Integrating digital devices and (social media) applications during lecture time in a Saudi University: Students' and lecturers' views on blended synchronous approaches

A thesis submitted following the requirements of the University of Liverpool for the degree of Doctor in Philosophy by Moudi Alsharif

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Abstract

This research study aimed to explore potential issues regarding the integration of digital learning technology into the Higher Education sector in the Kingdom of Saudi Arabia (KSA). Although the KSA government has promoted a strategic approach over recent years to support universities to enhance their learning and teaching, university academics and students have not extensively experienced learning technology use in their courses. A predominantly traditional approach to teaching has been followed in lecture theatres. Thus, the first stage of this research study sought to identify the challenges universities, academics, and students encounter when adopting learning technology, according to recently published studies. After identifying common constraints regarding the use of technology for educational purposes in the KSA HE sectors, focused research projects were conducted to explore students' and academics' views, behaviours, and attitudes towards the integration of technology into their modules. The three research projects were conducted at three different Umm Al-Qura University Schools, English, Architecture, and Computer Science, to identify whether there was any significant difference between the three Schools in terms of student and lecturer intentions to use technology in their learning and teaching respectively, as well as in terms of student engagement when web-based applications are integrated into various modules. The pilot study was conducted at a university comprising a large population of students and academics. The three Schools had differently designed curricula.

One of the main challenges the students and academics faced, which prevented them from using learning technology in the lecture theatre, related to the University's unreliable infrastructure. The first-year project explored students' behaviours when they brought their digital device(s) into lecture theatres to support their learning. Social Cognitive Theory was applied to explore student behaviours, while a combination of quantitative and qualitative methodologies provided a depth understanding of the role of technology in their learning process. No significant difference between the three Schools emerged regarding student self-regulation, while students did become distracted by digital devices, especially when the teaching delivery process was not sufficiently engaging. Finally, although the Saudi students

were willing to bring their own digital devices into the lecture theatre to support their learning, their lecturers mainly felt reluctant about using learning technology to support their teaching, and, in some cases refused to allow students to access their devices during lectures. This finding prompted a second research project to investigate academics' intentions when using learning technology to support their teaching in lecture theatre.

The Technology Acceptance Model was applied to examine Saudi university academics' attitudes towards technology using a quantitative methodology. This revealed that for lecturers, usefulness, and ease of use of learning technology were the main factors influencing their intentions. From the lecturers' qualitative responses, it emerged that they were reluctant to use digital applications in their lecture sessions because they felt unable to monitor their students' learning process. By comparing the findings from the previous studies, including the literature review, a final third research project was conducted to explore students' and academics' views regarding learning engagement when two easy-to-use web-based applications, Kahoot and Padlet, were integrated into a Blended Synchronous Teaching and Learning approach.

Although training sessions were delivered and supplementary materials were designed to assist students and lecturers, the latter designed their teaching and learning activities based on their lecture topics and module learning outcomes. Overall, students felt engaged with the teaching, as they enjoyed the learning process and did not note any differences between the three Schools. Lecturers also appreciated that by using these web-based applications they could facilitate lecture discussions with their students, and provide feedback in real time-time, while they monitored students' learning process over the teaching process. This final research project was conducted during the COVID-19 pandemic (first lockdown). Both students and academics mentioned the importance of using learning technology to support face-to-face and online teaching.

Overall, the finding of this research study provided useful information regarding the learning technology integration process into the KSA HE sector from the lecturer and student perspectives, assisting the government and universities to re-evaluate their procedures (i.e., Bring Your Own Device policy, selection of digital applications which are easy to use for academics and students, support the teaching and learning process and are enjoyable for university students and easy for lecturers to track student learning). Further study in this area could support universities to implement the KSA government technology-enhanced learning strategic approach.

Publications and Presentations Arising from the Thesis

1. Alsharif, M., & Limniou, M. (2020, July). Device and Social Media Usage in a Lecture Theatre in a Saudi Arabia University: Students' Views. In *ECSM 2020 8th European Conference on Social Media* (p. 351). Academic Conferences and publishing limited.
2. Alsharif, M., Limniou, M., Forsythe A. (2022, submitted). Saudi student and lecturer views on Blended Synchronous Teaching and Learning (BSTL) via Kahoot/Padlet platforms. The future of blended learning, NOVA publisher.
3. Alsharif, M., Limniou, M., Forsythe A. (2022, submitted). Barriers to Using Diverse Types of Technology for Saudi Learning and Teaching*. Quality Assurance in Higher Education in the Middle East.* International Higher Education Teaching & Learning Association publisher.

CHAPTER 1 -Introduction

This chapter aims to provide an overview of the current Higher Education landscape in Saudi Arabia regarding technology-enhanced learning. This short discussion will assist readers to understand the aim and objectives of the current research study, including the research design used to explore the research questions about the integration of learning technology into the Higher Education sector in Saudi Arabia. Recently, the Kingdom of Saudi Arabia (KSA) has emphasized the use of technology to enhance Higher Education learning following current trends (Hosain AlHazmi, 2021; MAAAL, 2021). For this research study, students, and members of staff from Umm Al-Qura University (UQU) were asked to express their views on the use of technology for learning and teaching purposes, respectively. UQU was chosen mainly because it is one of the largest Saudi universities (with approximately 100,000 students and 5,078 academics) (www.uqu.edu.sa). Additionally, at UQU, a yearly report published by the Deanship of Electronic and Distance Learning reveals a lack of faculty and student commitment to employing technology to enhance learning (DEDL, 2017). This research study specifically focuses on three schools from UQU (English, Architecture and Computer Science), which belong to different faculties. These three schools were selected because they have different curriculum structures, which may influence how learning technology is integrated into study programs and how the attitudes and behaviours of academics and students may influence this integration over lecture time.

To explore the overall aim, this research study consisted of three projects, which were completed after conducting a literature review on the use of learning technology in KSA Higher Education. The literature review discusses the potential barriers and constraints that students, members of staff, and universities may face when aiming to use technology for educational purposes. The presentation of the subsequent projects explores students' and academics' views of the schools and compares the findings between the three schools alongside the findings of the literature review. By following this approach, the researcher can eliminate the potential risks associated with focusing on one university (UQU), as the findings drawn from students and academics consider the current situation in the Higher Education sector in the KSA. After collecting students' and academics' views, a third project explored how student engagement could be increased using two different interactive in-class learning digital tools (Kahoot and Padlet) and collecting students' and academics' views on these. Three research projects were conducted sequentially, with the results of the previous projects informing the subsequent ones. The next part of this chapter will provide more details on the research study (i.e., rationale, aim) and the dissertation structure.

The Case Study: Umm Al-Qura University (UQU)

The KSA is one of the most developing countries which has adopted a strategic approach to Technology Enhanced Learning (TEL). It has invested in technological resources and infrastructure to achieve high-quality educational standards to effectively assist universities to address 21st-century challenges (Al Mutlaq, 2018). Current efforts aim to improve learning and teaching through the adoption of digital communication, collaboration, assessment, and management tools (Aldiab et al., 2017). Therefore, a thorough understanding of how personal digital devices and (social media) applications can be integrated into higher education is vital to clarify the future of KSA universities. It is also crucial to note that the benefits and risks of these technologies vary from region to region; although there are several common points which are applied to all regions of the Kingdom of Saudi Arabia. Such discrepancies in the use of educational technology in Higher Education are because of the different approaches that were employed within the various institutions and academic settings. UQU was selected as a case study for this research study because it is one of the largest universities in KSA and has multiple schools across various disciplines, utilizing different curricula.

Three different academic schools were randomly selected to explore the general topic of technology-enhanced learning: Computer Science, Architecture, and English. These schools were chosen based on the nature of their educational curricula and the relevance of technological advancements, where each school has a distinct curriculum and a unique requirement for technology-based learning. When referring to what is published on the UQU website regarding the school's academic curriculum and course programs, it emerged that each school has integrated technology differently. For example, the School of English has mainly used technology to support learning resources by providing students with digital tools, such as online dictionaries and eBooks. For Architecture students, different drawing and design applications have been integrated into a face-to-face learning process. Finally, the lecture activities for Computer Science students use various digital applications to support their knowledge and skills development in the domains of computer programming and mathematics. Overall, by comparing the views of students and academics from different disciplines a difference in the findings is expected due to the curriculum variance (Tarman et al., 2019). This has led the researcher of this study to explore three different schools to gain insight into the integration of learning technology into lecture theatres.

Research Rationale

Over the past decades, many researchers from the KSA have investigated how technology and social media could be used for educational purposes (Alabdulkareem, 2015; Hamadi et al., 2021; Hashim et al., 2018; Hashim & Zamani, 2015). It has been argued that Higher Education should adopt learning technology in educational settings and support teaching and learning with the widespread use of social media and mobile devices (Bin Ayub et al., 2020; Kukulska-Hulme, 2012). However, the integration of technology into teaching and learning might also be influenced by students' and academics' behaviours and attitudes toward technology (Ali, 2018). This is in alignment with studies conducted by researchers from other universities. For example, Chawinga (2017) argues that students who use social media for learning purposes over lecture time are more motivated.

Therefore, this research study firstly examines how students use their own devices during lecture time, and how they may be using (social media) applications in the lecture theatre. Saudi Arabian academics' understanding of the potential importance and value of learning technology is currently in its infancy, meaning that encouragement of its use in practical teaching settings is limited (Al-Qaysi et al., 2021; Hashim et al., 2018). Similarly to what has been discussed in the international literature (Guy, 2012), in the Saudi Arabian Higher Education sector the proponents of social media emphasize its benefits for learning, and detractors argue that it should be regulated and removed entirely from lecture theatres. Thus, a challenge arises in terms of the attitudes of KSA academics toward the use of personal devices and (social media) applications during lecture time. This highlights the importance of gaining insight into current academics' attitudes towards learning technologies. Alamri et al. (2020) highlighted the positive general impressions that KSA undergraduate students have about social media being used for educational purposes. Similarly, Sobaih et al. (2016) identified students'' and faculty members' positive perspectives regarding the use of technology for educational purposes, giving particular attention to the potential value of social media use. Thus, it would be beneficial for any potential future decision regarding the use of learning technology, including social media, to gain an understanding of how a learning approach could be applied by KSA Higher Education students and academics, and whether or how student engagement may increase as a result. A synchronous blended learning approach could support teaching during lecture time and its practical implications in KSA universities (in this case, UQU) could be linked to the use of personal digital devices during lecture time and the needs of both academics and students. To gain a better understanding of their needs and views, all the aforementioned projects included participants from all three schools (English, Architecture, and Computer Science), which belong to different faculties. Finally, to gain information about the student's learning behaviours without being influenced by any previous university experience, only first-year undergraduate students participated in this study, as more advanced students may have expectations of the use of technology that have been influenced by their previous university experiences (Hassel & Ridout, 2018).

Aim and Objectives of Each Research Project

The primary objective of this research is to examine undergraduate students' learning behaviour and university academics' attitudes toward technology when it is used in lecture theatres, to ascertain the barriers and requirements for successful integration of learning technology into a university course. Achieving this objective necessitated the exploration of the current learning approaches and using digital devices and (social media) applications to mitigate any difficulties and satisfy the need to enhance KSA Higher Education teaching and learning.

Three research projects were conducted, each of which had specific aims and objectives as follows.

Project 1: Examining the Attitudes and Behaviour of Students

This project aimed to explore the attitudes and behaviours of students when using personal digital devices and (social media) applications in a lecture theatre. The objectives were to compare students' views regarding:

1. the usage of personal digital devices and (social media) applications in a lecture theatre;
2. students' characteristics, such as self-efficacy, test anxiety, and surface learning;
3. students' learning behaviour (i.e., multitasking and distraction due to the use of digital devices and social media applications in a lecture environment); and
4. students' involvement in (non)learning activities due to the use of digital devices and social media applications during lecture time.

Project 2: Examining the Behavioural Intentions of University Lecturers

This project examined Saudi academics' intentions to use technology and social media in the lecture theatre and explored how they thought digital learning tools could be integrated into teaching approaches. The objectives of this project were to compare:

1. academics' behavioural intentions regarding the use of technology and social media in educational contexts; and,
2. academics' views regarding the integration of learning technology and (social media) applications into the lecture teaching delivery process.

Project 3: Exploring the BSTL Approach via the Use of Two Web-Based Learning Platforms

This research project explored the use of Blended Synchronous Teaching and Learning (BSTL) with the use of web-based learning applications, Kahoot and Padlet. The objectives of this project were to explore:

1. students' perspectives on the use of BSTL via web-based learning platforms (Kahoot/Padlet) about learning settings and behaviours, engagement, self-regulation, and other individual characteristics; and,
2. academics' perspectives on the use of web-based learning platforms for teaching, by evaluating their attitude toward the use of specific digital tools (Kahoot and Padlet), teaching experience and satisfaction, and their views on challenges and opportunities regarding the use of specific digital tools, communication and feedback, and students' engagement (i.e., participation in activities and interactions with their peers and lecturer).

Furthermore, the BSTL approach overall is evaluated regarding its impact on learning effectiveness through eliminating technological barriers and meeting the needs of students and lecturers.

Thesis Organisation

This thesis is divided into seven chapters, which cover the three research projects conducted for this study and achieve the main aim and objectives of this research.

Chapter 1: Introduction (current chapter). This first chapter has introduced the importance of the study and presented a general description of the problem, aim, objectives and the rationale of this research study along with the thesis structure.

Chapter 2. Research methods. This chapter outlines the research approaches which have been employed in the three research projects. This chapter is divided into five sections: data collection methods, quantitative methods, qualitative methods, participants, and the translation process.

Chapter 3: This chapter entitled "Literature review" consists of two sections. The first section entitled "Technology-Enhanced Learning" discusses the previous studies on learning technology, providing definitions of technology-enhanced learning and blended learning, while a second section entitled "The Integration of Technology into Higher Education Institutions in the Kingdom of Saudi Arabia" discusses the current landscape about technology-enhanced learning, as well as the barriers that limit the use of different types of technologies in Saudi universities.

Chapter 4. This chapter entitled "Students' views regarding the use of digital devices and (social media) applications in lecture theatres" (Project 1) discusses how students use their digital devices during lecture time and what the connection is to their learning process. This chapter consists of four sections. The first section provides the theoretical background to the application of SCT based on its components of individual characteristics, learning environment, and learning behaviours. The second section details the research methods used in this project, being a questionnaire, focus groups, and statistical analysis. The third section presents an analysis of both the quantitative and qualitative data collected for the study. Finally, the fourth section presents the discussion and conclusion.

Chapter 5: This chapter entitled "Academics' perspectives on the use of devices and social media for Teaching in Lecture Theatres" (Project 2) discusses how academics currently use technology in lecture theatres and summarizes the requirements regarding the use of technology for teaching. The chapter is divided into four sections. The first section provides the theoretical background, explaining why TAM, based on the components of Usefulness and Ease of Use, is used to explore academics' intention to use technology in lecture theatres. The second section outlines the research methods, including the questionnaire and interviews, and the statistical tests employed. The third section presents the data analysis for both the quantitative and qualitative components of the project. Finally, the fourth section presents the discussion and conclusion.

Chapter 6: This chapter entitled "Evaluation of blended synchronous teaching and learning (BSTL) via Kahoot/Padlet platforms (Student and Lecturers view)" (Project 3) discusses how two different web-based applications would be integrated into a KSA university drawing on the findings from Project 1 and Project 2. It initially reviews the BSTL approach, considering its effectiveness at removing technological barriers and thereby meeting the needs of students and lecturers, and the use of web-based learning platforms (i.e., Kahoot and Padlet). The second section discusses the methods and the statistical tests employed, including questionnaires and interviews. Finally, the quantitative and qualitative data analysis is presented, followed by the discussion and conclusion.

Chapter 7: This concluding chapter summarizes the key implications and findings of this research project. Important recommendations are suggested considering key findings. An explanation of the limitations of this research and the directions for future studies are also provided in this chapter.

Research timeline

This research began on 1 October 2017 and ended in February 2022. (Dissertation submission on 10 February 2022). The timeline of the research is shown in Table 1.1 below.

Table 1.1

Research Study Timeline

Research Action	Research Method & Participants	Date & Time	Comments
Literature review	Literature review	November 2017 – December 2020	A review of previous literature from 2014 to 2020 on the use of technology in KSA Higher Education was conducted to explore the barriers and constraints faced by universities, academics, and students (Chapter 2).
Project 1 Students' perspectives on the use of digital devices and social media in lecture theatres	Survey, (n.344) Architecture: (113) Computer Science: (121) English: (110) Focus group (n.63)	July 2018 – March 2019 (Ethical approval: 28 November 2018) (Recruitment: Weeks 2 to 8, second semester 2018–2019)	An ethics application was approved to investigate the Saudi Arabian university (via an online questionnaire and focus group) (Chapter 4).
Project 2 Academics' views on the use of devices and social media for teaching	Survey, (n.109) Architecture: (38) Computer Science: (33) English: (38) Interview (n.13)	July 2019 – March 2020 (Ethical approval: 6 February 2019) (Recruitment: Weeks 3 to 7, second semester 2019–2020)	This project examined Saudi academics' behavioural intentions regarding the use of social media in the lecture theatre (chapter 5)
Project 3 Evaluation of blended synchronous teaching and learning (BSTL) via Kahoot and Padlet platforms (students' and lecturers' views)	Survey, (n.180) Architecture: (60) Computer Science: (40) English: (80) Interview (n.11)	April 2020 – June 2021 (Ethical approval: 2 April 2021) (Recruitment: Weeks 2 to 10, second semester – 2020–2021)	This project investigated academics and students. It was a fully online study due to the COVID-19 pandemic. Although the pandemic had an impact, the findings of this study may not be greatly influenced as the lectures took place synchronously through web conferencing (i.e., Zoom, Microsoft Teams) (Chapter 6)

CHAPTER 2 - Research Methods

Introduction

The research methodology is the starting point for selecting an approach that is typically comprised of theories, ideas, concepts, and definitions about the topic. According to Amaratunga et al. (2002), adequate procedures must be established to determine a proper research methodology to guide the whole research process. In addition, they observed that specifying the subject of study, as well as the research questions to be addressed is crucial when deciding on a research method. Thus, before selecting a suitable methodology for a research project, it is essential to comprehend the fundamental concepts and various methodological approaches. In addition, data was collected to analyse the primary research outcomes established in light of the project's baseline study. Thus, it is necessary to establish the data collection methods that are accessible and can be implemented.

The main aim of this chapter is to detail the quantitative and qualitative research that will be conducted to identify and explain the learning and teaching patterns when academics and students bring their own digital devices into lecture theatres (Jensen, 2020). Moreover, this chapter seeks to validate/justify the chosen procedures in light of the research questions, data collection and analysis phases. Consequently, it will illustrate the research methods utilized across the three research projects. These methods comprise the research procedure, ethical considerations, quantitative and qualitative methods, research instruments, and the data collection and analysis strategy.

Data Collection Methods

For all three research projects, a mixed-methods approach, including a questionnaire and a focus group/interview is used to deliver a comprehensive understanding of the learning and teaching processes engaged in by students and academics. Various research designs, including conceptual, exploratory, and empirical ones, are utilised. The data collated for the three projects come from primary sources, whereas the data used for the literature review comes from secondary sources. In addition, content analysis and data analysis are used for the literature review in all three research projects, including statistical analysis and the Confirmatory Maximum Likelihood approach.

Ethical approval was obtained for each project from the Institute of Life and Human Sciences Research Ethics Committee (School of Psychology) at the University of Liverpool as follows:

1) For Project 1: ethical approval code (# 3376) and date of approval November 28, 2018, (Approval letter in Appendix 4. A).

