



Graduate Students' Experiences in a Blended Learning Program in Kazakhstan: A Mixed-Method Study Employing Interaction Equivalency Theorem

Gulmira Tussupbekova¹

 0000-0002-2205-6369

Kathy L. Malone^{1,2*}

 0000-0002-9286-4054

Janet Helmer¹

 0000-0002-2329-7885

Gulnara Namyssova¹

 0000-0001-8077-1283

Miruyert Abdrakhmanova¹

 0000-0002-4310-5166

Filiz Polat¹

 0000-0002-6494-513X

Zumrad Kataeva¹

 0000-0002-1348-584X

¹ Graduate School of Education, Nazarbayev University, Nur-Sultan, KAZAKHSTAN

² University of Hawai'i at Hilo, Hilo, USA

* Corresponding author: klmalone60@gmail.com

Citation: Tussupbekova, G., Malone, K. L., Helmer, J., Namyssova, G., Abdrakhmanova, M., Polat, F., & Kataeva, Z. (2022). Graduate Students' Experiences in a Blended Learning Program in Kazakhstan: A Mixed-Method Study Employing Interaction Equivalency Theorem. *Contemporary Educational Technology*, 14(4), ep386. <https://doi.org/10.30935/cedtech/12398>

ARTICLE INFO

Received: 10 May 2022

Accepted: 9 Aug 2022

ABSTRACT

This explanatory sequential mixed-method study explored the effectiveness of blended learning (BL) courses offered to graduate students at an English medium university in Kazakhstan. The study's purpose was to explore and understand graduate students' experiences while enrolled in BL courses by learning their perceptions of the benefits and challenges of BL, as well as its potential for enhancing their teacher leadership skills. A survey (n=81) and semi-structured individual interviews (n=17) were used as the main research instruments. This allowed for a detailed and rich data set on the conceptual underpinnings of the BL courses, their effectiveness, and their potential to inform higher education institutions towards implementing BL policies and practices, specifically in the field of education. Through the lens of the Interaction equivalency theorem, we analyzed students' experiences and their interactions with their teachers and peers, as well as the mode, place, and pace of learning. This investigation revealed that the benefits of learning using BL outweighed its challenges. However, most of the participants preferred the face-to-face part of the BL course over its online teacher-student interaction component due to the opportunity to gain immediate feedback. Most importantly, the BL courses facilitated the enhancement of teacher leadership skills among the students. Finally, the paper provides recommendations for further development and revisions to current BL courses to enhance their learning value.

Keywords: blended learning, higher education, graduate students, educational leadership, interaction equivalency theory, Kazakhstan, teacher leadership

INTRODUCTION

Higher education institutions are continuously exploring new practices of teaching to improve students' engagement and learning. Many universities have started to experiment with the BL as one promising and innovative teaching approach. Around the globe BL has become a widespread mode of instruction in universities (e.g., Pechenkina et al., 2018; Smith & Hill, 2019), while in Kazakhstan, a post-soviet country, BL is a relatively new education phenomenon that was first implemented in 2015 (Tyler & Abdrakhmanova, 2016). In addition, the effectiveness of BL on the development of teacher leadership has been an understudied issue internationally (Gallego-Arrufat et al., 2015). This paper details a study that was developed to address these needs.

Literature Review

Overview of blended learning research

Blending learning in the context of higher education has attracted much attention from research teams (e.g., Raes et al., 2020; Smith & Hill, 2019). The main corpus of this research has been undertaken in the United States, UK, and Australia while fewer studies have been undertaken in the Asian context (Birgili et al., 2021; Smith & Hill, 2019). In addition, thematic reviews in the field of BL research concluded that the learning experiences of students have been scarcely investigated (Pima et al., 2018). More empirical studies are needed that focus on various BL designs and their effect on student learning outcomes (Raes et al., 2020). Particularly, empirical studies exploring teacher leadership development are scarce and need to be examined in terms of how they support leadership roles and shape teachers' participation in BL (Trust & Horrocks, 2017).

Conceptualization of blended learning

The definition of BL has been a matter of ongoing discussion among the scholarly community and there continues to be terminological confusion (e.g., Smith & Hill, 2019; Spring & Graham, 2017). While there are a variety of definitions, there is a consensus in the literature that the notion of BL refers to an approach to teaching and instruction that combines diverse spectrums of teaching modes including face-to-face and online components (Tucker, 2012). In this paper, we conceptualize BL to include this consensus but also students must have some "control over time, place, path and/or pace" as well as the face-to-face being "away from home" (Staker & Horn, 2012, p. 3).

The potential benefits and opportunities of blended learning

BL has the potential to tackle various challenges as it is compatible with working life, thus enhancing the learning experiences and engagement of working students (e.g., Broadbent, 2017; Chen et al., 2010; Lin, 2018). It has also been shown to enhance access to information, as well as offer flexibility in the curriculum and educational process (e.g., Owston et al., 2013; Rahman et al., 2015). Additionally, BL fosters collaboration with peers, prioritizes student-centered learning, engages learners, and enhances the technological and digital knowledge of learners (Bouilheres et al., 2020; de Brito Lima et al., 2021; Tucker, 2012).

Studies have shown that the advantages of BL included flexibility, communication, peer collaboration, enhancement of critical thinking skills, and individualized and active learning (e.g., Bouilheres et al., 2020; Lee, 2020; Moussa-Inaty, 2017; Smyth et al., 2012; Zhu et al., 2021). One of the most obvious advantages of BL is the opportunity for students who work full-time to immediately apply what is learned in practice (Smyth et al., 2012). Another benefit of BL is its ability to enhance collaborative activities as it can promote the collaboration of students through completing assignments or projects online (Yilmaz & Malone, 2020).

Studies have indicated that BL is more effective when compared to traditional face-to-face instruction (Bernard et al., 2014; Harmeet Kaur, 2020). In addition, Allen and Seaman (2015) reported that higher education academic leaders in the US rated the learning outcomes of blended courses higher than online and traditional courses. However, Means et al. (2013) reported in their meta-analysis that on average the advantage of BL over traditional courses was significant while the contrast with online and traditional was not. However, Bernard et al.'s (2014) meta-analysis, found that both blended and online learning approaches were more effective when compared to traditional classroom delivery. A recent meta-analysis found that BL with reduced face-to-face classroom time can be as effective as the traditional mode of learning, but it was

suggested that this difference might not be due to the learning format alone but also to the quality of the implementation (Müller & Mildemberger, 2021). Thus, the instructional design of the course may be key to effectiveness as well as clarifying these past contradicting results (Merrill, 2017).

The barriers and challenges of blended learning

Despite the opportunities and potential benefits of BL, there are likely to be different challenges. Rasheed et al. (2020) found three typical student challenges included difficulties with the technological tools for learning, feelings of isolation and alienation, and challenges with their self-regulation skills. Difficulties with technology has been found in other studies (Tanveer, 2011; Yilmaz & Malone, 2020). Lack of teacher-student and student-student interaction in BL environments were frequently highlighted (Lightner & Lightner-Laws, 2016; Smyth et al., 2012).

Student engagement and active participation were other challenges leading to low self-efficacy and low academic achievement (Prifti, 2020; Wang & Degol, 2014). Indeed, course design and students' perceptions of their learning seem to be influencers of student instructional engagement and motivation (Honebein & Reigeluth, 2021; Manwaring et al., 2017; Merrill, 2017), especially perceptions about the importance of assigned activities (Manwaring et al., 2017).

Leadership skills development and enhancement through blended learning

The adoption of a leader's stance is a daunting challenge. Few publications can be found in the literature that examined how BL promoted teacher leadership skills (Adams & Ross, 2014; Aytac, 2009; Trust & Horrocks, 2017). For example, Gallego-Arrufat et al. (2015) explored instructional leadership in BL by conducting a content analysis of communication between teachers and students during virtual teaching. They found that teacher-student interactions played a crucial role in developing conditions for distributed leadership. Aytac (2009) also attempted to evaluate the impact of BL on promoting the leadership skills of school administrators by dividing them into three groups based on the mode of delivery: traditional teaching (24 students), BL (23 students), and computer-based learning (25 students). The BL group demonstrated a substantial change in achievement scores over the other two groups. Participants' views of BL were extremely positive, especially noted was the enhanced quality and number of interactions with tutors and group members through online discussions, improved teamwork opportunities, and prompt feedback from instructors. The problems for students included technical difficulties, low quality of online materials, and declined motivation to study in BL mode. Acree et al. (2017) also found BL was essential for the professional development of school leaders and played an effective role in making substantial changes in their practice of using BL with teachers in their schools.

