W., Mayfield, B. E., Finley, P. M., & Yasseri, D. (2018). The hard work of soft skills: augmenting the project-based learning experience with interdisciplinary teamwork. *Instructional Science*, *46*(3), 457-488.

Wu, T. T., & Wu, Y. T. (2020). Applying project-based learning and SCAMPER teaching strategies in engineering education to explore the influence of creativity on cognition, personal motivation, and personality traits. *Thinking Skills and Creativity*, *35*, 100631.

Contact email: Carinda.Williams@nwu.ac.za