2) For Project 2: ethical approval (# 5727) and date of approval February 06, 2019, (Approval letter in Appendix 5. A).

3) For Project 3: ethical approval (# 8551) and date of approval April 02, 2021, (Approval letter in Appendix 6. A).

Additionally, official approval was obtained from the three schools (English, Architecture, and Computer Science), which meant they both approved the methodology after it had been adopted by their respective ethics advisory boards, and from the Higher Education Deanship of Umm Al-Qura University (Appendix 4. B).

Quantitative methods

This thesis employs a questionnaire instrument to investigate the current situation regarding technology integration, particularly digital devices, and social media, as well as lecture theatres in English, architecture, and computer science schools. For each research project, the statistical package SPSS (Version 27) was employed to examine the reliability, validity, and factor analysis for the questionnaire scales, as will be shown next. All the research participants were informed about the purpose of the study and their right to withdraw either during or after the data collection. All the data collected was also stored in a secure database that only members of the research team can access. The data will be destroyed after ten years. Moreover, according to the central limit theorem, a one-way ANOVA test was used, even when there was an unreliable distribution of the data.

The questionnaire

A questionnaire is a series of questions administered to individuals to effectively collect statistically valid data relating to a particular subject (Babbie, 1990; Roopa & Rani, 2012). Equally, a questionnaire can be utilized for survey research, experiments, and other observational methods (Acharya, 2010). It is a useful method for collecting a wide range of data from a large number of survey participants (Roopa & Rani, 2012). The collection of questionnaire data can also take place as how respondents or interviewers record responses (Hair et al., 2007). In research, the primary purpose of a questionnaire is to collect relevant data most reliably and validly possible (Taherdoost, 2016).

Consequently, three distinct questionnaire models were developed based on the appropriate theoretical approaches determined for the three research projects. Initially, the first research project surveyed the perspectives of students. In the subsequent second research project, the intention of academics when using technology was investigated. Finally, the third project concluded by discussing the use of the same tool to investigate students' engagement with blended synchronous lectures.

The participation of students/academics in the study was optional, and none of the participants was forced to take part. All those who chose to participate in the study were free to withdraw without giving a reason at any stage of the investigation. All the data collected was stored in a secure database that only members of the research team could access. The data will be destroyed after ten years.

Each questionnaire was distributed using an online survey form from Qualtrics, a web-based survey platform. Questionnaire and interview advertisements including the participant information sheet and consent form were initially circulated to both the students and the academic members of staff from each School (Appendix 2. A). All the participants were informed about the purpose of the study, their voluntary participation in it, and their right to withdraw during or after the data collection phase.

Factor Analysis

The factor analysis approach method is a statistical method for evaluating relationships with visible variables or a set of factors by measuring an item or question. It is vital to note that factor analysis involves a series of statistical analyses that employ use a similar and functional method instead of a single statistical method (Beavers et al., 2013). There are two main types of factor analysis: exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Both aim to create relationships observed in groups comprised of a small number of members with only a few hidden variables. However, EFA and CFA often vary in terms of the number and type of instructions and the size of the hidden variables (Brown & Moore, 2012).

According to Brown and Moore (2012), contrary to EFA, CFA necessitates a solid empirical or conceptual base from which to guide the specification and evaluation of the factor model. Consequently, EFA is frequently utilized in the early phases of scale development and construct validation. In contrast, CFA is implemented in later phases, when the underlying structure has been established based on empirical and theoretical grounds.

As the researcher adopted a theoretical model for each research project as a measurement scale, it is crucial to ensure the model used fits the data. Therefore, the EFA was not used, as Beavers et al. (2013) affirmed that theoretical knowledge is more important than a statistical measure, and that interpretation of factual analysis should always take place according to theory and common sense. They added that the items and factors involved should theoretically be coordinated. Additionally, theoretical causality establishes a structural model for estimating relationships between factors (Kumar & Kumar, 2015). Accordingly, the CFA is employed for all theoretical models, as it is sufficient to check the model fit with each project’s data. Additionally, the CFA is an essential analytic tool for factor validation, and CFA results can provide compelling evidence of theoretical factors' convergent and discriminant validity (Brown & Moore, 2012).

The researcher used IBM SPSS Amos Application v. 25 to perform the Maximum Likelihood analysis. This aimed to confirm the factor solution identified in each theoretical model. Additionally, and simultaneously in this measurement approach, pathways between latent variables were drawn, following consideration of the solution derived from the theoretical model. Items were free to load onto related latent factors, and no restrictions were established. Following the initial modelling, model fit was improved by adding the covariance between error terms. These adjustments were made after considering the modification of indices and theory.

The number of factors in each model and the structure of the performance indicators were determined theoretically. Thus, the factorial solution was assessed by the ability to reproduce the exemplary covariance matrix of the measured variables. The maximum likelihood method was chosen for factoring because the underlying principles were most congruent with the study's focus. Maximum likelihood estimation assumes the standard factor model holds precisely in the population, and the measured variables follow a normal multivariate distribution (MacCallum et al., 1999).

The suitability of each model for each component was assessed using standard compliance statistics: Chi-square ($\chi 2$) is the most prevalent method for evaluating model fit. A low $\chi 2$ value, indicating non-significance, would suggest a good fit (Hair et al., 2010), CMIN/DF equates to discrepancy divided by degree of freedom. The CMIN/DF value for the default model is of interest and can be interpreted as follows: If the CMIN/DF value is ≤ 3, the fit is acceptable (Kline, 1998). Meanwhile, if the value is ≤ 5, the fit is reasonable (Gribbons & Hocevar, 1998). On the Tucker Lewis Index (TLI) TLI values close to 1 indicate a very good fit (Forza & Filippini, 1998); on the Comparative Fit Index (CFI), values close to 1 indicate a very good fit. According to Hu and Bentler (1998), Hair et al. (2010), and Awang (2012) the Root Mean Square Error of Approximation, RMSEA (RMSEA values indicate good- (< .05), fair- (> .05, < .08), mediocre- (> .08, < .10) and poor- fit (> .10) respectively (Awang, 2012; Hair et al., 2010; MacCallum et al., 1996), and the Standardized Root Mean Square Residual (SRMR) is reported by Hu and Bentler (1998).

Qualitative Methods

The qualitative methods employed for this thesis involved two tasks: data collection and data analysis. Data collection included conducting focus groups and interviews. Data analysis is the final step in the analysis of interviews based on research questions.

According to Pearse (2019), the research procedure for Deductive Qualitative Research (DQR) includes seven steps: Conceptual Framework, Propositions, Codes illustration, Question Matrix, Data Collection, Analysis, and Reporting (Discussion).

Braun and Clarke (2006) proposed a six-phase procedure termed Thematic Analysis (TA) (Table 2.1). TA clarified the last two phases of Pearse's DQR. Therefore, this researcher followed these six phases: (a) familiarize with the data; (b) generate initial codes; (c) search for themes; (d) review themes; (e) define and name themes; and (f) produce the report for all three research projects. TA is a method for identifying and analysing patterns in qualitative data that can be applied within various theoretical frameworks (Braun & Clarke, 2006).

Table 2.1
Phases of thematic analysis (with modification) (Braun & Clarke, 2006, p. 87)

N.	Phase	Description of the process
1	Familiarizing with the data	Data transcription, reading and rereading the data, and noting initial ideas.
2	Generating initial codes	Systematic coding of data's interesting features across the entire data set, followed by the collection of data relevant to each code.
3	Searching for themes	Assembling codes into potential themes and collecting all relevant data for each potential theme.
4	Reviewing themes	Checking whether themes work about the coded extracts and the entire data set and conducting the analysis based on the themes.
5	Defining and naming themes	Ongoing analysis to refine the particulars of each theme and the overall story that the analysis tells, resulting in the generation of precise definitions and names for each theme.
6	Producing the discussion report	Final analysis processes. Selection of vivid, persuasive extracts as examples, the final analysis of selected extracts, relating the analysis to the research questions and literature and writing a discussion reporting the analysis.

Castillo-Montoya (2016) indicated that a "question matrix" can be developed to ensure interview questions will prompt responses that are relevant to answering the researcher's questions. For the research projects in this thesis, three question matrices were developed, as discussed in the focus group and interviews.

All the data for each project was initially coded and collated, and an extensive list of the different codes as identified across the data set will be presented later. Thematic analysis of data collected by focus groups and in interviews involves organizing the different codes into potential themes and collating all the relevant coded data extracts within these themes. Therefore, the researcher analysed the codes and considered how they could be combined to form an overarching theme, judging the relationship between the codes, themes, and different levels of themes (e.g., main overarching themes and sub-themes within them). Thus, it was possible to acquire a relatively acceptable understanding of several themes, their interrelationships, and the overall story they convey about the data. In conclusion, a satisfactory thematic plan regarding the data for each project was established (Appendix 2. B).

Notably, codes can be developed based on the theoretical model chosen for each research project. These were created solely to acquire qualitative data via interviews. Thematic plans were also prepared for the thematic analysis of the qualitative data collected.

Focus Groups

A focus group is a collection of people with a shared concern or quality, organized by a mentor, who uses group interactions to gather information about a particular topic (Williams & Katz, 2001). The objective of focus groups is to create a comfortable environment in which individuals can share and express their ideas, insights, and attitudes about a problem. Data collection using a qualitative method involves either focus groups or individual interviews. Guest et al. (2017) compared both methods and found that sensitive and personal disclosures often occur in a focus group setting and that in some cases, sensitive issues are only raised in the context of focus groups. However, it is important to note that the focus group method is a unique data collection technique involving in-depth interviews, so the data provided depends largely on the interaction between team members and the participants' willingness to answer the research questions (Rosenthal, 2016).

Focus group interviews typically incorporate open-ended questions and follow-up inquiries to clarify participants' knowledge, experiences, thoughts, cognitions, and feelings (Patton, 2002). Crowther and Lauesen (2017) defined two types of questions: open and closed. The first usually starts with what, why, when, and who, and the response pattern follows a yes or no format. In contrast, open-ended questions begin with statements such as "tell me", or "give me an idea". However, it should be emphasized that too many closed questions can impede the data collection process. Collecting data from numerous sources can provide exhaustive data on the subject under investigation (Forza, 2002). In this context, a focus group survey can support a given finding by allowing the researcher to compare results from several sources.

A focus group is only conducted here for the first project, in the format of a discussion between the researcher and a group of students. The aim is to create a forum in which students can freely discuss their behaviours in their own words. The focus group questions were created using theoretical codes (Table 3-2). Thus, as detailed in the following sections, Pearse's DQR (Pearse, 2019), was used to build a focus group question matrix for Project 1 taking into account the SCT components (Appendix 2. C).

Table 2.2
Illustration of Codes Based on SCT Theory (Project 1).

Behaviour Codes	Environment Codes	Individual Characteristics Codes	Self-regulation for learning Codes
• Introduce and use different devices in lectures, • Use different applications during lectures, • Involve learners in activities related to lecture topic, • Include activities unrelated to the lecture topic	• Lecture theatre • Multi-tasking • Distractions from others • Distractions from one's own devices • Source Variety	• Different backgrounds • Perceived course utility • Self-efficacy • Test anxiety • Surface strategy • Negative habits • Self-regulation	• Effect on the environment • Effect of behaviour • Effect of individual characteristics

Interviews

Interviewing is one of the most typical methods for collecting data in qualitative research studies (Byrne, 2001; Hofisi et al., 2014). An interview is defined as a purposeful conversation (Lune & Berg, 2017), which allows participants to provide detailed, contextual descriptions of events (Byrne, 2001). The interviewer must work carefully to ensure the validity and reliability of the interview data, avoid interviewer bias, and subjectivity, and develop effective interviewing skills (Hofisi et al., 2014).

For the second and third research projects, an interview instrument was used, providing pre-determined questions to guide the qualitative data collection process. It permitted considerable freedom to organize questions and to allocate time and attention to each topic of discussion. The questions were generally open-ended, allowing for different answers, and reducing the risk of bias as a result of the researchers' prejudices. It helped to take into account the different professional, educational and personal backgrounds of the participants (Longhurst, 2003). The interviews were conducted through Phone Calls, WhatsApp, and Skype. All the data for each project was initially coded and collated, and an extensive list of different codes was identified across the data set based on the theoretical approach applied.

For the second project, academic lecturers were invited to participate in the interviews and to evaluate the quantitative study's results in greater detail. The study aimed to explore the lecturers' behavioural purpose, and utilise social media in a lecture theatre, considering their views about their value in the teaching delivery method and the current learning technology integration process.

The questions developed for the interviews were also created using theoretical codes. Table 2.3 depicts these codes based on TAM Model for Project 2. Additionally, following Pearse's DQR (Pearse, 2019), an interview question matrix for Project 2 was developed (Appendix 2.D).

Table 2.3
Illustration of Codes based on TAM Model (Project 2).

Perceived Usefulness	Perceived Ease of Use	Behavioural Intention to use social media for Teaching
• Subjective Norm • Image • Job relevance • Output quality • Result demonstrability	• Self-efficacy • Perceptions of external Control • SM anxiety • SM playfulness • Perceived enjoyment • Objective usability	• Behavioural intention due to perceived usefulness • Behavioural intention due to perceived ease of use • Academics' requirement to use SM for teaching

For the third project, academic lecturers were selected to participate in the interview process to ascertain perspectives on the use of Kahoot and Padlet applications for teaching purposes, express their beliefs, and critically evaluate the integration of the applications into their lecture sessions.

The questions prepared for the interviews were also created using theoretical codes. Table 2.4 shows the codes based on the BSTL Approach for Project 3 (Chapter 6). Additionally, following Pearse's DQR (Pearse, 2019), an interview question matrix for Project 3 was developed (Appendix 2. E).

Table 2.4
Illustration of student engagement codes based on BSTL Approach of (Project 3).

Student Behaviour Codes	Student engagement Codes	Student individual characteristics codes	Academics' expectations Codes
• Collaboration • Motivation • Enjoyment and fun • Interaction and competition • Providing and receiving feedback	• Behavioural engagement • Engagement with lecturers • Engagement with peers • Online engagement • Synchronous engagement • Cognitive engagement	• student self-regulation • Self-efficacy, • Course utility, • Surface learning, • Variety of sources, • Test anxiety • Negative habits	• Monitoring teaching processes • Monitoring students' behaviour • Control of lecture time • Control of lecture content • Concerns about distraction, • Privacy issues

Participants

The research population is drawn from UQU, one of the oldest and largest universities in Saudi Arabia, comprising 28 academic colleges and fields, including religion, science, engineering, and medicine, delivering both theoretical and practical applications. There are

5,078 academics employed at the university, including 2,947 males and 2,131 females. Over the years, the total number of UQU students is 100,000. Therefore, first-year students from three schools were chosen: Computer Science, English, and Architecture. The three schools examined in this research have a combined total of 440 undergraduate students.

The sample size for each research project was determined following the rule of thumb governing sample size selection and the total number of individuals in the target population. According to MacCallum et al. (1999), a study's sample size is contingent on several factors, including the commonality of the variables and the degree of overdetermination of factors. They added that numerous recommendations have been made regarding sample size in the context of factor analysis. These recommendations are typically expressed in terms of the minimum sample size required, N, or the minimum ratio of N to the number of variables subject to analysis.

MacCallum et al. (1999) also referred to some previous studies suggesting a number for adequate sample size. For example, Gorsuch (1983) recommended that N should be at least 100, and Kline (1979) supported this recommendation. Guilford (1954) further argued that N should be at least 200, and Cattell (1978) claimed the minimum desirable N to be 250. They also referred to other studies that provided a rough rating scale for adequate sample sizes in factor analysis, such as Comrey and Lee (1992) who specified 50 as very poor, 100 as poor, 200 as fair, 300 as good, 500 as very good and 1000 as excellent.

According to Osborne and Costello (2004), each scale differs in terms of the number of factors or components, the number of items associated with each factor, the magnitude of the item-factor correlations, and the correlation between factors. When discussing guidelines for EFA and PCA, they emphasized the ratio of subjects to parameters (as each item was expected to provide loading for each factor or component extracted). Other researchers focused their attention on the ratio of the number of cases per parameter (N/p). The range of recommendations provided is 3:1 to 6:1 (Cattell, 1978), and 10:1 to 20:1 (Jackson, 2003; Kline, 2016; Lomax, 2018).

Meanwhile, de Winter et al. (2009) advised researchers to obtain the highest cases-per-variable ratio possible to reduce the likelihood of data overfitting. Browne and Cudeck (1989) noted that better recovery of population solutions was obtained when the ratio of the number of variables, and the number of factors increased (MacCallum et al., 1999).

MacCallum et al. (1999) identified the optimal conditions for obtaining sample factors, noting that these are highly consistent with population factors with high communalities and high determination. Consequently, the sample size has a negligible effect on the solutions, and relatively good recovery of population factors can be accomplished even with relatively small samples. Nonetheless, they added that even when the degree of overdetermination is high, the sample size has a much greater effect, as communalities can then enter the wide or low range (MacCallum et al., 1999). Based on Monte Carlo simulations, minimum sample sizes are recommended to limit the probability of non-convergence and to deliver unbiased estimates or standard errors (Kyriazos, 2018). Additionally, CFA/SEM is typically a large-sample technique (Kline, 2016), although models with robust parameter estimates and highly reliable variables can result in smaller samples (Kyriazos, 2018).

Based on the above literature discussion, the sample sizes for research projects can be readily evaluated. For the factor analysis, the sample size for Project 1 is 343 students, for Project 2 it is 109 academics, and 180 students for Project 3. These sample sizes may seem smaller than the optimal size, except for Project 1, which is deemed acceptable. However, these numbers are linked to other factors that influenced the researcher's ability to collect a specific sample size. For Project 1, the survey targeted the total number of First-Year students, which consisted of 440 students in all three schools. Therefore, 77.95 % of students responded to the survey.

For Project 3, a sample size of 180 students, or nearly 200 participants, could be considered fair. However, the survey was limited to the 239 students who attended the 11 academics examined lectures. Therefore, 75.31% of students responded to the survey. In contrast, Project 2 has 109 participants, which is a low number despite being more than 100 but poor based on Comrey and Lee (2013). However, Gorsuch and Hao (1993) suggest that the sample size should be at least 100. Considering that the total number of academics targeted in the three examined schools was 295, and the number of participants obtained was 109, the researcher recruited 37% of the academics for Project 2. This was the maximum percentage that could have been collected given the recruitment circumstances, specifically the COVID19 pandemic, which increased the difficulties in recruiting academics (Table 2.5).

Table 2.5.
Participants Overview

Study	Participants	Sample Size
Project 1	Students	Survey (N=343), Focus group (N=63)
Project 2	Academics	Survey (N=109), Interview (N=13)
Project 3	Both	Survey (N=180), Interview (N=11)

Moreover, according to MacCallum et al. (1999), CFA may reduce the effects of sampling error on research projects, because CFA indicators are frequently selected based on the established quality of measures of theoretical scale parameters. Based on the arguments and evidence supplied above, the researcher determined that the sample sizes produced should be appropriate given the relevant statistical procedures used. Therefore, the ANOVA test for analysis is used, because the sample size was greater than 30 participants (VanVoorhis & Morgan, 2007).

Translation Process

The survey tools, whether questionnaires, interviews or focus group questions, were initially written in English. Before starting the recruitment process, and since the targeted participants are all fluent in Arabic, the survey tool questions were translated into Arabic. Two experienced professors from Umm Al-Qura University reviewed the documents for each project tool (English and Arabic). They then provided some helpful comments recommending improvements to the survey tool items. The feedback obtained was analysed to assess the reliability of the words and constructs for each tool.