In contrast, Adams and Ross (2014) focused on exploring US teachers' views on the impact of a job-embedded blended teacher leadership program on their teaching and leadership skills using mixed-methods. This blended program was beneficial for teachers as it allowed them to transfer learning to the workplace. The blended mode helped teachers to learn new pedagogical strategies, assess them in their classrooms, and then share their reflections. The results of the study showed that teachers had changed both their perspectives of leadership and their leadership stance functioning as leaders after the program. Trust and Hollock (2017) found in their qualitative study that communities of practice stimulated teacher leadership skills. Thus, much of the past research focused more on the leadership enhancement of school administrators and not teachers.

There seems to be a dearth of research that has investigated students' perspectives on leadership in a BL environment using a mixed-methods approach and a well-grounded theoretical approach. This study will be filling a gap in the literature in terms of the Kazakhstani context, in particular, and students' teacher leadership skills development via BL modes of instruction, in general. This study can provide valuable information on how to design and deliver BL courses to effectively train and equip future educational teacher leaders.

Theory Informing the Practice of Blended Learning

The interactions equivalency theorem (IET) guided this study (Anderson, 2003). IET highlights the importance of interactivity as a significant component of satisfaction and persistence for learners within its two main postulates. The first postulate suggests that deep and meaningful learning occurs if at least one

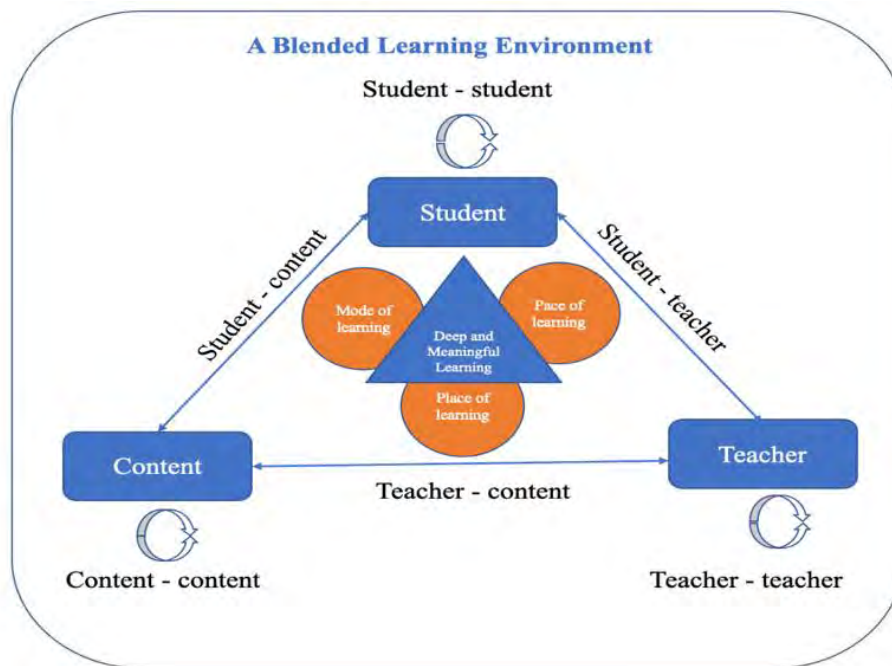


Figure 1. Adapted model interactions equivalency theorem (Anderson, 2003)

type of interaction is presented at a high level. The second postulate states that providing the presence of more than one type of interaction at a high-level produces an even more satisfying educational experience. The forms of interactions include teacher-learner, learner-learner, and learner-content (Rhode, 2007). The theory in this case has been further expanded by taking into consideration the aspects of mode, pace, and place of learning. To be specific, the decisions about how the learning occurs (mode), where the learning occurs (place), and when the learning occurs (pace) in combination with the three interactions are determined by the course design and teaching philosophy. **Figure 1** illustrates the BL environment design which involves a combination of the three key interactions and mode, pace, and place of learning.

This theorem was used in an empirical study by Miyazoe and Anderson (2010) to explore its validity and functionality. The results they obtained suggested that students were more satisfied with and preferred student-teacher interactions in the face-to-face environment and student-content interactions in the online environment. The IET has been used to analyze other BL courses in non-Asian and Turkish contexts (Mehall, 2022; Padilla Rodriguez & Armellini, 2014; Ozsari & Aydin, 2021). However, it has only been used in BL teacher education courses to study teachers use of technology in MOOCs (Tang, 2021), and its use in the choice of Learning Management Systems for teacher education courses in Australia (Holmes & Prieto-Rodríguez, 2018). Thus, it seems no other research has investigated students' perspectives in a BL environment using the IET in the post-Soviet context nor in teacher leadership development.

Kazakhstani Context of the Study

The current research involved graduate students in a master's level educational leadership program at an English medium university in Kazakhstan. Within the MSc program on Educational Leadership, there were three cohorts: inclusive education, school education, and higher education. This program offered a BL format to allow students to study while continuing their jobs and applying their knowledge in practice.

The participants were either in their first or second year of this two-year program. All students took a sequence of two BL courses—work-based project (in the first year) and learning to work (in the second year). Thus, all students in this study had taken the work-based project course while only half of the students had taken both courses. The course design followed the enriched-virtual model of BL, which means the entire course was taken both remotely through online delivery and face-to-face classes (Staker & Horn, 2012, p. 15).

The work-based course, a project-based course, provided students the opportunity to integrate theory into real-life working conditions by identifying issues within the workspace and implementing solutions to them. The course included three phases. In the virtual phase 1, students developed an understanding of project planning and management through assigned readings and meetings, both individual and group, ultimately identifying a project need within their workplace. Students then developed a draft implementation plan which they presented to instructors and peers during phase 2's intensive face-to-face sessions lasting three days. Based on feedback, students conducted their projects at their local sites during phase 3.

The Learning to work course was a continuation of the work-based course where students were expected to share their gained experiences and reflect on their studies over the past two years. Students engaged in personal reflection about leadership skills and implemented these skills via case studies that allowed them to practice putting theory into practice in a safe environment. The online component of the course was followed by three days of face-to-face sessions. The course enabled students to reimagine their professional identity and reconceptualize their future personal and professional roles as educational leaders.

The course activities are problem-based and are aligned with the first principles of instruction: activation, demonstration, application, integration, and problem-centered principles (Merrill, 2018). For example, the courses activated prior knowledge, the project planning activities demonstrated how this knowledge could be applied in problem situations using case studies, and students integrated their skills in their life by applying them to workplace specific problems. This instructional design should promote engagement and motivation (Merrill, 2018). In addition, the course was designed to be balanced and provide effective and appealing instruction that was also efficient, which is a main focus of the instructional theory framework (Honebein & Reigeluth, 2021).

Purpose of the Study

The purpose of this study was to determine the effectiveness of these BL courses on emerging teacher leadership skills, and interactions as posited by the adapted model interactions equivalency theorem. This research addressed the following research questions:

1. How did the graduate students conceptualize BL?
2. In their opinion,
 - a. what were the benefits of BL courses in terms of course interactions (i.e., student-student, student-content, and student-teacher)?
 - b. what were the challenges of being enrolled in BL courses?
 - c. to what extent were their leadership skills developed and enhanced?

METHODOLOGY

Research Design and Sampling Strategies

An explanatory sequential mixed research methods design was adopted. In this design, a quantitative data collection and analysis of survey results preceded the qualitative data obtained through interviews, and, in general, the qualitative data functioned to enhance and provide a deeper understanding of the quantitative data (Cohen et al., 2011).

A non-probability sampling strategy was used in both phases of the study. The participants for the first phase of the study were recruited based on convenience sampling, as the sample was the target audience of graduate students enrolled in the BL courses. The survey link was sent to all master's students enrolled or previously enrolled in the courses included in the study. This email invitation also asked students from the courses who were willing to participate in an interview to contact the researchers. The selection of participants for the qualitative phase was based on a homogeneous sampling strategy, where the researchers tried to interview an equal number of students from each of the three different cohorts (Cohen et al., 2011).

Table 1. Demographics of the study respondents

Survey respondents				Interview participants		
Cohort	Percent	Age	Percent	Location	Percent	Number of participants
Inclusive education	28.4%	21-30	58%	Large city	69%	6
Higher education	27.2%	31-40	37%	Small city	28%	6
School education	44.4%	41-50	5%	Rural	3%	5
Total	100%		100%		100%	17

Survey Respondents and Interview Participants

The survey respondents' (n=81) were master's students at an international university studying educational leadership and enrolled in BL courses in the Spring of 2019. The demographic characteristics are shown in **Table 1**. The gender distribution of the respondents was 48.5% female, and 51.5% male. The majority of the survey respondents were from the school education cohort, but this was to be expected since this cohort is about the same size as the other two cohorts combined.