Furthermore, ten Saudi (Arabic speaking) postgraduate students studying at the University of Liverpool (PhD students) were asked to carefully review the items and suggest further comments. These suggestions and observations were designed to improve the Arabic translation copies for each tool and ensure each item written in Arabic would be consistent with its corresponding English ones providing an accurate measurement. According to all the comments, changes to statements and suggestions were deemed appropriate to improve clarity and suit the sample at the target Saudi university. Accordingly, the PhD students in the pilot study affirmed the language of each survey tool was clear and readily understandable.

Conclusion

This chapter organizes the research procedures determined based on the study objectives, theories, concepts, and expositions. Therefore, an overall picture of the research methodology for all three projects was created to guide the research procedures. Furthermore, in the chapters dedicated to each particular project, the methodology was discussed in great detail. These particulars included the theoretical models, measurement tools, research questions, and the results of the factor analysis.

CHAPTER 3 - Literature Review

Introduction

Technology-enhanced learning has been discussed extensively by many educational researchers about teaching, learning and facilities (Dunn & Kennedy, 2019; Kirkwood & Price, 2014; Shen & Ho, 2020). The Kingdom of Saudi Arabia is gradually adopting learning technology to support individuals in all levels of education, from primary to Higher Education (HE) (Aljaber, 2018). However, several barriers and constraints continue to prevent educational institutions, academics and students from using and integrating technology into their teaching and learning (Aldiab et al., 2017). This chapter aims to examine the evidence concerning the current role of learning technology in Higher Education in the Kingdom of Saudi Arabia, after discussing key concepts, principles and terminology related to technology-enhanced learning. To achieve this, the chapter has been divided into two sections. The first section, entitled "Technology Enhanced Learning" discusses previous findings regarding learning technology, offering definitions of technology-enhanced learning and blended learning (BL), while the second section, entitled "The Integration of technology in the Higher Education Institutions of the Kingdom of Saudi Arabia" discusses the current landscape reflecting on technology-enhanced learning and the barriers and constraints that arise when using technology for learning and teaching purposes within Saudi universities.

Technology-Enhanced Learning

This section discusses the overall concepts, aspects, and principles underlying the use of technology for educational purposes, while at the same time providing explanations of the relevant terminology. It also addresses the integration of learning technology in Higher Education highlighting the use of personal devices (Bring Your Device to the lecture theatre) and providing a brief overview of the role of social media in teaching and learning.

Technology-Enhanced Learning (TEL) describes the "effective use of digital technologies to support learning and teaching" to give students "a very flexible learning experience" (Joint

Information Systems Committee, 2014). Universities have recognised and promoted technology-based learning as it has developed over the last few decades, and this proved especially beneficial when the COVID-19 pandemic disrupted face-to-face (F2F) teaching (Pokhrel & Chhetri, 2021). Before the pandemic, the European Commission had already recommended that the integration of digital technologies should be considered an integral component of universities' teaching and learning strategies and training programs (including highlighting relevant pedagogical approaches) for members of staff to provide at the university level (Serrano et al., 2019).

Information and Communication Technologies (ICT) comprise three elements, which could be interpreted from the TEL perspective as information to knowledge, communication to interaction, and technology to the learning environment, providing opportunities for learning and teaching. However, many researchers have focused on just one area. For example, Khan (2020) describes ICT as encompassing a broad range of advanced communication platforms, namely the Internet, wireless networks, cell phones, and other media.

According to (Al-Samarraie & Saeed, 2018), the chief opportunity provided by using technology in higher education settings was primarily to facilitate students' interactions in real-time by offering a series of reflective and dialogue-centred participatory learning activities. Although the use of technology may introduce innovations and improvements to teaching and learning environments; the integration of technology into teaching requires considerable experience and commitment from teaching staff, along with the development and use of relevant resources (Bin Ayub et al., 2020). Ünal and Çakir (2017) mentioned that the integration of digital technologies into education required that members of staff not only develop the relevant technical skills but that they develop their theoretical knowledge and understanding of the role and the viability of digital technologies in teaching and learning, as well as an awareness of the reasons for this integration in the context of education. Certainly, the technical ability to use technology in a classroom is not sufficient, as observed by Gilakjani (2017). Notably, technology:

1) supports the construction of knowledge based on the opinions, understandings, and beliefs of students and the a to create organized knowledge bases;
2) is an information system designed to acquire knowledge to promote learning by obtaining essential information and comparing beliefs and worldviews;
3) is an authentic context in which to promote learning by making manifest and stimulating significant difficulties, situations, and contexts, revealing beliefs, viewpoints, arguments, and defining a controllable space in which students can think;
4) supports learning by collaborating with others, debating, arguing, reaching agreements among people in society, and engaging in conversations across knowledge-based communities; and
5) is a smart partner, responsible for assisting learning by encouraging students to display what they know, what they have learned, and how they learned it? It also supports internal student discussions and construction of meanings presents the meaning personally and encourages creative thinking.

Social networking sites and related synchronized tools exemplify specific technological tools that can improve learning in HE institutions. Firstly, students' proficiency and familiarity with social networking sites enable them to actively engage in multiple collaborative social interactions, social reflection, and problem-solving (Schneckenberg, 2014). In addition, synchronized tools for collaborative learning chiefly focus on reducing the time students spend on e-mailing, revision, saving, e-mailing back, and other similar activities to develop their collaborative learning competency and productivity (Huang, 2017).

However, the majority of previous research studies discussed the integration of learning technologies into a F2F learning environment; i.e., the lecture theatre, laboratories and practical classes (Cann, 2016). Nevertheless, technology can also be integrated into multiple teaching models (F2F or online) using one or more learning tools and applying essential pedagogical principles/teaching and learning approaches designed to enhance opportunities in the learning environment. Sullivan et al. (2018) discussed how learning technology tools (i.e., blogs, wikis, videos, online collaboration spaces, and simulations) can be integrated into different teaching delivery modes (i.e., F2F, and online), and described the role of the lecturer. According to their study, technology supports social and cognitive learning processes through its integration into course content, enhancing interactions among and/or between students and the learning material. These information and experience exchanges promote learning through interactivity (Blonder et al., 2013). Even indirect experiences (i.e., learning by observing other people's experiences) permit students to learn from others, keeping them engaged in the teaching process (Sullivan et al., 2018). Thus, technology provides meaningful learning experiences, allowing students adequate opportunities to interact and collaborate with peers, resulting in mutual learning (Costley, 2014).

Billings and Mathison (2012) identified two reasons for the association between improvements in students' academic performance and technology. The first relates to student engagement and interaction with the learning materials, and the other relates to student motivation to participate in learning activities simply because they involve technology. In addition, Dockstader (2008) explained how technology could be integrated into the teaching approach by enabling students to gain a deeper understanding of module content, feel motivated by increased learning engagement, apply and synthesize knowledge, and enjoy learning within an information-rich environment. To achieve in-depth learning, many researchers studied how technology-enhanced learning (e.g., project work, group learning) can encourage students to move from surface to deep learning, building up new knowledge that rests on a prior foundation (Dolmans et al., 2016; Ling & Gan, 2020; Sivan et al., 2000). Students are not only the recipients of information, but also they play an active role in learning and teaching through the selection, reception, and subsequent transfer and use of information (Gilakjani, 2017). Moreover, technologies enable students to develop their skills, identify current information and knowledge, and communicate with other members of their learning communities (Farahani et al., 2015).

In addition, and of particular interest here, technology can be integrated into various teaching modes/learning patterns; such as distance or blended learning (BL), to enhance interactions between academics and students, between students, or between students and learning resources inside and/or outside a classroom environment (Harrell & Bynum, 2018).

These learning patterns enable academics to support a flexible teaching process, increasing student engagement and motivation (Gordon, 2014). Additionally, the combined use of technological elements provides improved processing, visualisation, and delivery of content and concepts, which, when effectively utilised, can improve students' attention spans (Costley, 2014). Online classes, meanwhile, attract lower engagement levels, which can be ascribed to the numerous capabilities provided by online platforms, such as screen sharing, audio settings, video display, screen aspect ratio, etc., which can then overload students resulting in distractions (Sharma & Bumb, 2021).

On the other hand, such an optimistic view of technology-enhanced learning is not readily accessible. Providing reliable Internet access to group members to incorporate and comprehend one another's ideas has proven a common obstacle among those utilizing technological tools for learning. Students may also experience social disengagement and their presence of a lack of trust when team members have diverse backgrounds. Consequently, such occurrences can reduce individuals' participation and willingness to share knowledge collaboratively (Al-Samarraie & Saeed, 2018). In addition, previous research has found that social networking tools are yet to wholly incorporate the pedagogical principles necessary to facilitate meaningful learning (Kurtz, 2014). Additionally, the use of synchronized tools for online collaborative learning is impeded by the relatively low technological proficiency of faculty members, who must consider modifying traditional teaching methods to supplement their collaborative learning plans with technology (Schneckenberg et al., 2011). Examples of this include a dearth of effective strategies for improving communication, coordination, the balance of member contributions, and mutual support (Qin et al., 2016). Al-Samarraie and Saeed (2018) emphasised two main challenges here: students may need more time to gain confidence and experience, and HE institutions need to alter their teaching culture to acquire practical pedagogical principles.

Research has further identified several obstacles and challenges to integrating mobile learning in the classroom. For example, lack of self-efficacy to integrate technology, classroom management issues, attitudes towards technology, and the absence of pedagogical strategies complicate the implementation of mobile learning in schools (Christensen & Knezek, 2017).

Similar obstacles to technology integration are lack of access, funding, time, training, and attitudes (Christensen & Knezek, 2017; Ertmer & Ottenbreit-Leftwich, 2010). Moreover, both teaching experience and age can inform a lecturer's willingness to implement new technologies in lecture theatre. According to O'bannon and Thomas (2014), older lecturers perceive implementation difficulties as more challenging than younger lecturers when considering how to use mobile devices in the classroom.

Overall, researchers have observed that technology integration processes might include learning activities that potentially limit the traditional classroom teaching delivery process, affecting access to learning resources, and communication and interactivity with others (Raes et al., 2020). For example, the integration of digital technologies into the F2F learning environment allows students to interact, work together, and share and exchange practical information and resources, such as pictures and videos with others (Al-Samarraie & Saeed, 2018). Distance learning enables off-campus students to access a variety of learning materials and resources (Carmel Parker White et al., 2010; Moore et al., 2011) enhancing their learning process (Beketova et al., 2020). Al-Arimi (2014) categorizes distance learning as an area of e-learning, defining it as an educational learning pattern that focuses on pedagogy, technology, and designing systems that can be “effectively” mixed to support asynchronous and synchronous communication. To achieve effective outcomes, teaching needs to incorporate relevant course content, requiring that institutions emphasize lecturer support, interactive processes, and assessment techniques (Markova et al. (2017).

Bliuc et al. (2007) described blended learning (BL) as a systematic combination of F2F interactions and technologically mediated interactions involving students, academics, and learning resources. According to Al-Arimi (2014), whenever e-learning is used in connection with F2F teaching, the term BL is applicable. Law et al. (2019) further mention explained that BL “*combines online learning and offline face-to-face learning and facilitates free and open dialogue*” (p. 1). Within this approach, the flipped classroom describes one of the various possible combinations of BL (Marchalot et al., 2018), combining various delivery modes: before and/or after lecture time (online) and face-to-face lecture time (Ling & Gan, 2020). The online teaching mode principally consists of two activities: delivering content through online conferencing/video and receiving content from students via learning tools, such as discussion forums, blogs, and online tests. The alternative mode consists of two activities that take place within the classroom setting: students participate in activities to aid understanding, and lecturers assist them in consolidating knowledge.

BL is one of the most frequently investigated approaches (Law et al. (2019), as it “effectively” combines different teaching modes with interactive content (Edward et al. (2019), thereby allowing both academics and students to achieve their teaching and learning goals (Fauzi & Hussain, 2016; Nguyen, 2017). Thus, it has been highlighted that BL encourages students to participate in and out-class activities, retaining their engagement with the learning process (Albiladi & Alshareef, 2019).

Overall, BL is identified as a teaching approach that combines synchronous and/or asynchronous online and F2F learning activities utilizing resources, with varying proportional "mixes" (Allen et al., 2016; Heilporn et al., 2021; Littlejohn & Pegler, 2007). Academics’ presence in the BL environment remains vital, as they guide students toward learning goals and keep them motivated and engaged with the learning process (Law et al., 2019), thereby allowing students to interact and collaborate (Bai et al., 2016). Senffner and Kepler (2015) described BL as a flexible, scalable, and meaningful method of teaching and learning, allowing Albiladi and Alshareef (2019) and Serrano et al. (2019) to argue that BL not only combines a wide range of technologies but is also a teaching approach that “effectively” uses technology to support high-quality teaching standards.

However, many researchers have critically examined the integration of technology into university courses, suggesting that the BL approach should be viewed from the perspective of pedagogical principles, and not only adapted as a complement to face-to-face teaching (Limniou & Hands, 2019; Mirriahi et al., 2015). Hence, Cronje (2020) argued that very few researchers have explored the pedagogical aspects of BL, suggesting that the definition should therefore emphasize pedagogical aspects. It is, therefore, necessary to discuss the potential pedagogical approaches that may support learning and teaching, and their connection to the research context of the technology-enhanced learning environment, to allow academics to keep students motivated and engaged with the learning process by providing an enjoyable teaching modality (Limniou et al., 2012; Sullivan et al., 2018). In this context, constructivism offers students an opportunity to actively process their knowledge through feedback, by working in a more student-centred learning environment (Hoidn & Klemenčič, 2020; Jordan et al., 2008; Trinidad, 2020). In such an environment, students have the opportunity to develop self-regulatory skills by actively participating in their learning, as they were responsible for their learning process (Zimmerman et al., 2017). Examples of constructivist frameworks include collaborative learning and problem-based learning (Laurillard, 2013). In a collaborative learning environment, students share experiences, participate in small group activities, discuss their ideas, improve upon their ability to reflect on their assumptions and thought processes, develop social and team skills to build consensus, and gain experience with diversity (Alkhathlan & Al-Daraiseh, 2017). In a problem-based learning environment, students enhance motivation, and take responsibility for their learning, as well as share and exchange their ideas with others, actively participating in their learning. In addition, encouraging students to explore their skills to solve problems, and enhance their self-confidence, makes them eager to learn by exploring all learning resources to resolve problems, and thus establishes a positive attitude toward learning. Meanwhile, this approach is challenging to implement, as it requires much more time, more preparation, and greater management, and is confusing for some students (Ghufron & Ermawati, 2018).

Overall, a BL approach combines educational theories, as mentioned above, with technology (Bokolo et al., 2019) to improve student engagement and learning experiences and to keep students motivated throughout their learning process (Bokolo, 2021; Bokolo et al., 2019; Wai & Seng, 2015). For example, Baragash and Al-Samarraie (2018b) examined the role of independent, collaborative, and teacher-led learning in student engagement and academic performance by depicting its different contributions to various assessment modes (i.e., a significant positive effect on the final exam of students had, while independent and collaborative learning had a significantly positive effect on students' online assignments). Integrating technology into HE courses following a BL approach allows lecturers to shift their teaching from a traditional (teachers are at the centre of the learning process and students have a passive role) to a student-led approach, where students are active learners engaging autonomously in various learning activities (Dziuban et al., 2018; Slavin, 2011).

Many researchers have explored how technology could be integrated effectively into teaching and learning to increase student interest, participation, and engagement within the learning process (Ercolino et al., 2016; Lamscheck-Nielsen & Jakobsen, 2009; Seifert, 2015). The integration of technology into the classroom allows lecturers to adopt a role in facilitating students' learning processes, rather than serving as an expert who only provides students with relevant information (Aslan & Zhu, 2016). Limniou et al. (2018) explored the role of teachers in a BL environment (following a flipped classroom approach), identifying that the choice of learning material and activities the teacher's contribution to the flipped classroom approach and their expectation/behaviour toward technology promoted "effective" learning (Student Higher Order Thinking Skills development). Overall, technology integration necessitates that academics rethink their approach to teaching in terms of time commitment, access to technology and resources, perceived usefulness, support and training, and pedagogical transformation, to develop an active learning approach (Baran, 2016). By integrating technology into university modules, students can take an active approach, taking on greater responsibility for their learning (Gilakjani, 2017). This also affords the same learning opportunities to all students, as even shy students, who do not exchange and share materials and opinions with their peers, have an opportunity to engage with online discussions and the collaborative tools that are built into the teaching (Chawinga, 2017). However, the critical challenge to overcome here is to deliver learning activities in such a way that a blended approach, and the technology employed, add value in a continuous process that results in the achievement of the set learning objectives (Osorio Gómez & Duart, 2012).

Recently Bokolo (2021) proposed that the main dimensions of technology integration that academics are seeking to adopt are based on personalization, learning activities, information for students, supporting resources, types of assessment, and feedback, to critically evaluate the role of technology within teaching and learning processes. Singh (2021) observed that different examples of teaching practice could enable academics to understand the possibilities of BL more fully, and the integration of technology into different teaching approaches. Thus, technology can support lecturers as they prepare authentic learning activities, allowing them to be creative and innovative (Fitriah, 2018). Technology encourages lecturers' creativity in a meaningful and exciting way and can complement skills by affording a means of experimentation and exploration and developing individual creativity by providing a straight forwards way to convert an idea into reality (Jordan & Carlile, 2012; Fitriah, 2018).

The review above directs the researcher to identify the chief factors and determinants that might be explored when examining the adoption of technology-enhanced education in lecture theatre. According to Joo et al. (2018), determinants that influence academics' intention to use technology include a personal experience with technology, school support for using technology in the classroom, and academics' anxieties about the use of technology. Furthermore, Isaac et al. (2017) expressed that the effects of technology use should be investigated, considering decision quality, communication quality, knowledge acquisition, and user satisfaction.

Bring Your Own Device (BYOD)

The majority of today's students belong to the digital generation (Horovitz, 2012), i-generation (Rosen, 2010), or net generation (Tapscott, 2008) and use technology in their daily lives to produce and share digital material via social media (Sullivan et al. (2018). Due to the rapid growth of the Internet and the development of mobile technologies, "Bring your own device" (BYOD) has become a viable teaching strategy and is used to encourage active participation in the learning process (Chou et al., 2017). Therefore, BYOD has attracted interest from researchers (He & Zhao, 2020). Afshin et al. (2016) proposed that integrating students' digital devices in the classroom (i.e., mobile devices, laptops, tablets) could support school-based forms of teaching.

Recently, Sokolova et al. (2021) reported that students' mobile learning devices appear attractive to universities, and can help reduce costs and support teaching and learning. Deb et al. (2020) described BYOD as an inexpensive and less demanding infrastructure solution, able to transform the classroom environment into an interactive session between academics and students. Hopkins et al. (2013) described BYOD as a private, wireless, and mobile technology including (but not limited to) a laptop, netbook, iPad, tablet, iPod touch, and smartphone. Kong and Song (2015) described BYOD as a technology model in which students bring their own devices to support their studies, while Miller and Welsh (2017) reported that the current increase in mobile device ownership offers important opportunities for students to use their own devices to enrich their learning experiences.

Disterer and Kleiner (2013) identified the most important value of BYOD as the convenience that users enjoy when employing a single device for anything, anywhere, anytime in a manner that is gradually being supported by educational institutions (Hopkins et al., 2013). As students are encouraged by their academics and University to bring their digital devices into the classroom for their studies, the cost of buying and maintaining the university's IT infrastructure has fallen (Hamza & Noordin, 2013). This process also supports mobile learning (or m-learning) (Diaz et al., 2015): "*Learning in multiple contexts, through social and content interactions using personal electronic devices*" (Crompton, 2013, p. 4). Generally, the prevalence of personal devices is present in almost all aspects of student and university life, enabling individuals and faculty members to incorporate technology into current teaching and learning within academic institutions (Livas et al., 2019).

Kong and Song (2015) identified several characteristics of BYOD, including the portability of small and lightweight devices, and the wireless capability to practice anytime, with no barriers. Education researchers also mentioned the importance of BYOD as an enhancement to learning, knowledge, creativity, collaboration, and innovation for today's students, who also use social media and learning platforms according to various pedagogical approaches (French et al., 2014; Sánchez et al., 2020). Hence, BYOD's learning and teaching opportunities are positively rated as supporting a strong learning environment that is engaging, encourages creative thinking, and respects students' learning passions and preferences (Hopkins et al., 2013). Previous literature highlights that students can achieve learning benefits by bringing their own devices into lecture theatres, as they are familiar with setting up their devices (Kibar et al., 2019). In addition, BYOD provides opportunities for students wishing to become more familiar with technology and enable device and university customization, as it lowers the cost of new technology compliance for universities (Miller & Welsh, 2017). Eventually, students were ready to use their own devices, as they felt more motivated to learn, and are more committed to teaching (Miller & Welsh, 2017). Recently, Sokolova et al. (2021) noted that BYOD has been widely accepted at the majority of universities, at least to some extent. Meanwhile, in contrast, several universities have completely banned BYOD, requiring students, faculty, and staff to access the university's network through university-provided devices.

Nevertheless, technical issues associated with the use of personal devices in the classroom have been identified, including poor access to the Internet, minimal access to charging sockets, lack of university infrastructure, and lack of professional training for academics about how best to integrate the technology into their classrooms (Cheng et al., 2016). Crucially, training opportunities can improve the teaching practices of academics by assisting them in effectively incorporating BYOD HE policies into their teaching approaches (Sorotiva et al., 2019). Laxman and Holt (2017) found that the practice of BYOD can support various behavioural and safety problems on the university campus. For example, students can use mobile devices in class to access unrelated learning materials and websites, which then creates teaching challenges for academics (Mittal, 2014). The chief security threat in a university network system requires addressing by university information and communication technology (ICT) teams (Dickerson, 2013). A further issue relates to inequality in learning, as not all students can bring digital devices into classrooms (Hockly, 2012). Therefore, lecturers face the challenge of managing how students without portable devices can follow their teaching approach and access the same opportunities as those students who bring their own devices into a class (Miller & Welsh, 2017).

Song and Kong (2017) divided the potential limitations of BYOD into three categories: technical limitations such as functionalities, screen size limitations, Wi-Fi infrastructure, insufficient charging, and computing power; social constraints largely including concerns from academics regarding equality issues, such as the uneven quality of the BYOD students can provide, classroom support, and less F2F communication; and personal limitations, such as lecturer expertise, student expertise, unwillingness to implement BYOD, significant time investment, opportunities to access learning materials and pedagogy. Laxman and Holt (2017) also suggested that the digital infrastructure itself may prevent students from bringing their own devices into the classroom. Universities should also consider how different types of digital learning tools could be incorporated into curricula to not only make it easier for students' learning processes according to various pedagogical aspects but also to involve students in their learning process in a BL environment (Bokolo et al., 2020; Hakami, 2020; Layali & Al-Shlowiy, 2020; Sokolova et al., 2021).

Social Media – A Learning Technology Tool

The proliferation of social media technologies in alignment with BYOD opportunities has arguably transformed the HE landscape (Abdillah, 2017), bringing about significant changes to teaching methods and the roles of students and academics (Hamadi et al., 2021). For example, the use of introducing personal devices and (social media) applications to a BL environment can transform course design, pedagogical approaches, and teaching processes (Bokolo et al., 2019), so that students and academics can share comments, thoughts, and immediate materials (Karim & Gide, 2017). Thus, the integration of (social media) applications could alter traditional modes of teaching (Chawinga, 2017) by supporting various new approaches to problem-based and collaborative learning via BL (Hashim et al., 2018). Alamri et al. (2020) argued that student learning activities and group discussions could be enriched through engaging in collaborative learning and the use of social media for learning purposes. This argument was also made by Sobaih et al. (2016), who discussed the value of using social networks to support learning.

Several academics have integrated Facebook, Twitter, and YouTube to improve their approach to teaching in the classroom, allowing students to gather information about their courses and/or modules to feel connected with peers (Hembrough & Jordan, 2020; Moghavvemi et al., 2018). Several researchers have also discovered Twitter is an important platform for academics, as it digitally connects them with their students, enabling them to understand course content that covers classroom materials (Desselle, 2017; Gonzalez & Gadbury-Amyot, 2016; Hull & Dodd, 2017; Malik et al., 2019). Mahdi (2019) has also found that WhatsApp and Twitter were the most popular social media apps among Saudi students for learning.

Although the current content of social media largely reflects potential applicability to HE (Piotrowski, 2015), on the basis that the integration of social media into the HE environment may enhance learning and teaching objectives (Ranginwala & Towbin, 2018), lecturers also need to consider potential challenges, such as frequency of use and the extent of time spent on social media. In addition, Gok (2016) revealed that digital technologies and social media applications might have a negative impact on student's study habits, citing the effects of Smartphones and digital technologies on students and teenagers. The majority of the biggest challenges that students encounter relate to critical skills and how best to filter a large amount of information present on social media, as they seek to determine what information is accurate and valuable to them (Shaw et al., 2016).

Lau (2017) further examined differences in students' academic performance when using social media, resulting in a negative effect of multitasking (whereby individual attention is divided into different mental actions). Furthermore, Olutola et al. (2016) examined the relationship between social media use, study habits, and student performance, and recommended that faculty members often need to guide social media use to improve student performance. Subsequently, Pedro et al. (2018) argued that dynamic discipline in the classroom is at risk due to the addictive qualities of digital devices and social media. Thus, Alamri et al. (2020) recommended introducing effective ways to incorporate social media into learning activities without affecting students' performance.

Subsequently, Web-Based Learning (WBL) was developed to incorporate the benefits and productive values of personal devices and social networks. WBL platforms are generally designed along the lines of a game-based student response system (GSRS) (Wang, 2015), or a student response system (SRS), which may help lecturers deliver their lectures, keeping students motivated and engaged with the learning process (Naveed, Qureshi, et al., 2017). Doung-in (2019) mentioned that students' perceptions when using online digital tools as part of the teaching approach were generally positive, whereas Kahoot is the most affordable single platform, followed by Padlet and then Poll-Everywhere.

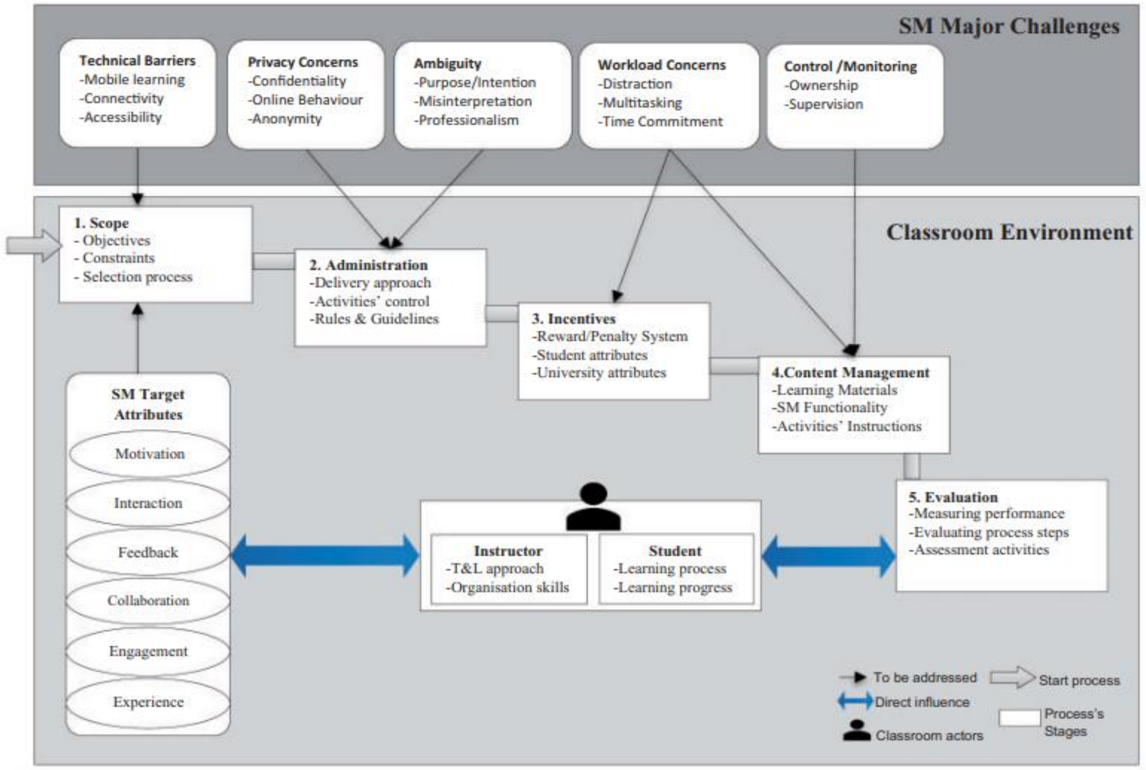

Figure 3.1 A Social Media Integration Framework for Teaching and Learning in HE Adopted by (Hamadi et al., 2021), p.72)

A recent study (Hamadi et al., 2021) proposed a conceptual framework for integrating social media into HE for learning purposes (Figure 3.1). This framework has five main phases: scoping, administration, incentives, content management, and evaluation. The first stage of this framework, the scope, refers to those technical obstacles and challenges that can prevent the integration of technology into the learning environment by influencing motivation, interaction, feedback, collaboration, engagement, and the experiences of students and academics. Recent studies recommend additional research to address the issues arising from the use of social media in HE, such as multitasking, distractions and pedagogical demands (Al-Rahmi et al., 2020; Aldahdouh et al., 2020; Rahman et al., 2020).

Accordingly, academics are expected to "accept" new technology when they believe it is pertinent to the specific pedagogic techniques within their courses (Scherer et al., 2019). According to Hashim et al. (2018), all forms of SMAs can potentially facilitate learning. However, they also observed that if social media tools are employed in HE contexts, social-media-suitable assessment styles and teaching pedagogies need to be developed. From this perspective, and to explore how and why (social media) applications can be integrated into teaching in HE, developing an approach involving understanding their utilization within a technology-supported teaching environment is essential. According to the above, (social media) applications could be employed in several teaching contexts (i.e., collaboration, communication, and resource sharing) (Arshad & Akram, 2018). Thus, the portability and application-based flexibility of (social media) applications has triggered an overall pedagogical shift from non-participatory teacher-centred to participatory student-centred learning (Bature, 2020; Eos Trinidad & Radley Ngo, 2019).

When considering the use of technology for teaching and learning, Bond et al. (2018) recommended understanding the technological skills and knowledge provided by both academics and students, identifying their respective needs, and striving for mutual understanding of both perspectives (bottom-up). Beyond that, they indicated that implanting sustainable technology could succeed if the overall application in HE is rooted in the context of the university and is supported by university administration (top-down). Therefore, reflecting on the above recommendations, the following section reviews the current situation regarding technology integration in Saudi HE.

Technology Integration in Saudi Higher Education Settings

Since this research study is set within the case study context of the Kingdom of Saudi Arabia (KSA), the second section of this chapter discusses the current state of HE in KSA and the use of technology in Saudi HE settings for learning purposes. A literature review was conducted to explore the barriers and constraints that might prevent Saudi universities, academics, and students from using technology and social media for educational purposes.

Introduction

Saudi Vision 2030 was launched in 2016 and incorporates the Human Capacity Development Program (HDCP) as one of its newly updated programs. The aim was to officially launch the HDCP in the third quarter of 2021. It details the requirements to acquire the skills necessary to thrive in a market characterized by global competition by teaching values, developing basic and future skills and improving knowledge. Overall, the Vision 2030 program intends to help develop all components of education and training, including lecturers, trainers, and faculty members, to align with modern and innovative trends. The program relies on 63 universities in the Kingdom of Saudi Arabia (KSA); six of which are expected to be among the top 200 universities in the world by 2025. KSA was previously voted one of the 10 best countries in the world due to its digital development capabilities (MAAAL, 2021). According to a recent report (H. Alhazmi, 2021), the KSA ranks seventh in technology investments, ninth in technology application and development, tenth in average mobile internet speed, and 28th in terms of digital infrastructure, and when compared to the entire Saudi population, the proportion of internet users on all types of devices (i.e. laptops, tablets, smartphones) is 95.7%. Specifically, the proportion of those who own a smartphone is 88.14%, a computer and laptop 57%, and a tablet 34%.

The current teaching approach employed by academics is described here to clarify the process by which technology is being introduced into the Saudi HE. The dominant pedagogical approaches to teaching and learning in Saudi Arabia are rote learning, and didactic teaching (Smith & Abouammoh, 2013). Meanwhile, Saudi Arabia's education system is primarily based on traditional approaches delivered through a teacher-centred approach (Grami, 2012) in which the teacher is viewed as the sole source of knowledge (Khan, 2011).

Traditionally, lectures have been viewed as the focal point of university education in KSA and take place in either a large or small group setting. A good lecture can inspire students if it is effective and has been well-received; for example, if a lecture is segmented, incorporates activities, film clips, and the Internet, and concludes with useful condensed summaries. However, as a teaching method, the lecture has been criticized for being a one-way communication focused on imparting information, in a manner that can be dull, boring, and repetitive (Alnassar & Dow, 2013).

Most Saudi academics believe that traditional teaching and learning methods are best for their students. According to Smith and Abouammoh (2013), this attitude probably endures because, for the majority of Saudi academics, this is the only instructional paradigm they have ever known. However, they have added that a critical issue here is that to achieve effective pedagogical change academics need to believe in and want it.

However, government strategies regarding the integration of educational technology into HE began more than four decades ago. Specifically, since 1970, KSA has adopted a five-year plan that reflects its strategies and policies to achieve its development goals (Al-Maliki, 2013). The KSA government has used resources and accessible materials to meet goals that have been reformed every five years since the first development plan (1970-1975). In particular, the implementation process was based on technological developments imported from developed countries that established the country's physical infrastructure during the kingdom’s first three five-year plans (1970-1985). As the implementation process has continued every five years, the KSA has succeeded in rapidly adopting new (ICT) infrastructures, particularly in the private sector. For example, the focus was placed on the implementation of ICT systems in organizations/institutions to facilitate day-to-day operational activities and improve their overall productivity. In the fifth development plan (1990-1995), the KSA government introduced new policies designed to close the gap between technology and science.

The Seventh Development Plan (2001-2005) highlighted the effort required to develop science and technology, raise public awareness, and support scientific research and technological development. It was designed to direct long-term technological developments and incorporate cultural, social, economic, and technical aspects over a longer time frame, from 2001 to 2020. The chief objective in this period was to create a framework and specific rules to support scientific and technological development within the country. This aim was mainly to promote research and development activities in various technological areas by improving the country's competencies in technical areas; developing the human resources to navigate advanced technologies; promoting scientific and ICT-based organizations to improve the level of collaboration, integration, and interaction between them, and improving the level of cooperation with other countries in the science and technology fields, while also integrating the use of ICT systems into educational contexts.

To implement the plan for this period, the Ministry of Education (MoE) and the Ministry of HE (MoHE) managed and implemented the KSA's education policy. These two ministries merged in 2015 to form the so-called Ministry of Education (MoE), which offers Saudi universities and colleges support and services, promotes awards, develops programs, and awards scholarships to Saudi students studying abroad. The MoE includes several educational centres, such as the Computer Science and Information Centre, which develops the national ICT infrastructure development strategy. Excellence in science and technology in HE has also been suggested to further promote the development of distance learning, the uptake of ICT in all areas of education, and the creation of digital content.

Additional centres, such as the National Centre for E-learning and Distance Learning (NCeDL) (www.elc.edu.sa), support universities with online learning (Aldiab et al., 2017) by enabling Saudi students to use technology, making KSA a knowledge-based economy and a technologically advanced country offering educational and e-learning opportunities for all (AlMegren & Yassin, 2013). Specifically, the goals of NCeDL are to provide research support in the fields of e-learning and distance learning; raise awareness of the culture of e-learning, and manage projects related to e-learning and distance learning. For example, the “Jusur” learning platform was developed by NCeDL in 2007 to facilitate the learning process, including registration, scheduling, monitoring, and communication (https://jusur.elc.edu.sa).

“Jusur” was founded in 2010 to support university students and members of academic staff who required digital information resources and services. In particular, the Saudi Digital Library (SDL) has more than 310,000 digital books and is supported by more than 300 publishers around the world. The Saudi Electronic University (SEU) (www.seu.edu.sa) was founded in 2011 and offers both distance and BL courses. One of its main goals is to provide a sustainable e-learning environment across the country. Online HE is increasingly popular among the younger generation, and there were more than 19,000 students in 2015, including about 7,000 new students.

Alnassar and Dow (2013) argued that university learning and teaching can and should be significantly improved. The anticipated improvements should begin with university teaching staff adopting more effective instructional methods, being more explicit about course objectives, utilizing small group teaching methods to foster genuine interactions with students, effectively adapting the modern technologies available for learning, and directly connecting student assessments to course objectives. Additionally, they believe that students should be encouraged to be active participants in their learning and that they must be explicitly taught learning skills, such as information retrieval, learning by doing and practising skills and techniques, as well as connecting and contextualizing their learning.

Colbran and Al-Ghreimil (2013) conducted one of the earliest and most comprehensive surveys on the use of information technology to support teaching, learning, and assessment in Saudi HE. They asked: How can Saudi Arabian universities meet emerging teaching and learning needs while maintaining and developing institutional infrastructures? How can Saudi universities most effectively bridge the gap between their educational communities' needs and expectations and the capabilities of information technology? How can instructional technology be reviewed, adopted, and supported most effectively? They concluded that the primary barriers to successful educational technology adoption in Saudi Arabian universities include a lack of infrastructure and infrastructure failures, blocked websites and software issues, and a lack of training and support.

King Abdul-Aziz University (KAU), for instance, uses technology in its instructional study programs. Specifically, KAU was the first university to deliver distance or BL courses. However, the challenges of limited technological infrastructure (limited Internet and unreliable access) prevented students and staff from routinely working and studying online (Aljaber, 2018). Although the MoHE in Saudi Arabia has invested a considerable proportion of its budget into supporting e-learning activities, universities still need support and integration of technology into their teaching and learning processes (Al Gamdi & Samarji, 2016).

Many researchers have recently studied the role of technology for educational purposes to support HE programs (Aldiab et al., 2017), although a literature review of technical barriers, limitations, and challenges may further explore learning technology integration into HE at KSA, allowing us to identify the potential difficulties that universities, academics and students typically face. More specifically, this literature review aims to identify the barriers, limitations and constraints that might prevent Saudi universities, academics, and students from integrating technology and social media into teaching and learning. In the current literature review, educational technology refers to the use of any type of learning technology tool (i.e., learning management systems, social media, and web-based applications) embedded in teaching and learning modes (i.e., F2F, BL, and mobile learning) to support distance and/or online learning. Learning Management Systems (LMS) (also known as Virtual Learning Environments, VLEs) enable lecturers to deliver course materials such as audios, videos, animations, and simulations to students, offering assisted computer-tagged online assessments through comments, and tracking student assignments and plagiarism (Turnitin UK Assignment) and/or interaction through collaboration (synchronous or asynchronous) with their students (Asiri, 2012; Limniou et al., 2012), while social media facilitates the exchange of ideas, thoughts, and information through networks and virtual communities (Carr & Hayes, 2015). According to Smith and Abouammoh (2013), the KSA government's efforts are all directed toward achieving 'world-class' standards in the operation of Saudi universities. Thus, this thesis examines how technology can be used to improve education in Saudi universities with this purpose in mind.