After completing the survey, seventeen MSc students from all three cohorts took part in a follow-up interview on a volunteer basis (**Table 1**).

Instrumentation

The instrumentation in this study included a survey and a semi-structured interview protocol. The anonymous 38-item survey included Likert-scale, slider, ranking, and open-ended questions. It was developed by the project team and administered online via Qualtrics. The survey was designed to measure students' interest in taking BL courses and its effect on their leadership skills. In order to strengthen its validity, the survey was piloted in an earlier study and then revised based on feedback. The revised instrument answered all the components of the study so content validity was achieved. It also had external validity as it provided a solid assessment of the students and issues under investigation and further reconfirmed the findings from the pilot study (Namysova, et al., 2019). However, given the small number of students who responded to this survey, we cannot state anything in terms of the statistical validity of the instrument. Given this survey was administered to a second cohort of students within this program and produced very similar answers, we are confident in terms of its reliability.

It is crucial to note that the survey was not initially developed specifically with the theoretical framework in mind and did not include specific sections concerned with student interactions with peers and course content which is a limitation. However, adding questions about these two interactions would have produced a survey that was too long so this was not included by the research team.

The interview guide was developed based on the results of the survey to enrich the quantitative data. The interview guide consisted of 10 semi-structured questions. The addition of the interviews allowed us to further query the quantitative results. Using both quantitative and qualitative data sources allowed us to triangulate the data adding to the reliability and trustworthiness of the data (Merriam & Tisdell, 2016). In addition, the qualitative data allowed for information about student interactions with peers and course content to arise so that all the research questions were addressed. Once the interviews were transcribed, member checking took place to further allow interviewees to review what they had said and verify their opinions had been presented correctly.

Data Analysis

The quantitative and qualitative data were analyzed separately. Descriptive data analysis for the survey was completed using SPSS software. The qualitative interview data were transcribed and analyzed using NVIVO software. Thematic analysis focused on identifying and describing both implicit and explicit ideas within the data to determine emerging themes (Merriam & Tisdell, 2016). The data was coded based on the key terms of the theoretical framework and research questions.

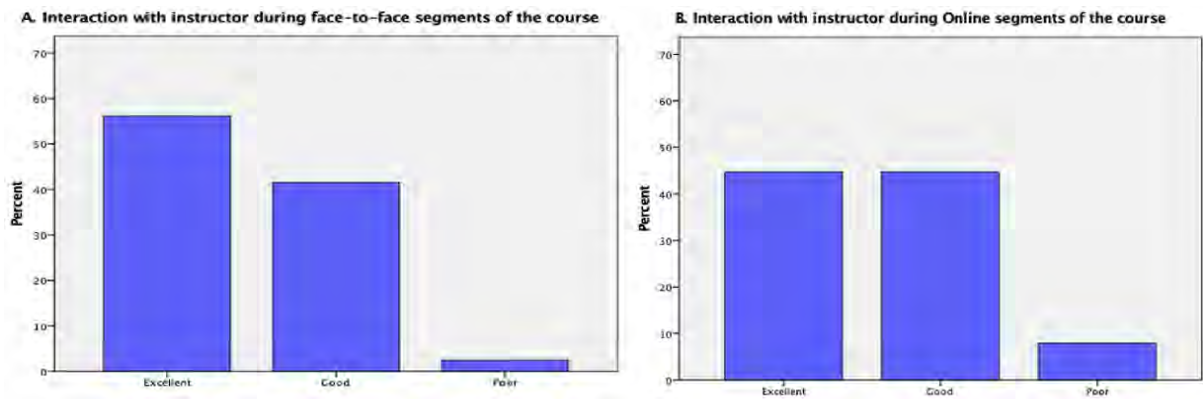


Figure 2. Interaction with the instructors during face-to-face (A) and online (B) course segments

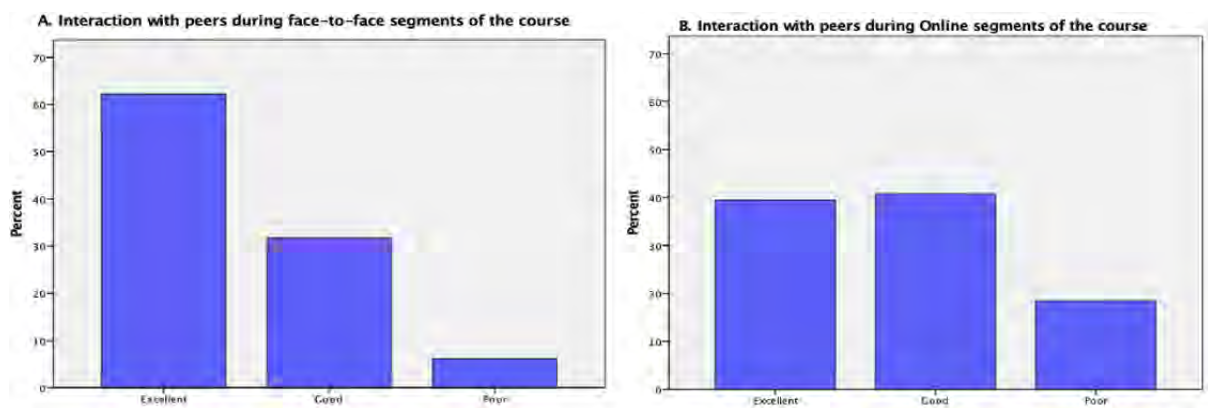


Figure 3. Interaction with peers during face-to-face (A) and online (B) course segments

RESULTS

Quantitative Findings

The survey return rate was 73% of the entire BL population, thus, representative of the sample population.

The benefits of blended learning courses

The findings of the survey are presented in line with the theoretical framework that focused on student-teacher interactions, student-student interactions, and mode, place, and pace of learning, as well as the development of leadership skills.

An ANOVA revealed no significant differences between the three cohorts, so all data was collapsed for further analysis. For instance, there was no significant effect of cohorts on students' confidence both prior and after the face-to-face sessions [$F(2, 42)=26, p=.77$], [$F(2, 42)=11, p=.90$]. Similar results were obtained with other variables.

Student-teacher interactions

Ninety-seven percent of the respondents indicated their preference for face-to-face interactions with instructors (**Figure 2A**), and a slightly lower percentage (92%) indicated they enjoyed interacting with their instructors during the online segment of the course (**Figure 2B**). While only a small percentage of the students were not satisfied with their online (8%) and face-to-face (3%) interactions with instructors (**Figure 2**).

Student-student interactions

Overall, the majority of students were satisfied with the student-to-student interactions in both the face-to-face and the online segments of the courses (**Figure 3**). However, a greater number of respondents felt the student-to-student interactions were poorer in the online segments.