Methods

This literature review was conducted by a search of the following databases:

a) Google Scholar, which enables researchers to search specifically for scholarly literature, including peer-reviewed papers, theses, books, preprints, abstracts, and technical reports from various broad research domains including education.
b) Science Direct, which offers more than 4,200 journal articles from different disciplines, including education.
c) Scopus ensures journal coverage in many subjects across the fields of science, technology, medicine, social sciences, as well as the arts and humanities; and
d) PsychINFO which covers journal articles in the field of psychology and psychological aspects of related disciplines.

The search method and procedure targeted all the manuscripts published about KSA over the publication period, from 2014 to 2020. The search strategy included: “technology” OR “ICT” OR “social media” OR “LMS” OR “e-learning” AND “education” OR “universities” OR “learning” OR “teaching” OR “teacher” OR “students” AND “barriers” OR “constraints” OR “limitations” OR “challenges” OR “obstacles”.

Table 3.1
Classification of the Scientific Outputs included in the Literature Review Per Specific Technology-Based Category

Serial Number	Technology-based category	Number of Manuscripts	Authors
1	E-Learning	20	(Al-Taweel, 2019; Al Alhareth, 2014; Al Gamdi & Samarji, 2016; Al Mulhem, 2014b; Alahmari & Amirault, 2017; Alharbi & Lally, 2017; Alhuzali, 2015; Aljaber, 2018; Alqahtani, 2019; Alzahrani, 2015; Alzahrani, 2018; Ja'ashan, 2020; Mathew et al., 2019; Mutambik, 2018; Nagshabandi, 2019; Quadri et al., 2017; Sidawi, 2015; Solangi et al., 2018; Windiarti et al., 2019; Xanthidis et al., 2016)
2	ICT	16	(Al-enazi, 2016; Al-Zahrani, 2015a; Al Mulhim, 2014a, 2014b; Al Mutlaq, 2018; Alahmari, 2020; Alhanash & Almalki, 2020; Alharbi & Alotebi, 2019; Alruwaili, 2014; Alshahri, 2015; Alshehri, 2020a; Alturise et al., 2016; Alzahrani, 2017; Bajabaa, 2017; Ghanem, 2020; Mohamed et al., 2018)
3	Social Media	13	(Abdullah, 2020; Aifan, 2015; Al Khader, 2018; Alanazi & Thompson, 2019; Allam & Elyas, 2016; Alqahtani, 2016a, 2016b; Alqahtani & Issa, 2018; Alshehri, 2019; Alshehri & Lally, 2019; Khader, 2018; Kutbi & Zhang, 2016)
4	LMS	13	(Abdullah, 2018; Al Meajel & Sharadgah, 2018; Alghamdi & Bayaga, 2016; Alharbi & Alotebi, 2019; Alhosban & Ismaile, 2018; Alkhattabi, 2014; Almannie, 2018; Alshammari et al., 2016; Alshardan et al., 2019; Alturki & Aldraiweesh, 2016; Asiri et al., 2015; Binyamin, 2019; Khan & Adams, 2016)
5	Blended Learning	3	(Alghanmi, 2014; Aljahni, 2014; Alzahrani, 2019)
6	Mobile Learning	3	(Albazie, 2018; Alhassan, 2016; Aljuaid et al., 2014)
7	Smartphone	2	(Alenezi, 2017; Aljaloud et al., 2019)
8	Hologram Video Conferencing	1	(Aman & Shiratuddin, 2020)
9	E-Assessment	1	(Alenezi, 2018)
10	Video games	1	(Alqurashi, 2016)
11	VLE	1	(AlEnazi, 2015)

The abstract for each selected manuscript was reviewed to ensure it covers the main intended objectives. If the abstract did not include the target objects, the main context of the manuscript was reviewed to identify any additional barriers discovered, the results, and the discussion sections. Studies were excluded if they did not report bivariate or multivariate associations between predictor variables and dependent variables. The inclusion of only prospective studies was vital, as only HE in KSA, technology-enhanced learning, constraints, and teaching or learning variables had been investigated, as these were not explored in any previous studies in a literature review format.

Of the 125 records resources identified in the databases when applying the inclusion and exclusion criteria of date, education level and country, 75 scholars were remaining. Table 3.1 presents a list of scientific outputs to support this literature review. Different types of technology-based categories were examined in the literature, including e-learning, ICT, social networks, LMS, technology, BL, and e-learning. In addition, only one journal article was found to meet the criteria for e-assessment, video conferencing with holograms, video games, and VLE.

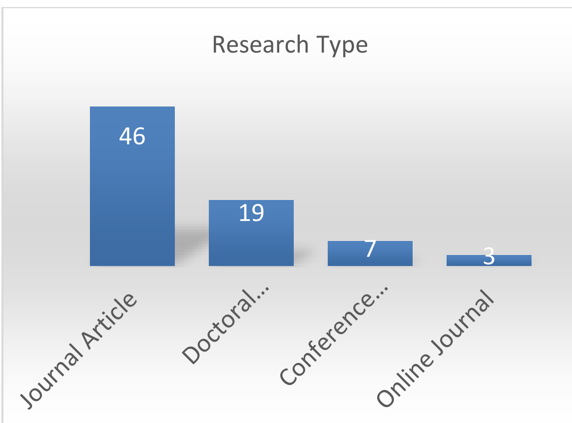

Figure 3.2 Classification of Literature-Based on Manuscript Type

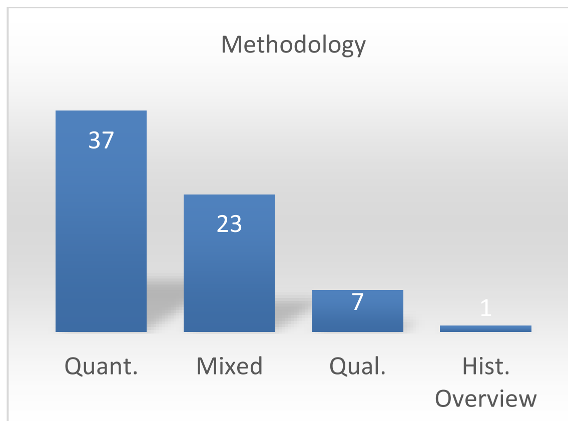

Figure 3.3 Classification of Literature-Based on The Methodology

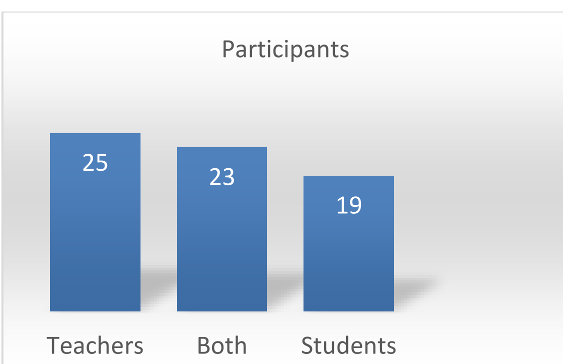

Figure 3.4 The Sixty-Seven Individual Manuscripts Classified Based on Participant's Type

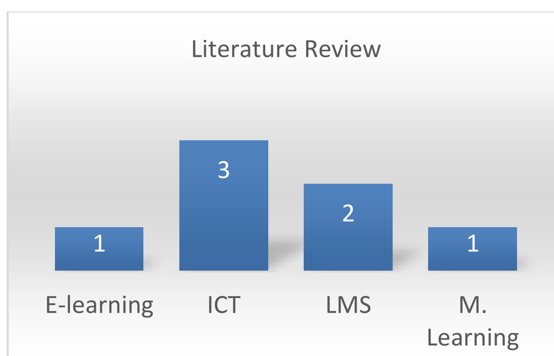

Figure 3.5 Seven Literature Manuscripts Classified Based on Technology Type

The literature included several types of manuscripts: dissertations, journal articles, conference articles, and online journals (Figure 3.2). It emerged that the research methods used in the selected literature included quantitative (questionnaire), qualitative (interviews and focus groups), and mixed methods (Figure 3.3). Finally, it was also verified that the target samples for teachers, students, or both varied (Figure 3.4). In addition, seven literature-like manuscripts were reviewed (Figure 3.5).

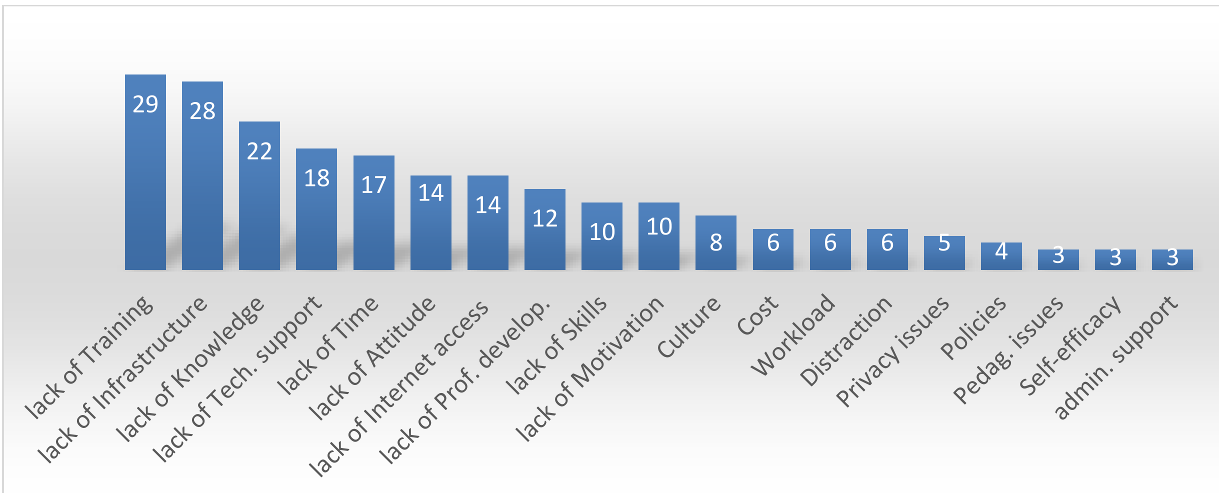

Figure 3.6 Barriers to Using Different Types of Technology for Learning and Teaching in HE in Saudi Arabia According to Literature from 2014 to 2020.

Of the 75 publications examined (published from 2014 to 2020), 19 barriers were identified that affect the use of technology for learning and teaching in HE at KSA (Figure 3.6). The 19 barriers found were divided into three categories:

1. Barriers to Saudi institutions/universities include lack of training, lack of technical support, lack of professional development, lack of guidelines, excessive workload, lack of time, educational issues, and lack of administrative support.
2. Barriers affecting academics and students include lack of knowledge, lack of attitude, lack of skills, culture, lack of motivation, distraction, privacy issues, and lack of self-efficacy.
3. Technological barriers (University, academics, and students) including infrastructure, internet access issues, and cost.

As the main aim of the literature review was to explore barriers, limitations, and constraints of technology integration into HE, a form of categorization was selected based on the nature of each barrier and the researcher's understanding of the academic environment in the Saudi HE sectors.

Results and Discussion

This literature review aims to identify the barriers, limitations, and constraints that Saudi universities, academics, and students may face in terms of the use of technology in their teaching and learning. Each of the 75 reviewed scientific outputs (from 2014 to 2020) identified at least one issue that influenced technology integration into Saudi HE. As detailed above, the results are listed and discussed according to three categories. The 75 scientific outputs included were then split into different categories, as discussed in the previous section of the literature review.

Institutions/Universities Barriers

Eight potential constraints emerged regarding Saudi institutions/universities: lack of training, lack of technical support, lack of professional development, lack of guidelines, excessive workload, lack of time, educational problems, and lack of administrative support (Figure 3.7). These barriers may have prevented the use of various technologies by students and academics working at Saudi universities.

29 sources cited lack of training as a potential difficulty affecting technology integration into Saudi HE. This point referred to studies related to e-learning (nine studies) and ICT (eight studies) generally, or when more specific learning tools have been examined, such as LMS, and social media. Several studies demonstrated that effective training through online learning is vital for successful learning and teaching (Al Mulhim, 2014a; Alzahrani, 2018; Quadri et al., 2017). Al-Zahrani (2015b) found that online training courses are not so expensive, allowing universities to offer multiple courses without significantly investing in expensive infrastructure (i.e., computer clusters and well-equipped classrooms). Even members of staff from

professional services are expected to receive relevant training to address students' questions regarding technical and administrative issues (Sidawi, 2015).

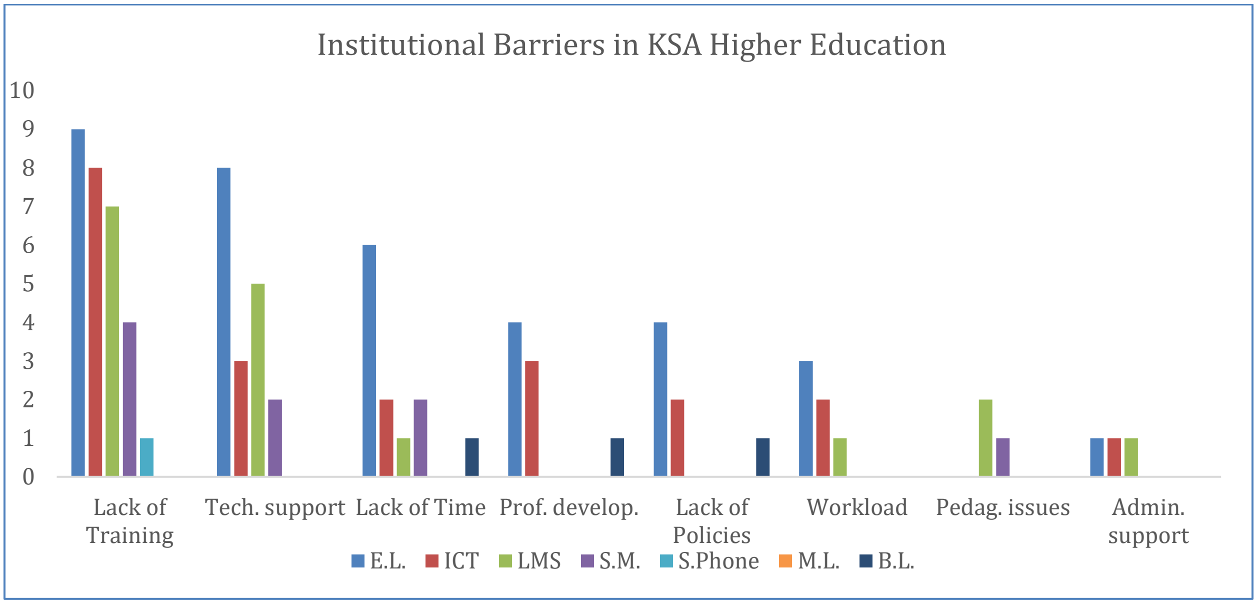

Figure 3.7 Barriers for The Saudi Institutions/Universities Classified Based on Different Technologies

Members of staff and students also apparently encounter difficulties integrating technology into their teaching due to a lack of training opportunities provided by KSA universities (Alturise et al., 2016; Alzahrani, 2017). Subsequently, Alhosban and Ismaile (2018) recommended that KSA universities further invest in employee training in the use of digital technologies in diverse contexts (Nagshabandi, 2019), whilst only a limited number of lecturers used LMS, due to insufficient training (Alharbi et al., 2019). Although this training issue was identified several years ago, as recently as 2002, Alshehri (2020a) noted that lack of academic training was causing problems regarding technology integration in the classroom, having also been highly linked to a lack of personal development (Alshehri, 2020b). Similar to insufficient staff training, Al Meajel and Sharadgah (2018) found that inadequate training of students with LMS is also related to time and workload constraints. Khader (2018) further explored the main barriers to the integration of social media for educational purposes, observing that the lack of facilities and infrastructure and relevant training prevented academics from adapting learning tools to benefit their teaching. Additionally, Alanazi and Thompson (2019) found that lecturers' lack of educational experience on social media reflected a lack of access to and training on these technologies for personal reasons.

Another issue that academics faced regarding the integration of technologies into teaching and learning was linked to technical support (identified in 18 scientific outputs). Moreover, Sidawi (2015) stated that a robust e-learning infrastructure should be implemented so that academics and students can receive full technical support. Support service and help desk (Alruwaili, 2014) can assist KSA universities to provide relevant VLE technical support to students and staff (Al-enazi, 2016; Asiri et al., 2015; Kutbi & Zhang, 2016). This recommendation to KSA universities was also supported by Bajabaa (2017), who investigated the provision of technical and administrative support to members of staff in the Faculty of Education at Taibah University as a case study example. It was also found that the institution limited (or did not even have) technical support, and that inadequate training (Al Meajel and Sharadgah (2018) prevented members of staff and students from adopting a VLE to develop their teaching and learning. For example, Almannie (2018) also mentioned the lack of technical support influencing students' engagement, commenting on online tests and communication via a VLE system (i.e., Blackboard).

Lack of time is another major obstacle often discussed in the literature, which relates to the teaching and learning workload for lecturers and students respectively (Al Mulhem, 2014a; Alruwaili, 2014). Seventeen peer-reviewed outputs already mentioned this, when studying e-learning, ICT, and social media. Alkhattabi (2014) discovered when using a VLE system (i.e., Blackboard) that students complained about the time needed to familiarise themselves with system functionalities. Al-enazi (2016) suggested that institutional support should consider the time required in the context of the workload of the academic staff. Al Mutlaq (2018) identified that significant challenges for lecturers' engagement with the technology integration into teaching and learning approaches were time and effort, accessibility and familiarity with the e-learning courses. Al Meajel and Sharadgah (2018) found that lack of time was one of the institutional barriers to the use of e-learning, due to the high teaching workload. Specifically, when exploring academics' views on the use of social media, Allam and Elyas (2016) identified a lack of time. A relatively recent recommendation regarding staff lack of time, issues with the technical infrastructure and lack of interest in the integration of social media into KSA HE was proposed by Alqahtani and Issa (2018). For example, staff were expected to feel that their institutions should acknowledge the time spent using technology for educational purposes.

Another quite frequently mentioned constraint regarding the use of technology related to lack of training or professional development (11 scientific outputs have identified it). Alahmari and Amirault (2017) further mentioned that a shortage of professional technicians providing technical support, equipment maintenance, and problem-solving when using e-learning, as well as a lack of training to support e-learning, and e-trainers acted as potential technology integration barriers. Those academics who use learning technology to support e-learning opportunities for teaching and learning need to be up-to-date with technological developments and the principles of pedagogical integration (Aljaber, 2018). To meet the evaluation needs of the technology-enhanced learning (TEL) Continuing Professional Development (CPD) course, Saudi university academics pointed out the ongoing requirement for continuous learning based on their teaching specifications, needs, and preferences; including demands in terms of time and effort, ease of access to technology, opportunities to practice in real teaching settings, and information about course details before and during training (Al Mutlaq, 2018).