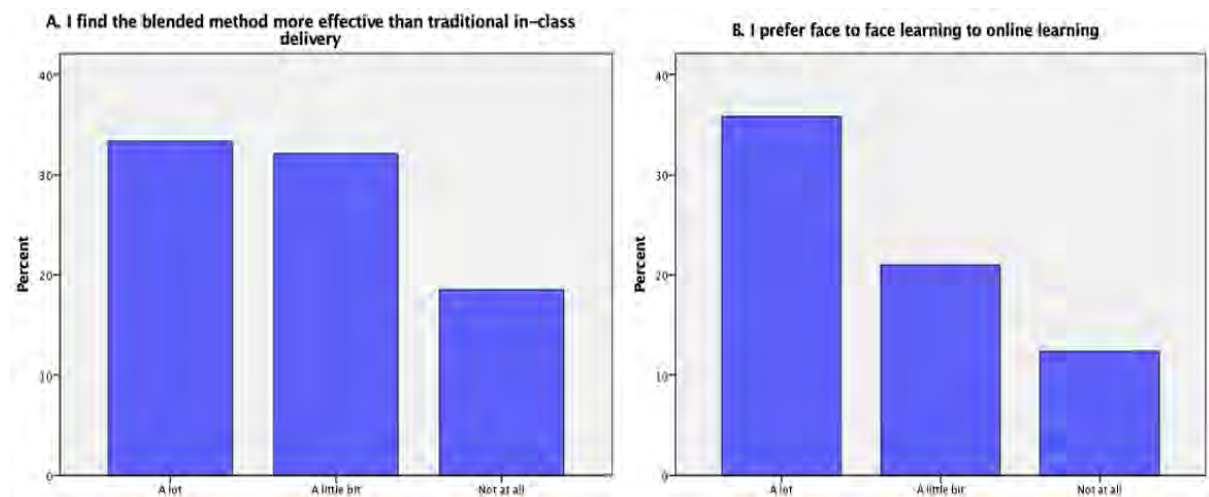


Figure 4. The evaluation of the blended learning courses

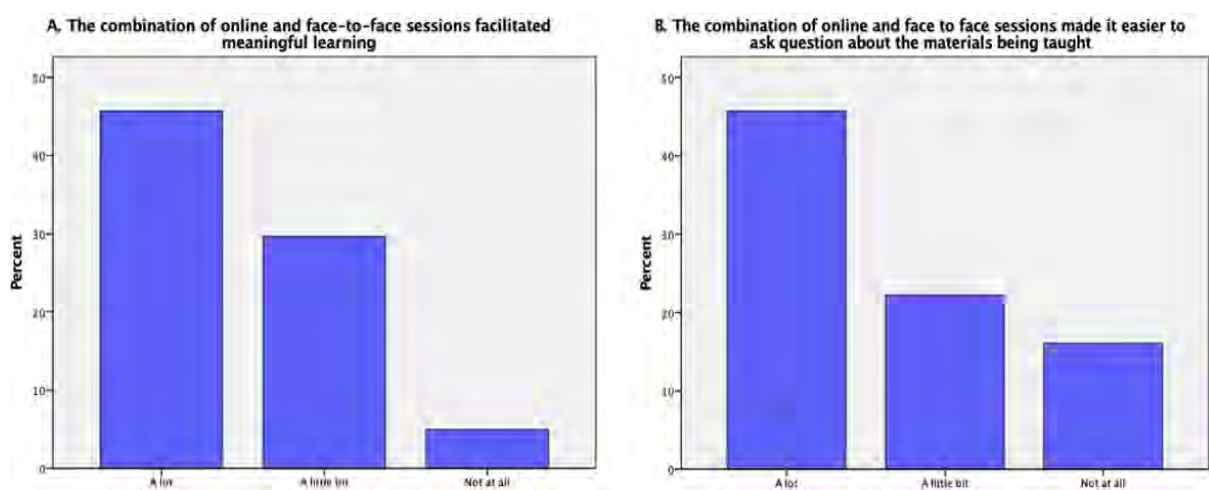


Figure 5. Combination of online and face-to-face learning facilitated meaningful learning

Mode, place, and pace of learning

Overall, after combining the responses of “a lot and a little bit” the majority of students found the BL method more effective than traditional classes (Figure 4A). In addition, the majority of respondents indicated that face-to-face learning was more beneficial than strictly online modes (Figure 4B). These responses suggest that BL was the preferred mode of learning over traditional while face-to-face learning was the preferred mode of learning over online.

In addition, the majority indicated the combination of online and face-to-face learning facilitated meaningful learning (Figure 5A) and eased the communication process (Figure 5B).

When asked to evaluate confidence levels for project implementation before and after the face-to-face meetings, the majority of respondents agreed that their confidence increased after the face-to-face meetings. Moreover, the number of those who had high confidence increased by 31% when compared to rates prior to intensive face-to-face sessions (Figure 6). This finding further demonstrates the importance of BL and its multiple modes of delivery.

The relationship between confidence in conducting project work before and after the face-to-face sessions and interest in taking the course was investigated using Pearson product-moment correlation coefficient. There was a strong, positive correlation between interest in taking the course and confidence in conducting projects prior to face-to-face sessions [$r=.60$, $n=81$, $p<.000$]. This suggests that practical projects were engaging and motivating to students.

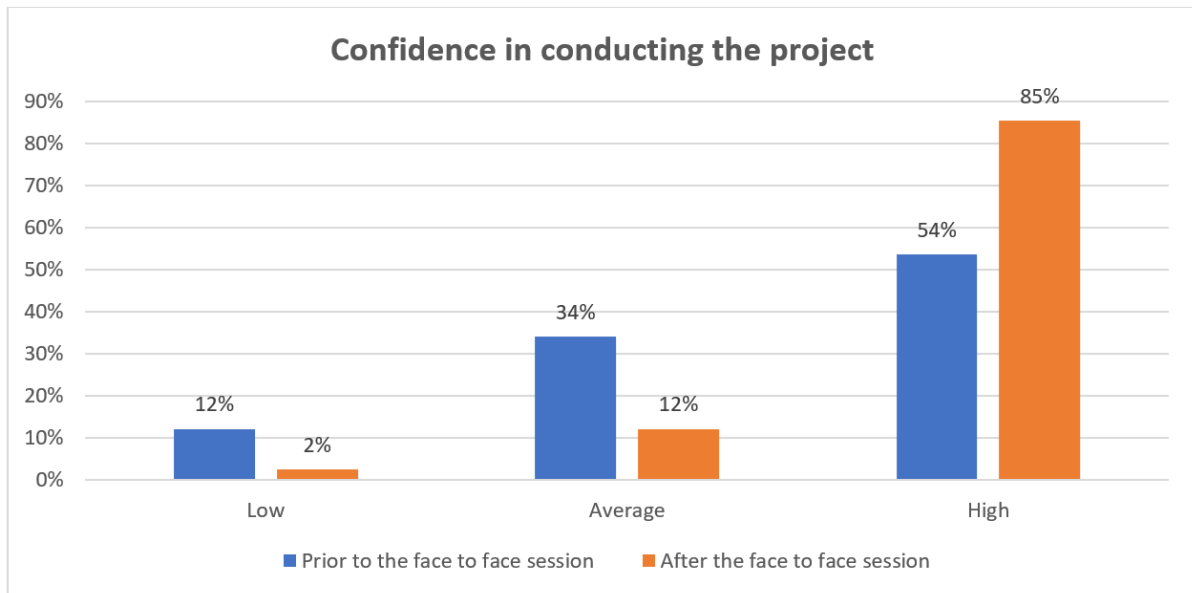


Figure 6. Confidence in conducting the project

Table 2. Pearson product-moment correlations between measures of confidence levels and interest in taking the course

Measure	1	2	3	4
1. Interest in taking the course	–			
2. Confidence in conducting project before face-to-face sessions	.60**	–		
3. Confidence in conducting the project after the face-to-face session	.48**	.57**	–	
4. How did the proficiency of skills with online technology change or improve?	.50**	.37*	.24	–

Note. *Coefficients are significant at $p < .05$ & **Coefficients are significant at $p < .01$

There was a strong, positive correlation between interest in taking the course and perceived proficiency in technology skills obtained through learning online [$r = .50$, $n = 81$, $p < .000$] (Table 2). This suggests that students with more technological skills felt more comfortable in the online part of the course due to their perceived self-efficacy.

When asked to elaborate on what facilitated this increase in confidence after the face-to-face intensive meetings in open-ended questions, 30% mentioned the opportunity to have a more in-depth discussions about their project plans during the face-to-face sessions.

Enhancement of leadership skills

Students also ranked how several activities completed within the course influenced their development of leadership skills (Table 3). The lower the average the more that activity supported students' perceived leadership skill development as the top-ranked activity for each student was awarded a one, the second-ranked activity was awarded a two, etc. The top four ranked activities were determined using descriptive statistics. The analysis found that students perceived face-to-face discussions with peers, project development and project implementation as the most essential aspects for enhancing their leadership skills. The least helpful aspect in students' opinions was the final project report which may be attributed to this being the culminating task for the course.

The correlation between these three activities that were perceived to promote leadership skills was investigated using Pearson product-moment correlation coefficient (Table 4). All the correlations were significant either at the $p < .01$ or $p < .05$ but only one was of moderate effect. The results showed that project development and its implementation were highly moderate correlated at a moderate level [$r = .54$, $n = 81$, $p < .000$]. All of the other correlations showed weak associations between the activities and face-to-face discussions and in some cases were negative. For example, there was a weak negative correlation between the project implementation and the face-to-face discussions with peers demonstrating that these discussions were not as important for leadership development.

Table 3. Leadership skills development

Development of leadership skills	Mean	Standard deviation
Face-to-face discussions	3.53	2.500
Project development	4.44	2.230
Project implementation	4.99	2.230
Presentation of the preliminary project and/or its rationale	5.21	2.760
Needs assessment	5.54	2.550
Emails exchanges with my instructor	5.67	2.797
Online meetings with peers in my section	6.10	2.468
Final project report	6.77	2.389

Table 4. Correlations between face-to-face discussions with peers and project development stages

Measure	1	2	3	4
1. Face-to-face discussions with peers	-			
2. Project development	-.27*	-		
3. Project Implementation	-.34**	.54**	-	
4. Final project report	-.28*	.22*	.29**	-

Note. *Coefficients are significant at $p < .05$ & **Coefficients are significant at $p < .01$

Table 5. Themes emerging during interview data analysis

Main themes	Sub-themes
Benefits of the blended learning courses	Mode, pace, and place of learning Student-teacher interactions Student-student interactions Student-content interactions Leadership skills development
Challenges of the blended learning courses	Student-teacher interactions Student-content interactions
Challenges of specific blended learning courses	

Qualitative Results

The interview participants included current and graduate master's students who had taken the courses being studied. They were evenly distributed across three cohorts including school education, higher education, and inclusive education (Table 1). The interviewed students were labeled randomly as participant 1 (P1), participant 2 (P2), and onwards. The interviews took two months to complete in the Fall 2019 and were started 3 months after the survey was completed and analyzed. Three main themes and seven sub-themes emerged during the thematic analysis of the interview data. They are included in Table 5. The results are presented.

Benefits of blended learning courses

Benefits of blended learning courses-Mode, pace, and place of learning: The majority of participants consistently discussed that BL provided an opportunity for them to study at their own pace as well as favoring it over either traditional or online instruction. This was due to the opportunities provided by the BL model for students to dictate pace and place. This course was especially convenient for students who had full-time jobs, as well as family commitments, as P14 clarified, "I very [much] like BL because I am a mom, [and] I am working full time. And for me it's very useful and it's very interesting that you can interact with your professor online." Even without being concerned about taking care of a family, it was also noted that:

Distance learning has its benefits: I can do it at my workplace, I can do it at my own pace, which is very important if you have a job, and if you have a family, if you have kids. It's important to have this flexibility (P3).

However, there were some students who felt that face-to-face classes were more convenient allowing one to approach the instructor and peers in person and ask questions of a more individual nature. Some students mentioned it was crucial to have face-to-face meetings to discuss the issues they encountered, and more specifically, to ask questions that they would not otherwise inquire about online, due to their not being

confident in their statements and having a feeling of asking “silly” questions. As P8 said, “For me, personally, distance online learning is not enough. I actually have to meet with people. I need to discuss; I need to do it in real-time and space” (P8).

However, P10 was adamant that they:

personally prefer[ed] face-to-face learning environment. It seems like when it is online or BL, I feel like I am lost or behind and don't understand something properly. It feels like during the face-to-face sessions you can reach your professor anytime and personally ask about what is not clear (P10).

In agreement with this sentiment, P17 stated that face-to-face classes were more effective, but this might be because of “our problems with time management probably”. Thus, even though some students still preferred face-to-face the majority liked the flexibility of BL.

Benefits of blended learning-Student-teacher interactions: Although the BL approach was preferred by most of the interviewees, several highlighted that the face-to-face mode of learning offered more opportunities to reach out to instructors and get material clarified. As P3 said, “I'm much more likely to ask my professor questions if we are in the same [physical] classroom.” There was a level of comfort for some in asking questions immediately after the lesson.

Moreover, some thought that there were subjects that were better asked via face-to-face. As P2 noted:

“Some courses need more support from the instructor. For example, in quantitative research methods, we really need the instructor face-to-face to show how we can make analyses of different data and it's difficult to work online.” The face-to-face part of the BL course provided more opportunities for students to effortlessly interact with their instructors as students would have private consultations to clarify project expectations. These consultations helped students “to understand what the aim of the course was and how to do such assignments. [P11]”.

At the same time, the opportunity to reach the instructor despite the distance, was mentioned to be an extremely helpful part of the BL course. As P3 stated “the BL course was perfect. Because I could talk to my professor via Skype and Hangouts. I could talk and discuss any steps of my project. We had about three online meetings before we met face-to-face.”

Benefits of blended learning-Student-content interactions: The BL courses helped some students to conceptualize and apply knowledge and skills gained throughout the two-year master's degree program and implement those skills in their workplaces: “During the course, I learned how to use my knowledge acquired during the two years of the master program on my work and future career” (P1). P10 concurred with this idea when they said: “Another good thing about the course was the fact that we had to present portfolios. It is good to have your career portfolio ready in case you apply for different jobs.” In general, the content of the program was acknowledged to be beneficial for students as it provided more practical skills and prepared them for future work. For instance, P3 noted that “the strategies that we were taught like investigating the need of the context, ..., meeting with people, discussing, prioritizing, planning the steps, all of that was very useful”.

Benefits of blended learning-Student-student Interactions: As the majority of interviewees mentioned, they highly valued interactions with their peers. Groupmates' support instilled confidence and provided opportunities for mutual growth. As P14 said: “I really appreciate all my professors and my classmates. They are doing a lot of work and giving us a lot of inspiration, and they are doing this to grow and to think outside the box” (P14).

Students thought that both online and face-to-face segments of the BL courses were helpful and encouraging for students as they had plenty of opportunities to interact despite the distance and time differences.

Benefits of blended learning-Leadership skill development within the framework of blended learning courses: The participants highlighted that the ability to implement their projects, communicate with stakeholders, and attempt to convince them about the need for the project inevitably required leadership

skills: "I started to use my knowledge in the workplace. And be more active, be a proactive person. And then, ...they recognized me as person who has leadership potential, who cares about the faculty and the university" (P1). P3 concurred with this when she said:

You do not have to be in a leadership position at this working place, but you must be able to convince people that this is a good idea. And you need to be able to convince people to give it a try. That takes leadership skills. So, in this respect, the work-based project improves your leadership skills (P3).

Moreover, P14 highlighted that the BL courses improved their leadership skills during the process of implementing the project: "right now I'm not afraid of taking responsibility and to give more ideas" (P14).

For some participants, the BL courses helped shape their career goals and think about promotion or career change. As P2 said, "It helped me, ... it directed me to another sphere, the sphere of management." Another student thought the BL courses helped to clarify their enjoyment of academia: "I would probably be happy to continue my studies, to do for example a PhD" (P14). As P1 stated:

I know that in [the] educational sphere without a Ph.D. or without any degrees you're just a person, who's not intended to be a scholar. That's why, first-step is to acquire Ph.D., but, while acquiring Ph.D. I should take on some projects, take some extra responsibility on myself in order to be a leader in my workplace (P1).

Challenges of blended learning

Challenges of blended learning-Student-teacher interactions: One challenge was related to the professors' style of teaching and feedback. One of the participants complained about the inefficiency of the feedback and its constant delay:

Again, it all depends on the course instructor and professor. Because, whenever it's online or blended, the feedback, is delayed. Whereas in face-to-face courses the feedback was immediate. The longer it takes the professor to give the feedback, the less the information was for learning (P17).

This supported the data from the survey, where 97% of the participants preferred face-to-face interactions with instructors (**Figure 2A**). As the individual interview results showed, this might be due to the idea that feedback online was not always timely enough.

Challenges of blended learning-Student-content interaction: Even though the content of the BL courses was useful for the students, some of them mentioned that they encountered challenges related to the timing of the project implementation. One of the participants mentioned that she had written her reflection entries before the meeting with her peers, for which she was criticized by her instructor. She was supposed to do it after the face-to-face meeting sessions, however, as P3 mentioned:

Probably, it's worth getting the approval of your professor and your peers to get feedback before you start doing something. However, I didn't want to do this project just to get a tick. I wanted it to mean something. I wanted to actually do it. I was thinking realistically that I will not be able to complete this project by the end of the year as I want to if I don't start writing now. So, that was the biggest problem with the course (P3).

This idea was continued with others as many felt that the course did not allow students to fully implement their projects.

It was mentioned by many of the interviewees that they had more time for planning rather than for actual implementation: "The biggest problem with the work-based project this year, was that we had about two months to plan the project, and then we had two weeks to implement it" (P3). Moreover, the timing allotted for the implementation was not enough to allow for the project outcomes to emerge. Thus, it was hard to evaluate the results within that short period since "when it was the time for [implementation] of the idea, it just undoable. Because it needs more time, more resources, and it's not so easy to do it. It takes time" (P14).

Another challenge was related to the assignments that were sent before the beginning of the BL courses. P11 mentioned that the obligation to fulfil assignments before the course was to some extent distracting, as they needed to dedicate more time to their thesis: With this, well I personally do not like assignments before the beginning of the course... we don't have all time to do it and the thing is that we really want to be focused on our thesis... (P11).