The lack of guidelines on the use of technology for educational purposes was found to be an issue that lecturers needed to overcome (identified by eight scientific outputs). In particular, Alghanmi (2014) found that the lack of policy and decision-making in Saudi universities regarding BL had a negative impact on teaching practices. Similarly, Alruwaili (2014) pointed out that members of staff had no opportunity to participate in decision-making related to the introduction and integration of technologies. The “effective” use of technology, along with digital skills development should be part of the university’s strategic plan, which will be well-communicated to all members of staff and students (Al Gamdi & Samarji, 2016; Alahmari & Amirault, 2017; Mohamed et al., 2018). An issue might arise here regarding online assessment and potential academic integrity (plagiarism) (Abdullah, 2018). However, through a clear strategic plan and e-learning policy, universities can ensure academic quality assurance for students and staff (Alhanash & Almalki, 2020; Alharbi & Alotebi, 2019).

However, academics also mentioned that being overburdened with academic work, prevented them from using technology for educational purposes (six scientific studies identified this as a constraint). Al-enazi (2016) pointed out that the lack of institutional recognition (i.e., criteria for promotion, financial rewards, fewer responsibilities to lighten their workload) did not motivate academic members of staff to spend time on learning technology initiatives. Bajabaa (2017) mentioned that technical skills and workload are the chief factors KSA universities need to invest in further to support technology integration in their courses. Alharbi et al. (2019) also stated that lack of administrative support and their demanding workload was the main challenges affecting the adoption of VLE for teaching. Reducing lecturers' workload, allowing them to attend training courses deemed relevant to their teaching needs, linking technological development with pedagogical principles for "effective" integration into courses, and implementing a well-structured technology-enhanced learning strategy where several of the proposals that arose from research in Saudi universities (Alharbi & Lally, 2017; Bajabaa, 2017).

A clear connection between pedagogy and technology supporting e-learning and/or BL has been also mentioned as a potential constraint influencing the integration of learning technology into HE. Faculty members expressed a high level of awareness of the usefulness of technology for educational purposes, however; this chiefly related to supplementing traditional approaches to teaching (Alzahrani, 2015). Al-enazi (2016) found that the lack of pedagogical knowledge among academic staff meant they did not tend to use VLE in their teaching. Thus, further action regarding this needs to be taken by KSA universities, allowing academics to shift their approach from a traditional to a BL/distance learning one (Al Gamdi & Samarji, 2016). Al Khader (2018) recently discussed how social media can be used "effectively" to support teaching and learning in HE when pedagogical principles are followed.

Finally, administrative support was another constraint reported regarding the use of technology for learning and teaching in Saudi HE. For example, Ja'ashan (2020) mentioned that academics at Bisha University had difficulty using e-learning technologies, due to administrative challenges such as insufficient administrative support and encouragement, changes in faculty roles, and an inadequate ICT and E-learning infrastructure. Alruwaili (2014) reported that academic members of staff and students stated that administrative support was necessary to apply learning technologies. In a specific study of the factors influencing the use of Jusur LMS in Saudi universities, Asiri et al. (2015) provided administrative and financial support as a determinant for the use of Jusur.

Overall, eight constraints, which were overlapping in some cases, were identified for the institutions/universities category, preventing academics and students from using technology in teaching and learning contexts. These barriers are classified in the technology-based category. The use of e-learning technology, and the use of ICTs more generally, are associated with the first six constraints. Notably, mobile learning technology has not been specifically included in any of the scientific outputs reviewed. Regarding the use of social media, the constraints concerning lack of professional development, lack of guidelines, and excessive workload had not been mentioned by any of the reviews of scientific output.

Technological Barriers to Saudi Academics and Students

The eight potential constraints that Saudi academics and students might face regarding technology integration for educational purposes have been identified: lack of attitude, lack of motivation, lack of knowledge, lack of skills, cultural problems, distraction, privacy problems, and lack of self-efficacy (Figure 3.8).

The lack of an attitude towards technology has been mentioned as a potential barrier in fourteen scientific outputs, all of which discussed e-learning technologies and ICT more generally, and VLE and social media use more specifically. Examining the role of e-learning technologies as a bridge allowing the KSA student population to access HE, Al Alhareth (2014) observed that the use of e-learning technologies fits with attitudes towards women, by offering potential options to deliver alternative educational services. Alhuzali (2015) found that neither lecturers nor students appreciated the e-learning teaching and learning process.

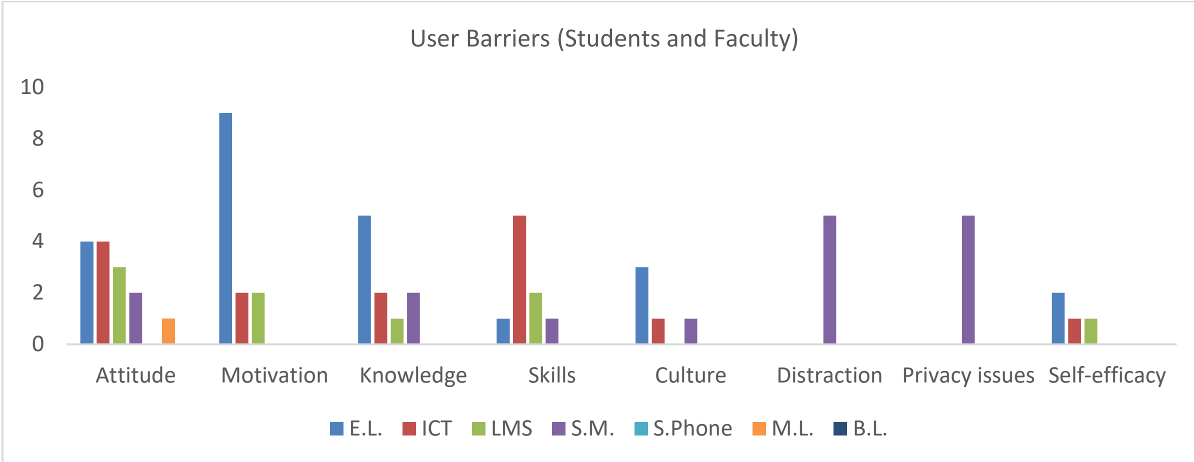

Figure 3.8 Barriers for Academics and Students Classified Based on Different Technologies

To overcome this issue, Al-enazi (2016) proposed potential actions that institutions might adopt to promote e-learning technologies and delivery processes in the academic community. These included developing strategies for e-learning initiatives, communicating the importance of e-learning technologies, and clarifying the implications associated with their participation. By emphasising the importance of training in the use of e-learning technologies and processes as a promotional technique among members of staff, Windiarti et al. (2019) stated that it would be possible to encourage academics to alter their attitudes toward technology, encouraging them to develop themselves. Regarding ICT use more generally, Alshahri (2015) reported that for Saudi Arabian academics perceived value played an important role, which significantly related to attitudes toward students. In a study of the teaching practices at Saudi universities between 2009 and 2019, Alharbi et al. (2019) confirmed that one of the main obstacles to the use of technology in education is attitudes toward technology alongside lack of knowledge, administrative support, and skills. These barriers were previously mentioned by Alshammari et al. (2016) in a study conducted at three Saudi universities. Regarding the adoption of VLE within Saudi universities, Alghamdi and Bayaga (2016) highlighted the lack of technical skills among academics, arguing that this could be linked to their attitudes towards the use of VLE (Alenezi, 2018). Alhosban and Ismaile (2018) also found that the most frequently cited obstacles for students regarding the use of VLE have been considered communication, interactivity, and feedback. Regarding the integration of social media into the teaching process, Al Khader (2018) mentioned possible constraints as being academics' beliefs about the value of social media as a learning tool, lecturers' familiarity with social media, confidentiality issues, and previously established teaching practices. Alhassan (2016) identified several potential barriers relating to the use of mobile learning technologies, such as smartphone cost, students' and/or academics' resistance to the use of mobile phones for educational purposes, and their familiarity with this type of technology. Aljaloud et al. (2019) also proposed that social media application developers should consider academics' views about the suitability of applications for learning purposes, as these might encourage lecturers to increase student participation.

The lack of motivation to use technology for educational purposes was mentioned in thirteen of the identified scientific outputs discussing e-learning and ICT in generally. Due to a lack of motivation, students and academic performance might have a negative effect on teaching and learning processes (Aljaber, 2018; Alzahrani, 2019; Quadri et al., 2017; Windiarti et al., 2019). When studying how e-learning technologies and processes are integrated within Saudi academic institutions, the complexities of online classroom environments were highlighted in the diversity of student populations, their motivation, participation in learning activities, and their ability to learn independently (Alqahtani, 2019; Mathew et al., 2019). Although e-learning technology has been used in Saudi HE, there remain issues that need to be addressed about both students' motivation to learn through the use of technology, and their ability to work independently and collaboratively (Mathew et al., 2019). Regarding ICT more generally, it seems that a lack of motivation to use technology for educational purposes affects students as well as academics. Alruwaili (2014) and Al-enazi (2016) proposed financial incentives and/or promotional rewards when acknowledging their efforts to use technology to assist teaching and learning. Khan and Adams (2016) also linked technology acceptance for educational purposes to motivation, among other factors that included the performance expectation, the expectation of effort, social influence, and the formation of habits.

A lack of knowledge or understanding of how to use technology (i.e., e-learning, ICT, and social media in general) for educational purposes has been reported in ten scientific outputs as a potential barrier affecting KSA HE. The term "knowledge" can refer to theoretical and/or practical understanding of the intended learning technology. Well-structured knowledge requires that individuals combine their contextual, conceptual, and procedural knowledge (determining how to solve problems quickly and efficiently) (Rittle-Johnson & Koedinger, 2005; Zwart et al., 2021). Overall, it appears that ignorance of e-learning opportunities was the main obstacle affecting both students' and academics' use of technology (Al-enazi, 2016; Alzahrani, 2018; Quadri et al., 2017). Alqurashi (2016) considered student knowledge of the use of technology as a constraint impacting their perceptions of applications, feedback provision and their performance. Meanwhile, Alharbi et al. (2019) highlighted that the most challenging factors for the KSA academics were their attitudes towards technology, and the lack of technical and theoretical (pedagogy) knowledge to allow them to integrate it effectively into teaching. Regarding the use of social media for educational purposes, Al Khader (2018) explained that academics did not feel confident about using social media for educational purposes, mainly due to their lack of knowledge about how to use it and keep their profiles confidential at the same time. However, Abdullah (2020) noticed that the use of social media for debating and sharing files has gradually improved among university academics and students, supporting knowledge exchange and communication processes. With expanding training opportunities, academics could be updated with new technological developments, enhance their understanding of technology-enhanced learning, and further develop digital skills to "effectively" integrate technology into their teaching practices (Al Mutlaq, 2018).

The lack of technical/digital skills (reported by ten scientific outputs) has also prevented academics and students from adopting technology-enhanced learning opportunities in KSA HE (Bajabaa, 2017; Quadri et al., 2017). Alzahrani (2017) explored how various Saudi universities have adopted technology for educational purposes and found that the use of ICT by lecturers and students highlighted their digital skills and previous experience and varied between KSA universities and/or other international universities.

The constraints regarding the integration of technology into KSA HE is a distraction (discussed in five scientific outputs) as are the privacy issues (discussed in four scientific outputs) that highly relate to the use of social media. Saudi students might become distracted when using social media applications if they already lack motivation and engagement in learning, as they may use the opportunity to check their social media accounts and chat online

(Aifan, 2015). To reduce social media distractions, lecturers need to keep students engaged in the learning process by implementing a well-designed teaching approach and applying clear pedagogical aspects (Abdullah, 2020). A further issue raising concerns about social media use in teaching and learning contexts relates to privacy, security and cyberbullying (Abdullah, 2020; Alshehri, 2019). Allam and Elyas (2016) mentioned that academics fear social media may be used to post restricted material during lectures. In a quantitative study, Alqahtani and Issa (2018) recently stated that individuals expressed concerns over the distinction between entertaining and educational uses of social media, feeling that others had invaded their privacy.

Finally, the last constraint frequently mentioned in the literature related to self-efficacy, meaning an individual’s confidence in their ability to achieve optimum performance with the use of technology (Alturki & Aldraiweesh, 2016; Solangi et al., 2018). Academics and students might not feel as confident about using ICT generally or as a learning tool/system (i.e. VLE), specifically (Alruwaili, 2014), as this negatively affects their willingness to integrate technology into their teaching and learning (Alturki & Aldraiweesh, 2016; Mutambik, 2018). When studying the use of e-learning at KSA universities, Solangi et al. (2018) linked student self-efficacy to educational compatibilities, such as students’ and academics' previous learning practices and knowledge in a comparable learning system, which promotes learning.

Overall, the barriers discussed in this section explain why academics and students have not fully integrated the use of technology into HE in the Saudi context. Lack of a positive attitude towards educational technology was the most frequently mentioned constraint in the literature and was referred to regarding e-learning technology, ICT, VLE, and social media. The second most frequently mentioned constraint was lack of motivation, which was mainly discussed alongside e-learning technology in general. Lack of knowledge and understanding about the use of technology for educational purposes, along with digital skills development was also discussed in the literature, mainly about e-learning technology and ICT generally. Finally, the constraints brought about by distraction and privacy issues were highly related to the use of social media and were focused on lecturers’ and students’ performance and engagement with various learning technologies.

University, Academic, and Student Technological Barriers

A lack of reliable infrastructure, Internet accessibility and cost investment were three significant constraints limiting the scale of the integration of technology into the KSA HE (Figure 3.9). For example, the lack of a reliable infrastructure was mentioned regarding sixteen scientific outputs in the case of e-learning technology adoption. The lack of ICT infrastructure (i.e., adequate network connections, software and hardware resources) was also considered a constraint for e-learning opportunities, despite being discussed differently (Alhuzali, 2015; Ja'ashan, 2020).

The requirement for high-speed broadband Internet connection and lack of Wi-Fi connectivity was also referred to by researchers when debating e-learning infrastructure (Al-Taweel, 2019; Alahmari & Amirault, 2017). Thus, while overarching constraints affect different scientific outputs, there appear to be overlapped when discussing them from the perspective of technology-enhanced learning. For example, Alshehri (2020a) interviewed academics from a Saudi university and found that poor internet connection, lack of equipment in the classroom and too few computer clusters were included under this broad constraint.

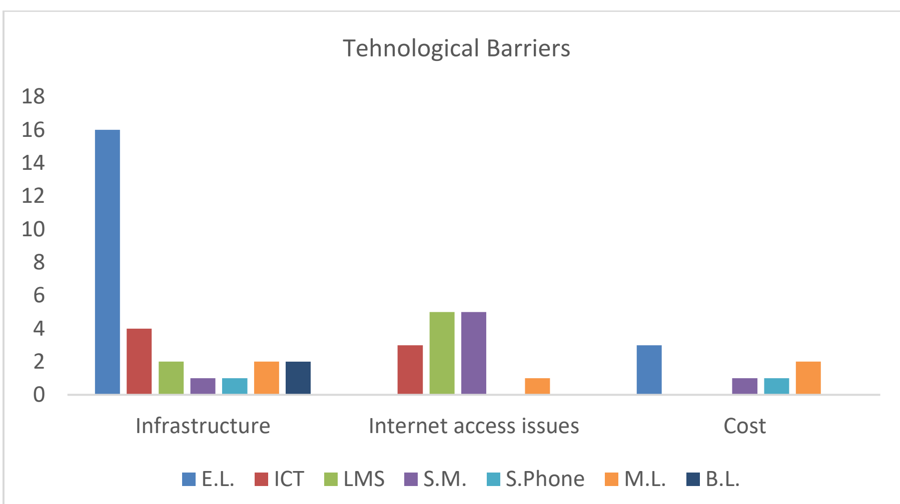

Figure 3.9 The Technological Barriers that Affected University Academics and Students, Classified Based on Different Technologies

Additionally, Internet accessibility has mainly been related to the use of social media and VLE in teaching and learning (Abdullah, 2018; Alqahtani, 2016b). Regarding social media, Aifan (2015) mentioned that Saudi students' attitudes towards social media for learning were influenced by disrupted Internet access.

Finally, there was significant investment required, which also presented a barrier to the ICT and e-learning implementation. Al-Taweel et al. (2019) observed that the main technological barrier to the use of e-learning technology is Internet infrastructure. Mobile learning cost demands also influenced its integration in KSA HE (Aljuaid et al., 2014), including smartphone costs for students (Alhassan, 2016). Alqurashi (2016) further stated that the experiences and attitudes of Saudi academics towards the integration of video games for learning purposes have been negatively influenced by the financial investment required. Aman and Shiratuddin (2020) have also mentioned that the cost of essential infrastructure to support hologram video courses at Arab Open University (AOU) proved to be extremely high.

The barriers discussed have been categorized as e-learning and ICT generally, and more specifically regarding VLE and social media. The lack of infrastructure was a constraint that applied in general and specific cases about the use of e-learning technology (sixteen scientific outputs). The cost implementation was chiefly discussed in studies considering social networking and VLE. Technologies aside from mobile learning, such as LMS, ICT, and BL were not examined here.

Conclusion

KSA has adopted a strategic approach to technology integration in educational settings, with goals set for every five years such that the seventh development phase (2000-2004) emphasized the role of science and technology, triggering long-term technological developments that support cultural, social, economic, and technical change (from 2001 to 2020). In addition, Saudi Vision 2030 supports further specific changes in education for universities, academics, and students to meet modern expectations and keep pace with innovative trends. All these efforts have currently brought KSA into the top 10 countries worldwide for its digital development capabilities with the Saudi government supporting projects that accelerate universities’ adoption of technology-enhanced learning opportunities. Examples of these projects are the National Centre for Electronic Learning and Distance Learning (NCeDL), the Saudi Digital Library (SDL), and the Saudi Electronic University (SEU).

The current literature review identified several barriers with the potential to limit or delay the use of technology in KSA HE. Lack of training, lack of technical support, and workload were the main constraints experienced by institutions/universities, delaying the use of technology within teaching and learning. Additionally, academics and students demonstrated a lack of motivation towards integrating technology, as well as a lack of knowledge and understanding regarding the use of technology for educational purposes, and concerns about distraction and privacy issues related to social media use. These examples highlight the challenges that may prevent academics and students from using technology for educational purposes. Finally, it emerged that universities, academics, and students encounter technological barriers due to a lack of infrastructure and limited Internet access.

These barriers need to be considered by KSA universities and actions taken to resolve them, to ensure academics and students effectively integrate technology into teaching and learning. Therefore, in this research program, the current HE situation will be explored to identify Saudi Arabian academics and students’ need to integrate personal devices and social media technology into the teaching and learning environment.

CHAPTER 4 – Students' Views Regarding the Use of Digital Devices and (Social Media) Applications in Lecture Theatres

Abstract

This chapter presents the first research project to investigate student behaviours, individual student characteristics, and the learning environment using Social Cognitive Theory (SCT). The study seeks to explore the views and behaviour of students when using personal digital devices and (social media) applications in a lecture theatre context. First-year students from three university schools (English, Architecture, and Computer Science) were asked to complete an online questionnaire and engage in focus groups. The main finding of the study is that although all the students bring their digital devices into the lecture theatre, not all their lecturers support their use. The findings also confirm that device-related behaviours differ significantly among the students in question, due to the differing structures of their respective curricula. Moreover, the students report a lack of Internet service available on the university campuses that prevents them from using their digital devices during lectures. While no significant difference is observed between the schools regarding student self-regulation, which is low among all the students, their multi-tasking ability is found to be high, although such behaviour can distract the students from learning, especially when they are engaged in non-learning activities during lectures. The influence of distraction and the degree of student participation in non-learning activities differ between the three schools, indicating the lecturers' degree of support for digital device use during lectures.