Apart from that, fulfilling the assignments before the beginning of the course was deemed to be ineffective, as some students had to totally reconsider their project and even change it during the course:

During the course, I changed [my project]. So, my time was wasted [by assignments prior to course], because before the course started, I was thinking "Okay I will do this" and then when I had the face-to-face intensive, I understood that it was too much. I needed to make it simple, so I just wasted my time (P14).

Challenges with specific courses

Students had issues with the work-based course due to repetitive tasks during the online and face-to-face sessions that felt to be tedious

So, by the time, our professor read our reflections, she knows about the project. You kind of discussed your project on your main readings, so your peers also have an idea about your project. This kind of repeated discussion of your project, by the time you present, everybody's already sick of it (P3).

This repetitiveness meant that students were not sure if they even needed the allotted face-to-face intensive days, as P1 highlighted: "It started from online meetings, then we met face-to-face. Three days [face-to-face] is too much. One day is ok. We just summarized what we learned, what we can do."

The majority of study participants mentioned issues with the course schedule. To be specific, the deadlines for the assignment submissions coincided and conflicted with the deadlines for other courses: "Yeah, challenge is with the deadline. My grade is B+. Because I did a good job initially, but for the third assignment I could not arrange my time, because it coincided with the submission of my thesis draft" (P1).

In addition, there were some issues raised that related to the design of the BL course, where one of the participants suggested reviewing the BL tasks to make them more engaging:

A blended course is a perfect platform to introduce some of the gamification elements, so that the students would be more motivated to learn and more motivated to participate. If you just take some of the tasks and put them on MOODLE, it doesn't make the course blended. It changes the agent, but the tasks stay the same. To make it fully blended, the tasks should be adjusted accordingly, and some could be gamified (P17).

Most interviewees admitted that the content of the Learning to Work course did not meet their expectations, as it mostly focused on theoretical rather than practical aspects of educational leadership. They thought that this course was time-consuming as it was taking time away from what they deemed as more important work, writing their thesis: "I felt it was just taking too much of my time" (P6).

Another drawback of this BL course was related to the types of assignments the students were provided before their face-to-face sessions, as they felt those tasks were not beneficial for them, nor relevant or challenging enough:

Maybe the tasks were too vague, too general, Maybe the descriptions of the tasks were not given specifically enough.... I felt some of the tasks were too simple, that's why I didn't take them too seriously. I did not feel I was learning anything new (P17).

Also, several participants declared that this course did not enhance or facilitate their leadership skills. As P17 said: "I'm not saying that I didn't enjoy the course, but I didn't feel that it helped me improve my knowledge or skills".

As a suggestion for further course improvements, one of the participants acknowledged the importance of following up with the earlier project completed in the work-based course to identify its impact on the institutions, as well as its successes and failures. This would provide more opportunity to thoroughly work on future projects and, in general, would provide coherence with the previous course: Well, you know, first, they could let us follow up on the projects. For example, we did something during the first year, we could see what impact our work has in that institution. And what impact it didn't have (P6).

DISCUSSION

The study findings indicated that the benefits of BL outweighed its challenges which were related to the content and timing of the courses. These results aligned with other studies in terms of BL allowing for flexibility, prioritizing student-centered learning, and enhanced engagement (e.g., Bouilheres et al., 2020; de Brito Lima et al., 2021; Rahman et al., 2015). Most students acknowledged the fact that BL was an invaluable mode of learning for students continuing their work careers, as well as for parents in academia. These results were aligned with other BL studies (Broadbent, 2017; Chen et al., 2010; Lin, 2018; Smyth et al., 2012).

This study highlighted the importance of both aspects (face-to-face and online) of BL towards producing positive attitudes about the course, which increased confidence. In addition, the survey findings showed that the students with relatively advanced technological skills felt more comfortable in the online part of the course. That is why, it is important to conduct training on the digital aspect of the course to make BL more effective and to not allow it to become a barrier to success (e.g., Rasheed et al., 2020; Tanveer, 2011; Yilmaz & Malone, 2020). Moreover, previous studies showed that BL supports can increase student confidence levels as was evident in this study (e.g., Chiu, 2021; de Brito Lima et al., 2021).

Interaction Findings

In general, the IET confirmed that the persistence of at least two types of interactions enhanced students' educational experience (Anderson, 2003). The result of this study promulgates the fact that students felt highly satisfied with two types of interactions: face-to-face interactions with instructors and online content, which further led to the satisfaction and development of leadership skills.

Teacher-student interactions supported by blended learning

Both the survey and face-to-face interviews illustrated that most students evaluated face-to-face interactions with their instructors highly as it provided ample opportunities for them to receive immediate feedback and it eased the communication process. Also, students highlighted the benefits of face-to-face sessions as they facilitated growth in confidence in conducting their project work. These are somewhat contradicting results to the existing literature, which suggested BL and online approaches were not only more effective but also more preferable to traditional face-to-face classrooms (e.g., Bernard et al., 2014; Harmeet Kaur, 2020). However, these findings are somewhat supported by Clark and Post (2021) and Pechenkina et al. (2018) who found that BL students preferred to face-to-face components of BL. However, this study using the IET allowed for the probing of specific interactions so it might be that the part of BL and traditional courses that are highly attractive to students are the face-to-face interactions which highlight teacher-student interactions which are often lacking in some BL courses (Lightner & Lightner-Laws, 2016; Smyth et al., 2012).

Student-student interactions supported by blended learning

Even though student-to-student interactions showed lower satisfaction than other interactions, no students mentioned it to be a major issue during interviews as found in some past studies (Lightner & Lightner-Laws, 2016; Smyth et al., 2012). The satisfaction with this interaction is a good sign, as according to Alabdulkarim (2021), student-student interactions in BL, specifically, collaborative peer interaction is essential in processing the content of the course, as it provided scaffolding mechanisms that enhanced the learning outcomes. However, this means it is essential to create more interactive and engaging online environments for students that help facilitate these interactions (Alabdulkarim, 2021; de Brito Lima et al., 2021).

Student-content interactions supported by blended learning

Regarding the content of BL, the work-based project that mostly focused on applying skills within their workplaces was considered to be beneficial for students as it helped put theory into practice, and even identified potential thesis topics as a result of exploring and observing the gaps in the field. Moreover, the survey results showed that the content of the BL course, in particular, the project development and its implementation were essential in developing students' leadership skills. This is in line with past research that indicated that the nature of the assignments and the content of the BL course influences learners' success (de Brito Lima et al., 2021; Smyth et al., 2012). In addition, application of theory in non-BL courses has been shown to be important in engaging, motivating, and allowing students to succeed (Merrill, 2017).

The survey respondents highlighted the top assignments that were deemed to facilitate leadership skills development (face-to-face discussions, project development, and project implementation), thus indicating that BL is essential in developing leadership skills compared to traditional face-to-face classes as it allowed for both face-to-face interactions and the ability to easily implement project solutions in the field. In addition, the moderate negative correlation between the project implementation and the face-to-face discussions might indicate the fact that students felt less satisfied due to the implementation of their projects in isolation, with limited access to their peers. In hindsight, the final project report was found to be the least helpful aspect in promoting leadership skills, which could be explained by the fact that students highly valued the process of engagement and real-life problem-solving activities. Previous studies on BL also support the view that students are more likely to learn by group participation rather than working in isolation (Alabdulkarim, 2021; Lee, 2020; Trust & Horrocks, 2017). This was further supported by the survey's open-ended responses, where 30% of the comments highlighted the opportunity to have an in-depth discussion about their project plans as being a plus of BL. Thus, project work in the workplace is an essential aspect of enhancing students' leadership skills as suggested by instructional design principles (Merrill, 2017, 2018). Consequently, restructuring the BL course by integrating specific implementation steps could facilitate students' satisfaction and engagement with the online content (Lin & Reigeluth, 2021) and has been suggested by Honebein and Reigeluth's (2021) instructional design framework.

Student's Leadership Skills Supported by Blended Learning

In this study BL increased students' learning confidence and leadership skills since it required the application of prior knowledge learned in other classes. The combination of online and face-to-face segments of the BL course facilitated student confidence in conducting on-the-job project work. It also developed certain features during project implementation that included responsibility, self-confidence, time-management, and the ability to lead others. Similarly, past research found that BL helped high school teachers transfer their knowledge and skills to their workplaces (Adams & Ross, 2014; Smyth et al., 2012). However, this study specifically linked the transfer to the workplace to leadership skill development.

Also, the course helped shape students' future career visions and clarify their career goals. This finding is similar to Acree et al. (2017) and Aytac (2009) who found BL was essential for the professional development of school principals and played an effective role in making substantial changes in their practice of using BL with teachers in their schools.

The Challenges and Suggested Improvements of Blended Learning Courses

One of the main challenges of the interviewees was related to the content of the BL course rather than its mode. To be specific, the students were not fully satisfied with the ability of one course to support their growth as educational leaders as it was more theoretical than practical with no actual fieldwork. This highlights that practical projects that integrate student knowledge seem to be what helps to develop leadership skills as well as engage and motivate students (Merrill, 2017, 2018).

Overwhelmingly students recommended modifying course timelines so that time was allotted to fully implement their projects so that assignments don't interfere with other course deadlines. This is a matter of timing that organizations should be able to modify as shown by Garrison and Vaughan (2013).

It is crucial to make sure that feedback is given as promptly as possible. One of the main reasons that most students preferred the face-to-face component was due to receiving almost instant feedback. It is suggested

that improving the communication and feedback processes in the online mode would enhance student learning and satisfaction such as more individual meetings. Indeed, aligned assessments that assess smaller sections of the projects would be helpful to promote mastery and allow quicker feedback (Honebein & Reigeluth, 2021; Lin & Reigeluth, 2021).

Limitations of The Study

There are several limitations of this study:

1. this was a case study based on convenience sampling,
2. the sample size of the quantitative phase was small so we cannot report on the statistical validity of the survey, and
3. the data in this study did not explore all aspects of the theoretical framework (specifically, teacher-teacher, teacher-content, and content-content interactions).

The first two limitations decreased the generalizability of the study. The last limitation points to the need for a survey or study that focuses on all aspects of the framework. In the same vein, regression analyses between the scores of three different interactions would further enhance this research.

CONCLUSIONS

In conclusion, this mixed-methods study explored master's degree students' experiences in BL courses through the lens of the IET. The study results demonstrated the benefits of the BL course regarding the enhancement of three forms of interactions: student-teacher, student-student, and student-content interactions. These enhancements led to the development of teacher leadership skills and increased confidence regarding taking on leadership roles. Thus, the design of the class in addition to the BL mode allowed for an effective class that increased student engagement and motivation in terms of teacher leadership skill development supporting several studies (Honebein & Reigeluth, 2021; Manwaring et al., 2017; Merrill, 2017; Müller & Mildemberger, 2021) while avoiding the lowering of student self-efficacy (Wang & Degol, 2014; Prifti, 2020)

This study contributes to the literature supporting the key issues identified and contributes to the gaps identified in the literature review. The results of this study have practical implications for further course designs by taking into consideration different forms of interactions (teacher-student, teacher-teacher, teacher-content, student-student, student-content, and content-content interactions). The findings suggested that BL courses can be designed to be balanced such that they can be effective, efficient and appeal to students. Further research needs to extend this study to investigate all the interactions of the IET (Anderson, 2003) in a more inclusive manner in BL courses as well as the link between BL, instructional design principles (Merrill, 2018) and the instructional theory framework (Honebein & Reigeluth, 2021).

Author contributions: GT: lead writer; KLM: PI of the project; JH, FP, & ZK: co-PIs of the project; KLM, JH, GN, & MA: edited and drafted sections of the paper; & FP & ZK: edited the final paper. All authors approve final version of the article.

Funding: The authors received no financial support for the research and/or authorship of this article.

Ethics committee approval: The authors state that the study was approved by the Nazarbayev University's Ethics board (IREC) on February 8, 2018 with IREC approval number: 34/29012018.

Declaration of interest: Authors declare no competing interest.

Data availability: Data generated or analyzed during this study are available from the authors on request.

REFERENCES

- Acree, L., Gibson, T., Mangum, N., Wolf, M. A., Kellogg, S., & Branon, S. (2017). Supporting school leaders in blended learning with blended learning. *Journal of Online Learning Research*, 3(2), 105-143. <https://www.learntechlib.org/primary/p/171355/>
- Adams, A., & Ross, D. D. (2014). Clinical partnership at a distance: A design that transforms teaching and leadership. *Peabody Journal of Education*, 89(4), 533-546. <https://doi.org/10.1080/0161956X.2014.939007>

- Alabdulkarim, L. (2021). University health sciences students rating for a blended learning course framework. *Saudi Journal of Biological Sciences*, 28(9), 5379-5385. <https://doi.org/10.1016/j.sjbs.2021.05.059>
- Allen, I. E., & Seaman, J. (2015). Grade level: Tracking online education in the United States. *Babson Survey Research Group*. <https://files.eric.ed.gov/fulltext/ED572778.pdf>
- Anderson, T. (2003). Getting the mix right again: An updated and theoretical rationale for Interaction. *The International Review of Research in Open and Distributed Learning*, 4(2), 1-14. <https://doi.org/10.19173/irrodl.v4i2.149>
- Aytac, T. (2009). The influence of blended learning model on developing leadership skills of school administrators. *UbiCC Journal*, 4(3), 538-543.
- Bernard, R. M., Borokhovski, E., Schmid, R. F., Tamim, R. M., & Abrami, P. C. (2014). A meta-analysis of blended learning and technology use in higher education: From the general to the applied. *Journal of Computing in Higher Education*, 26(1), 87-122. <https://doi.org/10.1007/s12528-013-9077-3>
- Birgili, B., Seggie, F. N., & Oguz, E. (2021). The trends and outcomes of flipped learning research between 2012 and 2018: A descriptive content analysis. *Journal of Computers in Education*, 8, 365-394. <https://doi.org/10.1007/s40692-021-00183-y>
- Bouilheres, F., Le, L. T. V. H., McDonald, S., Nkhoma, C., & Jandug-Montera, L. (2020). Defining student learning experience through blended learning. *Education and Information Technologies*, 25(4), 3049-3069. <https://doi.org/10.1007/s10639-020-10100-y>
- Broadbent, J. (2017). Comparing online and blended learner's self-regulated learning strategies and academic performance. *The Internet and Higher Education*, 33, 24-32. <https://doi.org/10.1016/j.iheduc.2017.01.004>
- Chen, P. S. D., Lambert, A. D., & Guidry, K. R. (2010). Engaging online learners: The impact of web-based learning technology on college student engagement. *Computers & Education*, 54(4), 1222-1232. <https://doi.org/10.1016/j.compedu.2009.11.008>
- Chiu, T. K. (2021). Digital support for student engagement in blended learning based on self-determination theory. *Computers in Human Behavior*, 124, 1-10. <https://doi.org/10.1016/j.chb.2021.106909>
- Clark, C. E. J., & Post, G. (2021). Preparation and synchronous participation improve student performance in a blended learning experience. *Australasian Journal of Educational Technology*, 37(3), 187-199. <https://doi.org/10.14742/ajet.6811>
- Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education*. Routledge.
- de Brito Lima, F., Lautert, S. L., & Gomes, A. S. (2021). Contrasting levels of student engagement in blended and non-blended learning scenarios. *Computers & Education*, 172, 1-13. <https://doi.org/10.1016/j.compedu.2021.104241>
- Gallego-Arrufat, M. J., Gutiérrez-Santiuste, E., & Campaña-Jiménez, R. L. (2015). Online distributed leadership: A content analysis of interaction and teacher reflections on computer-supported learning. *Technology, Pedagogy and Education*, 24(1), 81-99. <https://doi.org/10.1080/1475939X.2013.814585>
- Garrison, D. R., & Vaughan, N. D. (2013). Institutional change and leadership associated with blended learning innovation: Two case studies. *The Internet and Higher Education*, 18, 24-28. <https://doi.org/10.1016/j.iheduc.2012.09.001>
- Harmeet Kaur, K. (2020). Effectiveness of blended learning for teaching cardiac disorders on nursing students' learning outcomes and attitude. *International Journal of Scientific Research*, 9(1), 16-17. <https://doi.org/10.36106/ijsr>
- Holmes, K. A., & Prieto-Rodriguez, E. (2018). Student and staff perceptions of a learning management system for blended learning in teacher education. *Australian Journal of Teacher Education*, 43(3), 2. <https://doi.org/10.14221/ajte.2018v43n3.2>
- Honebein, P. C., & Reigeluth, C. M. (2021). Making good design judgments via the instructional theory framework. In J. K. MacDonald, & R. E. West (Eds.) *Design for learning*. BYU Open Textbook Network. <https://open.byu.edu/id>
- Lee, C. Y. (2020). How to improve the effectiveness of blended learning of pharmacology and pharmacotherapy? A case study in pharmacy program. *Technology, Knowledge and Learning*, 25(4), 977-988. <https://doi.org/10.1007/s10758-020-09447-5>
- Lightner, C. A., & Lightner-Laws, C. A. (2016). A blended model: Simultaneously teaching a quantitative course traditionally, online, and remotely. *Interactive Learning Environments*, 24(1), 224-238. <https://doi.org/10.1080/10494820.2013.841262>