Introduction

A considerable percentage of the population of the Kingdom of Saudi Arabia (KSA) employs digital devices in their normal daily life (Dwivedi et al., 2021). Similarly, in the KSA higher education sector, both lecturers and students are increasingly dependent on digital devices and the Internet for (non-) learning purposes (Barri, 2020). The Bring Your Own Device (BYOD) strategy is particularly followed in higher education institutions, allowing academics and students to redesign and/or modify their teaching and learning approaches (Ruxwana & Msibi, 2018). Since this establishes a need for research exploring the various factors associated with the practice, the present research project examines how students in the KSA use digital devices, namely laptops, tablets, and smartphones, in a lecture theatre context, and how this can impact the learning process during class.

To investigate how learning is driven by student behaviour, their characteristics and the learning environment, their connection with self-regulation and socio-cognitive theory are explored. To illuminate the current situation and to eliminate the ambiguities regarding the use of personal devices and social networks in the lecture theatre context, several aspects are considered relevant determinants. As far as the researcher is aware, these aspects represent a matter that is little explored in the extant literature, especially in the context of higher education in the KSA. Therefore, to examine how students use their digital devices during lectures, the Social Cognitive Theory (SCT) framework has been employed, as it combines the interactions between the learning environment, and individuals' behaviours and characteristics (Bandura, 1986).

This chapter explores the views and behaviour of students from three different KSA university schools (English, Architecture, and Computer Science) at Umm Al-Qura University, regarding their use of personal digital devices and (social media) applications in the lecture theatre context. The study compares the following between the three schools: (1) the current landscape of the use of personal digital devices and (social media) applications in the lecture theatre; (2) students' characteristics, such as self-efficacy, test anxiety, and surface learning; (3) students' learning behaviour, namely their multitasking ability and the distraction caused by their use of digital devices and (social media) application in the lecture environment; and (4) students' engagement with (non-)learning activities, due to their use of digital devices and social media applications, during lecture time.

This chapter also discusses the study's objectives, the participant recruitment process, the structure of the questionnaire and focus groups employed, the factor analysis used to evaluate the model fit to the data, and finally the analysis of the quantitative and qualitative data gathered, followed by a discussion of the results that evaluates the findings in the context of the literature review. The discussion contributes to the understanding of the use of devices and (social media) applications for learning purposes in a lecture theatre. The implications of the findings help to address the obstacles that limit the use of such devices and applications, and to determine the needs of students when using their own digital devices in lecture theatres, to support their learning process.

Theoretical Background

This section discusses the conceptual framework of the study, which was based on SCT, and identifies the research variables. It also discusses the rationale for the use of SCT and its components in the context of this project's objectives.

Social Cognitive Theory (SCT)

Previous research identified the existence of two distinct types of learning models: behavioural and cognitive. Behavioural learning models are based on the premise that observable behaviour occurs as a response to specific external stimuli that signal that learning has occurred (Ratten & Ratten, 2007). Meanwhile, cognitive learning models involve some degree of problem-solving, before responding to external stimuli (Schiffman & Kanuk, 2000).

According to this understanding, cognitive learning models are the theoretical foundation for explaining behavioural intentions in the technology context. Therefore, several cognitive learning models were reviewed for use in the present study to conceptualize the student learning process, including control value theory (CVT), self-determination theory (SDT), and social cognitive theory (SCT), each of which is based on different assumptions. For example, CVT assumes that the environment affects learning, and is mediated by control and value appraisals. Thus, controllability and academic values are of critical importance for students' emotions (Pekrun, 2006). According to Pekrun et al. (2007), CVT is a cognitive emotion theory, which indicates that emotions are intimately and reciprocally related to their cognitive and motivational antecedents and effects. However, this theory cannot effectively address the role of intrinsic and extrinsic values in the learning process (Simonton & Garn, 2020). Meanwhile, 'perceived competence', 'belonging', and 'autonomy' are components of SDT (Fried & Konza, 2013), which describes motivation as a continuum, in which intrinsic and extrinsic motivations coexist, and holds that certain learner motivations can be both (Ryan & Deci, 2000). This theory acknowledges the different levels of motivation and asserts that the more our innate psychological needs of autonomy, relatedness, and competence are satisfied, the more intrinsically motivated we become. Nevertheless, Reiss (2012) argued that motivation is significantly more complex than SDT claims and that individual differences also play a role in what motivates learners; therefore, motivations are incomparable, and cannot be generalized. Due to the difficulty of measuring motivation and the reliance on self-reporting, it is also difficult to determine whether or not studies concerning intrinsic motivations are valid (Ryan & Deci, 2000).

Meanwhile, SCT was developed in the 1970s, when psychological research shifted from a behavioural to a cognitive focus (Schwarzer & Luszczynska, 2005). The 'Social Cognitive Theory of Human Functioning' was developed by Bandura in 1986, addressing how, in a triadic reciprocal causality model (behaviour, individual characteristics, and environment), people see themselves as actors and products of their environment (Bandura & Walters, 1977; Schwarzer & Luszczynska, 2005). Therefore, in these situations, students learn by observing others, and the three model components influence learning development (Bandura & Walters, 1977).

The three components of SCT, student behaviour, individual characteristics, and learning environment, assume that, based on the importance of observing others, learning might engender a behaviour, and that goal is established by learners who regulate their learning and who have expectations regarding the outcomes of behaviour (Bandura, 1977). As the aim of the present study was to explore students' behaviours when using personal devices in a lecture theatre context (learning environment) for learning purposes, SCT was more relevant than the other theories. Additionally, SCT was selected as the most appropriate model for this project, due to its widespread acceptance as a model of individual behaviour (Chan & Lu, 2002), and for examining why individuals engage in particular behaviours (Bandura, 1986). Additionally, the central premise of SCT is that individuals can influence their actions (Mccormick & Martinko, 2004), which was highly relevant to the aim of the present study.

However, Riley et al. (2016) criticized the SCT model, believing that it lacks precision in the theoretical description of the relationships between the SCT constructs, and arguing that while some learning interactions are evident, such as the fact that self-efficacy increases the likelihood of behaviour, others are unclear, such as the effect of self-regulation or self-management on behaviour, adding that SCT was designed to explain the differences between individuals, not necessarily the changes within individuals over time. Moreover, learning is not recognized as a purely personal action, because it occurs in a social learning environment that requires consideration of the social interactions and social roles involved (Jordan et al., 2008). Nevertheless, social learning is considered to be a powerful learning approach, and a wide spectrum of learning has been developed from observing how people perform tasks, and how they model their actions (Bandura, 1977).

Moreover, SCT was previously applied successfully to studies regarding the adoption of technological innovations (Compeau et al., 1999; Wang & Lin, 2007), and a recent study investigated how SCT can be used to explore the learning behaviour of students in the United Kingdom (UK) when they brought personal devices to their lectures (Limniou et al. (2020). Indeed, with the advent of the Internet, and the subsequent adoption and use of social media and web-based technologies, SCT began to be used in a new way, specifically to explore the use of the Internet in general, or the use of web-based applications or services modelled as learning processes (Carillo, 2010). Individuals' behaviour, characteristics, and environment are interconnected with the acquisition of such learning processes, and they influence one another mutually (Romppel et al., 2013). Moreover, Carillo (2010) described SCT in terms of the bidirectional nature of causation, in which behaviour, individual characteristics, and the environment all influence one another constantly and reciprocally. For example, an individual's self-efficacy regarding the use of a particular element of an application is influenced by their prior positive experiences and performance with the application. Self-efficacy is viewed as an effect in this case, whereas behaviour is viewed as a cause.

This implication suggests a vast and novel research avenue, in which behaviour acts as a predictor of either individual factors or an individual's environment. A determining factor of functional adaptation in this theory is self-efficacy, which is related to goals, expectations, and self-assessment responses to behaviour (Bandura & Walters, 1977). Social psychologists not only discuss how the environment contributes to behaviour but also how it formulates individual cognitive development (Bandura, 1977, 1999). Thus, SCT highlights the social, situational, and relational aspects of learning (Devi et al., 2017; Goldie, 2016) that can be applied to a technology-enabled environment, to explore the impact of behavioural change due to environmental and individual characteristics when students bring their personal devices into a lecture theatre (Limniou, 2021). When students bring their own devices to lectures, how they use them in this context, influences their attention and working memory through the multitasking process concerned, as well as their self-regulation. Therefore, SCT was adopted by the present study to develop a theoretical model that considered the use of personal devices and social networks to be a type of technology in the lecture theatre. Specifically, SCT addresses how knowledge is built through interactions between personal cognition, such as self-efficacy, and offline and/or online behaviour through the use of digital devices, such as interaction with online learning material (Limniou et al., 2020; Wang, 2010). Therefore, the present study's exploration of students' learning behaviours involved acknowledging several points: 1) a focus on the expectations of environmental cues, 2) a focus on the perceived consequences of performing a behaviour, 3) the normative influences covered by outcome expectancies that concern the perceived social consequences of behaviour, and 4) the inclusion of self-efficacy in the behaviour model (Schwarzer & Luszczynska, 2005).

When applying SCT principles to a lecture theatre learning environment, in which students use their digital devices, various factors can influence the learning processes. These include the students' characteristics, such as their different backgrounds, perceived course utility, self-efficacy, test anxiety (TA), surface strategy, and behavioural self-regulation/negative habits); behavioural variables, such as the use of different devices and applications, involvement in activities related to the lecture topic, and involvement in activities unrelated to the lecture topic; and environmental variables, such as the lecture theatre, multitasking, and distractions due to others and their actions, along with distractions from an individual's own devices and source variety (Figure 4.1). Each of these variables is discussed under the following subheadings.

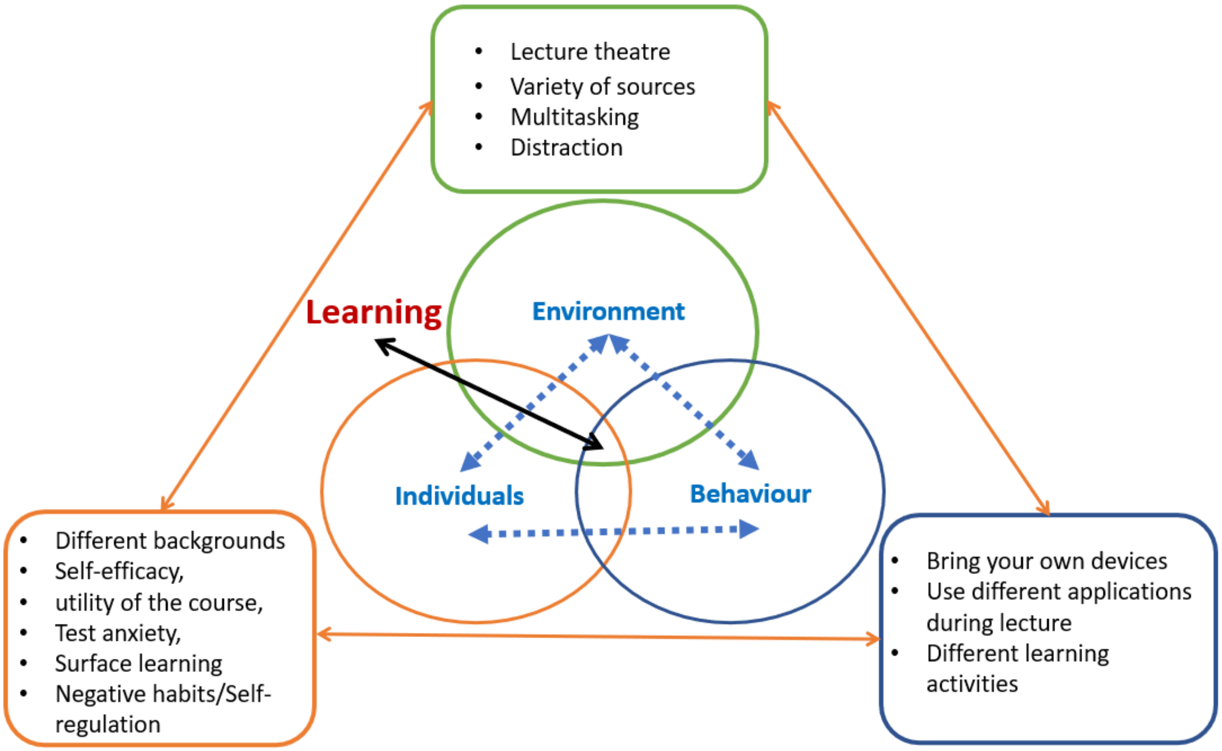

Figure 4.1 The Three Determinants of SCT, in the Context of Students Bringing Their Own Digital Devices to the Lecture Theatre (Adapted from Limniou (2021, p. 4).

Individual Characteristics

An important determinant of SCT is the individual characteristics that influence the development of learning (Bandura, 1977), including factors such as a person's abilities, skills, attitudes, and beliefs (Bandura, 1986). Previous studies (Pintrich & De Groot, 1990; Schunk & Ertmer, 2000; Seipp, 1991) found that student background, self-efficacy, behavioural self-regulation, TA, surface learning strategy, and perceived course utility often play a role in student learning. Each of these factors is discussed below about their role and the impact on learning when digital devices and social media are used by students in lectures, in the context of the KSA.

Different Backgrounds. In the KSA, to be admitted to a university, it is necessary to hold a secondary school diploma and to have completed two national tests: a capacity exam and an achievement test. The former is a nationally normed assessment administered to all students in their final two years of secondary school. It enables post-secondary education institutions to identify the most capable students who fulfil the criteria of their programs. Meanwhile, the accomplishment exam serves as a uniform norm for all secondary school graduates, assisting post-secondary education institutions to select the most successful students in secondary school courses. These two assessments are organized and facilitated at a national level by Qiyas (https://www.qiyas.sa), the Nationwide Centre for Measurement, which is overseen by the Education Assessment Authority, which is responsible for evaluating and measuring public and higher education in the KSA. The two assessments are identical for all students, although there are two distinct education paths, one of which is scientific, emphasizing mathematics and the sciences, while the other is theoretical, emphasizing language and social knowledge.

The most important entry requirement for the first year at university Architecture and Computer schools is obtaining 82% as an accumulated average, calculated as 40% of the total average of the secondary school certificate, plus 30% of the total score of the achievement test, in addition to 30% of the general capacity test score. University English schools require the same 82% as an average, calculated as 50% of the total average of secondary school, plus 50% of the capacity test scores, in addition to passing a specific written exam taken within the school itself (www.uqu.edu.sa).

The inclusion of the two standardized exams in university admission standards is related to new students’ prospective academic success once they are enrolled at an academic school. The capacity exam reflects a student's level of learning skills and intellectual capacities, demonstrating their ability to handle the complexity inherent in higher education academic programs. Meanwhile, the achievement test concerns the underlying knowledge acquired by students during their final two years of secondary school, serving as an indicator of the fundamental knowledge required for participation in a higher education academic program. As the present study targeted first-year students, it considered a student's background knowledge to consist of both their learning and intellectual skills, as well as the knowledge acquired during the final two years of secondary school.

Self-Efficacy. According to Bandura (1993), self-efficacy reflects the self-confidence that students show when facing new tasks, and is defined as the belief in one's ability to be successful in certain situations, or to complete a certain task. Self-efficacy can play a critical role in addressing goals, tasks, and challenges; for example, it is related to students' belief in their ability to solve tasks and perform well (Bandura & Walters, 1977). It is also associated with the amount of effort a person will make, and how long that effort will last (Bandura, 1986). For example, in the context of the use of (social media) applications, self-efficacy concerns a student's confidence to use them successfully for learning purposes (Balakrishnan, 2017; Cao et al., 2013; Park et al., 2012). In addition, Nardi and Ranieri (2019) found that there was a positive correlation between the perceived level of self-efficacy and digital test completion, demonstrating how feedback influences self-efficacy and learning. Meanwhile, other studies explored how the classroom use of social media for learning purposes can enhance students' self-efficacy through the observed peer learning processes (Anders, 2018; Argyris & Xu, 2016). Therefore, social media enables students to gain experiences developed from the indirect learning of peers, with self-efficacy associated with social awareness (Hill et al., 2009).

When exploring the association between SCT, self-efficacy, and physical activity, Keller et al. (1999) found a statistically significant correlation between self-efficacy and training behaviour, concluding that participating in a training program boosted self-efficacy, while programs that sought to increase result expectations and self-efficacy increased training behaviour significantly. Later, Sidman et al. (2009) assessed self-efficacy as a form of motivation, alongside course relevance, course interest, affect/emotion, and reinforcement. Their findings demonstrated the importance of the motivational elements of technology-enhanced learning, as self-efficacy was shown to influence the learning process in a classroom environment via trust, belief in student capabilities, and academic performance.

Perceived Utility of Course. The utility of a course refers to students' perception of the effectiveness of the technology tools and course materials involved (Edmunds et al., 2012), and their usefulness for their future careers. Previous research suggested that undergraduate students sometimes question the usefulness of course content (Akcaoglu & Bowman, 2016), and Vasilyeva et al. (2017) indicated that contextual course utility can affect the perceived quality of different types of explanations, but probably not the product of low-level attention mechanisms or intuitions about the experimenters' expectations. Nevertheless, previous well-designed evaluation studies indicated the presence of an association between student success in courses and positive results, such as higher persistence rates, retention, and credit earning (Karp, 2013). Existing research also suggested the usefulness of engaging students in practical applied research activities, although there is currently a lack of empirical data concerning the scope and nature of these activities (Rubenking & Dodd, 2018).

It can be argued that educational institutions must develop new strategies and approaches to help students define their career goals and the academic paths necessary for attaining them. New technology, new professional structures, and a commitment to working with students who need the most aid over the long term will be required, as well as a revitalized focus on advising and counselling (Karp, 2013). After assessing an elective course containing career development learning and work-integrated learning components, Reddan (2015) found that there were substantial variations in university students' level of confidence in self-appraisal, occupational information, goal selection, planning, and problem-solving, concluding that the participants learned more about their employability and job expertise after taking the course.

Meanwhile, Karp (2013) explored the academic and career planning activities of community colleges that are the most important for students entering undergraduate programs. She proposed reorganizing academic and career planning around four main principles, suggesting that structure and exploration should co-exist in a course design, career counselling should be at the centre of an integrated approach to advising, colleges should serve students according to their level of need, and colleges should make wise use of their resources to provide students with developmental guidance. When students are exposed to career advice classes, they are more likely to plan and make career decisions, and to better comprehend the nature of the labour market and the different types of jobs available (Dwivedi et al., 2021). According to Karp (2013), student support involves obtaining the interest inventory for the students to be advised to identify the academic areas aligned with their career goals. The college advisors should then use the results to discuss the pros and cons of different programs or program streams, enabling the student to decide which field of study to follow.

To attract a student to a program of study, it should offer courses in a topic area they are passionate about or specify if it is more hands-on. In addition, it should specify whether the program leads to positions with specific desired attributes, or has better cachet in the labour market and easier transferability (Karp, 2013). According to Jackson and Bridgstock (2021), who explored how graduates felt about the value of various embedded, extra-curricular, and co-curricular learning activities in terms of employability, training organized as an extra-curricular activity ranked higher than internships presented as work-integrated learning. These activities were thought to be more beneficial in terms of obtaining experience and skills than they were in terms of expanding networks and enhancing career outcomes.

Meanwhile, Park et al. (2012) created and validated a Future Time Perspective (FTP)-based career scale that was based on opportunity, value, and connectivity dimensions that defined the belief regarding the chances of success in one's future career, an assessment of one's future career prospects, and the link between one's current activities and one's future job. Subsequently, Park et al. (2020) administered an FTP-based career intervention to undergraduate students to clarify the relationship between FTP and career decisions, concluding that if students struggle with determining their career opportunities, improving their FTP can help, and confirming that FTP promotes career decision-making self-efficacy (Jung & Lee, 2018; Park et al., 2020). Indeed, individuals with an FTP are more motivated to advance their careers and believe in their abilities to manage the specific tasks necessary for professional preparation, entry, adjustment, or change across various occupational paths (Arkorful & Abaidoo, 2015).