- Lin, C. Y., & Reigeluth, C. M. (2021). Guidance for wiki-supported collaborative learning and community knowledge building for an entire class: Enhancing learning environments during the COVID-19 pandemic. *Revista de Educación a Distancia [Distance Education Magazine]*, 64(21), 1. <https://doi.org/10.6018/red.447401>
- Lin, L. (2018). Student learning and engagement in a blended environment: A mixed methods study. In I. Bouchrika, N. Harrati, & P. Vu (Eds.), *Learner experience and usability in online education* (256-269). IGI Global. <https://doi.org/10.4018/978-1-5225-4206-3.ch010>
- Manwaring, K. C., Larsen, R., Graham, C. R., Henrie, C. R., & Kaur, L. R. (2017). Investigating student engagement in blended learning settings using experience sampling and structural equation modeling. *The Internet and Higher Education*, 35, 21-33. <https://doi.org/10.1016/j.iheduc.2017.06.002>
- Means, B., Toyama, Y., Murphy, R., & Baki, M. (2013). The effectiveness of online and blended learning: A meta-analysis of the empirical literature. *Teachers College Record*, 115(3), 1-47. <https://doi.org/10.1177/016146811311500307>
- Mehall, S. (2022). Comparing in-class scenario-based learning to scenario based eLearning through an interactive, self-paced case study. *Journal of Education for Business*, 97(5), 305-311. <https://doi.org/10.1080/08832323.2021.1943294>
- Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative research: A guide to design and implementation*. John Wiley & Sons.
- Merrill, M. D. (2017). If content is king then e³ instruction is queen. In F. Q. Lai, & J. Lehman (Eds.) *Learning and knowledge analytics in open education* (pp. 172-192). Springer. https://doi.org/10.1007/978-3-319-38956-1_14
- Merrill, M. D. (2018). Using the first principles of instruction to make instruction effective, efficient, and engaging. In R.E. West (Ed.) *Foundations of learning and instructional design technology: Historical roots and current trends*. BYU Open Textbook Network.
- Miyazoe, T., & Anderson, T. (2010). Empirical research on learners' perceptions: Interaction equivalency theorem in blended learning. *European Journal of Open, Distance and E-Learning*, 1, 1-9.
- Moussa-Inaty, J. (2017). Student experiences of a blended learning environment. *International Journal of Learning, Teaching and Educational Research*, 16(9), 60-72. <https://doi.org/10.26803/ijlter.16.9.5>
- Müller, C., & Mildenerger, T. (2021). Facilitating flexible learning by replacing classroom time with an online learning environment: A systematic review of blended learning in higher education. *Educational Research Review*, 34(2021), 1-16. <https://doi.org/10.1016/j.edurev.2021.100394>
- Namyssova, G., Tussupbekova, G., Helmer, J., Malone, K., Afzal, M., & Jonbekova, D. (2019). Challenges and benefits of blended learning in higher education: A case of Kazakhstan. *International Journal of Technology in Education*, 2(1), 22-31. <https://www.ijte.net/index.php/ijte/article/view/6>
- Owston, R., York, D., & Murtha, S. (2013). Student perceptions and achievement in a university blended learning strategic initiative. *The Internet and Higher Education*, 18, 38-46. <https://doi.org/10.1016/j.iheduc.2012.12.003>
- Ozsari, G., & Aydin, C.H. (2021). Interaction preferences of distance learners in Turkey, open learning. *The Journal of Open, Distance and e-Learning*. <https://doi.org/10.1080/02680513.2021.1981279>
- Padilla Rodriguez, B. C., & Armellini, A. (2014). Applying the interaction equivalency theorem to online courses in a large organization. *Journal of Interactive Online Learning*, 13(2), 51-66.
- Pechenkina, E., Scardamaglia, A., & Gregory, J. (2018). "It's the combination that works": Evaluating student experiences with a multi-element blended design in first-year law. *Contemporary Educational Technology*, 9(4), 405-422. <https://doi.org/10.30935/cet.471019>
- Pima, J. K. M., Iqbal, R., Odetayo, M., & Sedoyeka, E. (2018). A thematic review of blended learning in higher education. *International Journal of Mobile and Blended Learning*, 10(1), 1-11. <https://doi.org/10.4018/IJMBL.2018010101>
- Prifti, R. (2020). Self-efficacy and student satisfaction in the context of blended learning courses. *Open Learning: The Journal of Open, Distance and e-Learning*, 37(2) 111-125. <https://doi.org/10.1080/02680513.2020.1755642>
- Raes, A., Detienne, L., Windey, I., & Depaepe, F. (2020). A systematic literature review on synchronous hybrid learning: Gaps identified. *Learning Environments Research*, 23(3), 269-290. <https://doi.org/10.1007/s10984-019-09303-z>

- Rahman, N. A. A., Hussein, N., & Aluwj, A. H. (2015). Satisfaction on blended learning in a public higher education institution: What factors matter? *Procedia-Social and Behavioral Sciences*, 211, 768-775. <https://doi.org/10.1016/j.sbspro.2015.11.107>
- Rasheed, R. A., Kamsin, A., & Abdullah, N. A. (2020). Challenges in the online component of blended learning: A systematic review. *Computers & Education*, 144, 1-17. <https://doi.org/10.1016/j.compedu.2019.103701>
- Rhode, J. F. (2007). *E-learning interaction matrix*. <http://www.jasonrhode.com/interactionmatrix>
- Smith, K., & Hill, J. (2019). Defining the nature of blended learning through its depiction in current research. *Higher Education Research & Development*, 38(2), 383-397. <https://doi.org/10.1080/07294360.2018.1517732>
- Smyth, S., Houghton, C., Cooney, A., & Casey, D. (2012). Students' experiences of blended learning across a range of postgraduate programmes. *Nurse Education Today*, 32(4), 464-468. <https://doi.org/10.1016/j.nedt.2011.05.014>
- Spring, K. J., & Graham, C. R. (2017). Thematic patterns in international blended learning literature, research, practices, and terminology. *Online Learning*, 21(4), 337-361. <https://doi.org/10.24059/olj.v21i4.998>
- Taker, H., & Horn, B., M. (2012). *Classifying K-12 blended learning*. Innosight Institute.
- Tang, H. (2021). Teaching teachers to use technology through massive open online course: Perspectives of interaction equivalency. *Computers & Education*, 174, 104307. <https://doi.org/10.1016/j.compedu.2021.104307>
- Tanveer, M. (2011). Integrating e-learning in classroom-based language teaching: Perceptions, challenges and strategies. In *Proceedings of the International Conference "ICT for Language Learning."*
- Trust, T., & Horrocks, B. (2017). "I never feel alone in my classroom": Teacher professional growth within a blended community of practice. *Professional Development in Education*, 43(4), 645-665. <https://doi.org/10.1080/19415257.2016.1233507>
- Tucker, C. R. (2012). *Blended learning in grades 4-12: Leveraging the power of technology to create student-centered classrooms*. Corwin Press.
- Tyler, B., & Abdrakhmanova, M. (2016). Flipping the CS1 and CS2 classrooms in Central Asia. In *Proceedings of the 2016 IEEE Frontiers in Education Conference* (pp. 1-5). IEEE. <https://doi.org/10.1109/FIE.2016.7757739>
- Wang, M. T., & Degol, J. (2014). Staying engaged: Knowledge and research needs in student engagement. *Child Development Perspectives*, 8(3), 137-143. <https://doi.org/10.1111/cdep.12073>
- Yılmaz, Ö., & Malone, K. L. (2020). Preservice teachers perceptions about the use of blended learning in a science education methods course. *Smart Learning Environments*, 7(1), 1-21. <https://doi.org/10.1186/s40561-020-00126-7>
- Zhu, M., Berri, S., & Zhang, K. (2021). Effective instructional strategies and technology use in blended learning: A case study. *Education and Information Technologies*, 26, 6143-6161. <https://doi.org/10.1007/s10639-021-10544-w>