Regarding the use of technology for academic courses, Subhash and Bapurao (2015) explored how a curriculum can be enhanced by allowing students to use their own digital devices to develop their employability skills. The best way to understand students' information and communications technology (ICT) orientation is to assess how it is used in the workplace.

Students may already have some exposure to certain areas of employment, and be more open to learning about new technologies that are related directly to their future career intentions (Edmunds et al., 2012).

Test Anxiety (TA). Cognitive TA concerns negative thoughts and behaviours at all stages of the learning cycle (Jensen, 2020). Anxiety concerns an individual's emotional or physical response to stress, causing them to experience fear. There are two types of anxiety: 1. state anxiety, namely a person's reaction to an event; and 2. trait anxiety, which is related to personality, and causes students a lack of motivation to learn in a lecture theatre context (Baig et al., 2018; Cook-Vienot & Taylor, 2012). The state of anxiety is described as an uncomfortable feeling, or an emotional state demonstrated by a learner's ability to perform tests or other cognitive measures, even with the notion of assessment (Cook-Vienot & Taylor, 2012; Pintrich, 1991; Zhang & Henderson, 2019). The impact of TA on student performance and individuals' emotional state is not only related to student failure to achieve their goals, but also causes a significant delay in the learning process (Baig et al., 2018). The impact of TA and its effect on students' psychological, emotional, and physical state means that students are often focused on assessments of any type, and the pressure to achieve a high score (Lepp et al., 2014). Moreover, Mavridis and Tsiatsos (2017) explored the role of student TA in depression, reduced performance during exam time, as well as repeated failures and a high level of fatigue. In addition, (Chin, 2017; Donati et al., 2020) reported that TA affects the learning process and student performance negatively, causing students to exhibit low self-esteem, self-confidence, and emotional instability in a competitive learning environment.

Meanwhile, in a qualitative study of self-directed learning for adult learners in online settings, Song and Bonk (2016) found that students who were familiar with online technologies reported less learning-related TA, and were more actively involved in discussion forums than those who were not. In addition, Stowell and Bennett (2010) and Woldeab and Brothen (2019) found that the overall TA of the psychology students in their study was reduced when they took online tests. Further evidence regarding computer-based examinations supported the argument that taking online tests reduces students' anxiety, as well as allowing them to access tests, grades, and feedback anywhere and anytime, and to work independently, or as a group (Baig et al., 2018). Moreover, a recent study found that the use of digital learning games was negatively associated with student anxiety, providing further evidence that technology-enhanced learning may reduce student TA (Zhang & Henderson, 2019). In addition, according to Duncan et al. (2015), training in practical learning strategies and test-taking skills can reduce student anxiety. Therefore, TA is a crucial factor influencing the learning process, as it can impact a student's stress level during an assessment process. Students' use of their own digital devices and (social media) applications in lectures might reduce their anxiety, as it means they can produce their notes and revise them in their own time, and/or participate in learning activities that help them to understand the topic with which the assessment is concerned.

Surface Learning. In contrast to the in-depth approach (deep learning), which is a knowledge-based approach, the surface learning approach is information-oriented (Johnson & Altowairiki, 2021). For example, in this approach, curiosity, interest, and goal orientation are significant, because they influence the cognitive learning process directly; therefore, the use of high-quality e-learning for more complicated processes should be developed around student-centred, engaging, and challenging activities that help students relate new content to their existing knowledge and experience (Mystakidis, 2021). According to Asikainen and Gijbels (2017), learning styles can be classified under three broad categories. First, certain students learn primarily through rote, memorization, and replication of the content; this is referred to as surface learning. When using a surface learning strategy, students memorize content selectively, according to extrinsic motivations or intentions unrelated to the task's true goal, such as a fear of failure, or the desire to avoid getting into trouble (Vanthournout et al., 2013). In contrast, students who employ a deep learning method grasp the significance of the content they are studying and connect it with their prior knowledge and personal experience. This strategy is related to the goal to comprehend and engage effectively in meaningful learning, by focusing on key themes and ideas and employing appropriate tactics to accomplish this goal. The third category of learning, dubbed 'strategic learning', favours either surface or deep learning, depending on which method students believe will produce the best outcome, such as the highest score, in any given situation. The strategic learning approach is theoretically distinct from both the deep and surface approaches, as these two styles describe modes of learning, while the strategic approach describes an intentional effort to choose a certain mode of learning to attain a specific objective (Asikainen & Gijbels, 2017; Jabarullah & Hussain, 2019).

The main goal of students who follow a surface learning approach is to extract the information necessary to pass a test and gain a high grade (Johnson et al., 2017). Indeed, Roberts and Iyer (2020) described surface learning as the reproduction of knowledge by students without engaging in significant critical thinking. It places a high premium on fact memory and the repetition of simple activities. Surface learners may not comprehend the subject completely, and simultaneously demonstrate a faculty for memorizing facts and information, rather than for assessment, a skill learned through active participation in the learning process (Pritchard & Woollard, 2013). Active student participation in the learning process through group discussion in online forums can influence the level of learning attained (Johnson & Altowairiki, 2021). Moreover, Alt and Boniel-Nissim (2018) highlighted the role of the classroom lecturer who guides students to develop deep learning strategies through the use of technology. Learning approaches, such as problem-based learning, and the use of the ‘flipped’ classroom can encourage students to discover and apply knowledge to real contexts, preventing them from merely memorizing facts (Dolmans et al., 2016). In addition, the use of teamwork in a blended learning environment allows students to follow a deep learning approach through dialogue and collaboration, enhancing students’ confidence and ability (Donnelly, 2017), while simply instructing students on how deep learning is linked to assessment does not improve their attitude towards learning (Johnson & Altowairiki, 2021). Furthermore, students who tend to employ surface learning are less likely to engage in the gamified activities on a course, including optional learning activities, than those who use other learning approaches. According to Tsay et al. (2018), this is because game mechanics provide positive, intrinsically motivating experiences that are tapped into more by deep learners than surface learners.

The use of technology for learning purposes does not engender deep learning if it simply provides the relevant information to students, without encouraging them to participate actively in learning (Donnelly, 2017; Johnson & Altowairiki, 2021). Consequently, Mizokami (2018) argued that lecturers should establish learning scenarios and environments that encourage students to approach learning deeply, regardless of their learning style. If lecturers provide a standard lecture in which all students are expected to adopt a surface learning method, even those who typically embrace the deep learning approach must use the surface approach. In contrast, if lecturers combine a training strategy (active learning) with a deep approach, even students who typically use the surface technique will be forced to use the deep approach (Mizokami, 2018).

Negative Habits/Behavioural Self-regulation. The process of organizing thoughts, feelings, and actions to achieve one's goals is known as ‘self-regulation’ (Usher & Schunk, 2018), and is critical for learning using technology (Müller & Seufert, 2018). Previous research concerning self-regulation focused primarily on how people control their thoughts, emotions, and behaviour. Little attention was previously given to how people manage their motivating states to achieve worthwhile goals (Scholer et al., 2018). To complete a picture of the development of self-regulation, and its impact on educational success, the various educational facets of emotion and behaviour regulation should be examined together (Edossa et al., 2018). Learning with prompts activates the self-regulation processes, which often produces an increased learning performance since the experiences of self-regulation and learning success are sources of self-efficacy (Müller & Seufert, 2018). The learning process is usually facilitated by study habits, such as subject review, self-assessment, time management, and the use of a learning plan (Ahmad, 2018; Cerna & Pavliushchenko, 2015; Credé & Kuncel, 2008). According to Scholer et al. (2018), previous research focused on people's beliefs about motivation, as well as the impact of beliefs on the selection of regulatory strategies, and Poscia et al. (2015) reported the perceived negative effects of Internet use, including excessive use that can engender inactivity (sedentary behaviour). Sedentary behaviour concerns certain activities, such as sitting or lying down, that require very little energy (Carballo-Fazanes et al., 2020). Moreover, several challenges are involved when students use technology for learning purposes, including disruption, addiction, lack of skills, and reduced personal communication (Anshari et al., 2017). Indeed, non-productive activities can engender bad habits, as students might miss lecture points, due to their participation in non-academic activities on their smartphones in class, and/or spend less time on learning activities.

Student self-regulation can influence the level of responsibility for learning adopted by students; according to SCT (Bandura, 1986), this includes three phases: self-observation, namely the observation by students of aspects of their performance; self-assessment, namely the comparison by students of their performance with that of others; and self-regulation, which concerns self-efficacy and the perceived ability to learn. Self-regulation refers to how students activate and maintain their perceptions, motivations, and behaviours to achieve their goals (Hadwin et al., 2018), monitoring and organizing learning through various cognitive, metacognitive, and behavioural strategies, including exercise control, resource management, information organization and processing, and self-examination (Zimmerman et al., 2017).

In their study, Domínguez and Marcelo (2017) found that university students rarely use technology to organize their learning, in part due to their limited understanding of the potential of technology to enhance learning. Thus, although students know how to use technology, they may not know how to employ it to support their learning process (Steiner, 2016). However, the use of social media can facilitate personal learning environments (PLE) by setting personal goals and tasks and engaging in the self-monitoring and self-assessment of the learning process through online communication that enhances self-regulation strategies (Dabbagh & Kitsantas, 2013). Therefore, lecturers should support students' self-regulated learning skills, allowing them to engage in online and in-class activities that encourage active learning (Al Mulhim, 2021; Kustandi et al., 2020).

Learning Environment

The nature of the learning environment can influence students' behaviour and attitudes. Indeed, it is a vital determinant in SCT, as it affects a person's ability to perform successfully by, for example, ensuring that environmental conditions promote the improvement of self-sufficiency by providing appropriate support and resources (Bandura & Walters, 1977). The introduction of new technologies to enhance the educational learning experience is constantly evolving, especially when students bring their mobile devices to class, and use various applications that allow them to study anywhere and at any time (Ho and Chua (2015). Indeed, (Song, 2014) found that this enabled students to develop a positive attitude toward scientific inquiry by using their devices to source additional information to that in their textbooks. As discussed in the previous chapter, the BYOD model can support both personalized learning experiences and collaboration among students (Ho & Chua, 2015). It also supports file storage and the information retrieval process, allowing students to study cognitive topics whilst concurrently developing skills, such as researching information and critical evaluation, although a poor information technology (IT) classroom infrastructure can inhibit this. While educators acknowledge the positive effects of BYOD initiatives on student learning, they also have concerns regarding the possible negative effects on student behaviour and well-being. These views are related to individual student characteristics and background gender, familiarity with new technologies, prior knowledge of BYOD initiatives, and the level of education being taught (Livas et al., 2019).

The Lecture Theatre. At university, the teaching processes and learning interactions between students and academics, and the learning resources involved occur in the lecture theatre learning environment (Weiser et al., 2018). Students participate in learning activities, and their lecturers employ different teaching approaches to develop their learning behaviour. Previous studies found that students report a positive effect on motivation and engagement when they attend lectures on a university campus (Hall & Ivaldi, 2017; Tarr et al., 2015). As discussed in the previous chapter, technology integration in a traditional learning environment, namely one that is face-to-face, concerns the use of ICT to enhance the student learning experience (Harrell & Bynum, 2018), and can involve some or little use of technology, combined with virtual learning (Brannan, 2015).

As Figure 4.2 shows, in the technology-integrated learning process lecturers play a significant role in facilitating the student learning process, while time and space factors affect the level of technology-enhanced learning involved in face-to-face, partially, or fully online interactions between students and lecturers, and among students and resources.

	Blended Learning Continuum for Technology Enhanced Online Learning		
Model	Face-to-face/traditional model (traditional way of teaching)	Hybrid/Combination	Online/virtual model
Responsibility for Learning	Lecturer controls learning ‘Sage on the Stage	Shared control	Student control of learning ‘Guide on the Side’
Time and Space	Constraints of time and space	Flexible time/space requirements	Flexible time/no space requirements

Figure 4.2 Integration Levels of the Blended Learning Environment in the Lecture Theatre (adapted from (Brannan, 2015, p. 517).

Variety of Resources. In the traditional learning environment, learning resources take the format of printed hand-outs, textbooks, and PowerPoint presentations (Truong, 2016), while a technology-enabled learning environment can include a variety of resources, from e-books and blogs to online magazines and tweets. These new types of resources provide endless possibilities for academics to deliver learning material to students using social media and other Internet applications. The use of a variety of learning resources, including different presentation methods, such as text, video, and audio, enhances students’ understanding and can be adapted to suit their learning approach, whether deep or surface; their goals; and their preferences (Chamorro-Premuzic et al., 2007). This provides students with the flexibility to study a subject’s cognitive material through active involvement in creating, extracting and using online learning resources, improving their learning partnerships with their peers through online collaboration and encouraging knowledge sharing (Anshari et al., 2016; Anshari et al., 2017). For example, Goldie (2016) found that a variety of digital resources can encourage students’ active involvement in the teaching and learning process when they share resources via social media, such as blogs, videos, and wikis, to connect with their peers, creating online communities. Moreover, Anshari et al. (2016) argued that learning resources circulated via social media are a great source of ubiquitous knowledge suitable for both teaching and learning purposes. Therefore, by bringing their own digital devices into a lecture theatre, students can gain access to a variety of resources, including websites and social media, that support their engagement with the learning process.

Multitasking and Distraction. Although multitasking is widespread in the modern work environment, its effectiveness and functionality have not yet been studied; the extant literature concerning multitasking focused on the pros and cons of combining different tasks into one task, or the types of tasks that must be combined. Multitasking describes the process of switching between different activities that divide an individual's attention (Umam et al., 2019), and can be defined as the divided attention and non-sequential switching of tasks for ill-defined tasks such as those carried out in learning situations (Delello et al., 2016; Hikmat & Mulyono, 2018; Umam et al., 2019). An 'ill-defined task' in this context is anything not related to learning, such as texting a friend while studying for a test. Meanwhile, Hikmat and Mulyono (2018, p. 4) described multitasking simply as "doing more than one activity simultaneously". The decisions regarding which tasks to combine in multitasking are highly correlated across generations, as are the difficulty ratings of certain multitasking combinations (Carrier et al., 2015).

Multitasking involves two types of learning behaviour: productive (learning-related) and non-productive (non-learning-related) (Hikmat & Mulyono, 2018). Productive behaviour in learning is the use of applications and course-related websites related to the course materials (Burak, 2012). Multitasking with a smartphone involves both the focus and the quick task of moving to learn and using a mobile phone outside of work (Chen & Yan, 2016). The rapid development of modern technology, specifically mobile devices, has engendered a new and more complex phase of multitasking (Grinols and Rajesh (2014), as using them for communication involves participating in two or more conversations using the same means, including via face-to-face conversations, phone calls, video conferences, short messaging device (SMS) and messaging, conversations, and email (Ma et al., 2020). Moreover, Wu (2017) found that university students who believe they are capable of multitasking are more likely than others to participate in simultaneous activities, although they tend to overestimate their ability to perform tasks simultaneously. Therefore, Ma et al. (2020) highlighted the importance of evaluating the self-reported outcomes of multitasking distractions in the classroom critically, noting that in circumstances where smartphones are utilized for educational purposes, policies or procedures limiting the multitasking distraction caused by their non-instructional use in the classroom should be explored.

According to Laxman and Holt (2017), most students recognize that part of their learning distraction is caused by digital devices, or can be created by behaviour that encourages them to keep the device close in other contexts. Indeed, Chen and Yan (2016) argued that the multitasking behaviour of students using smartphones in the classroom is a major source of distraction from learning. Such distractions may result from students or their peers using their devices in classes for either learning or non-learning activities (Flanigan & Babchuk, 2020). Meanwhile, Poscia et al. (2015) examined the sources of distraction-related to mobile phones used when studying and reported that students were irritated by the urge to check their phones, forward calls, messages, or emails, and were frustrated or stressed when faced with network access problems or phone malfunctions. In addition, when studying their respondents typically visited websites on their internet-enabled mobile phones for both education and non-academic purposes, with a large percentage using social media for non-academic purposes. Moreover, Sana et al. (2013) found that multitasking using a device such as a laptop can cause significant disruption for users and other students, and can impair comprehension of the lecture content. They also reported that the effect of an individual distracting their peers was around twice as significant as the self-distraction effect, as students who employed multitasking were often drawn to other students' laptop screens at inconvenient moments during class. According to Mendoza et al. (2018), laptops are a source of distraction in the classroom when used for both academic and non-academic purposes, and Peter and Bijik (2018) argued that the use of technological devices by higher education students distracted their attention, as did the use of mobile devices. The impact of this on student learning is reflected in the level of distraction caused by the use of such devices and (social media) applications for both learning and non-learning activities when studying (Mahsud et al., 2020).

Learning Behaviour

Learning behaviour is an individual's response to completing a learning task; a proper performance enables a student to experience successful learning (Bandura & Walters, 1977). According to Anshari et al. (2016), students in the KSA frequently use their smartphones to access classroom materials or find information, interact with their lecturers, and manage their group work online. When students are exposed to different learning environments, their learning activities change as they adapt. In their study, Henderson et al. (2017) examined students' learning behaviour (activities) when using digital technology in a university learning environment. These activities included scheduling and meeting course requirements; engaging in 'remote' university courses and/or mobile base; time management, and timesaving. Most of the learning-related activities involved reviewing, playing back and revising digitally recorded learning material (lecture notes), researching information, treating information 'visually', and seeking supplemental material to confirm or clarify what was learned (Sana et al., 2013). Meanwhile, other studies conducted in the KSA revealed that the integration of digital devices in the classroom environment was highly associated with the ability of lecturers to promote a classroom that prevented students from being distracted by non-learning activities (Anshari et al., 2017; De Arriba & Vidagañ, 2020). When students use their own digital devices in a lecture theatre, their behaviours and attitude toward learning are influenced by the type of digital devices concerned, the applications used for learning purposes, and how these influence their learning; multitasking and distractions might impact students' focus on and engagement with the lesson.

Methods

This study employed an SCT-based online questionnaire to analyse the dynamic interactions between the individual characteristics, learning environment, and behaviour of first-year students at the schools of English, Architecture, and Computer Science at Umm Al-Qura University, KSA. In addition, qualitative data were collected via focus groups.

Questionnaire

In addition to demographic questions, such as type of school attended and gender, the questionnaire included 52 Likert Scale items, incorporating ten factors that explored the use of devices and (social media) applications for learning in the lecture theatre context (Appendix 4. C). The four aspects investigated were personal devices and (social media) application usage, individual factors, student learning behaviour, and the learning environment. The questionnaire was designed to take approximately 10 minutes to complete. It included multiple-answer items, 7-point Likert scale statements (1 = strongly disagree/not at all and 7 = strongly agree/very great extent), and one open-ended question. Specifically, it included items about device usage; learning activities in the lecture theatre; distractions; multitasking using digital devices; student learning characteristics, such as self-efficacy, surface strategy, and behavioural self-regulation; and an open-ended question about the effective use of digital devices for learning in a lecture theatre context (Appendix 4.D).

The part of the questionnaire that addressed individual characteristics was based on the Motivation for Strategies and Learning Questionnaire (MSLQ), as it measures both attitude and behaviour (Pintrich, 1991). The updated version, titled 'The Digital Strategies and Motivated Learning (DSML) released by CHo and Summers (2012) incorporated the changes in current blended learning environments, and a shorter version was developed by Hands and Limniou (2018), both of which were adapted for use in the questionnaire.

The study recruitment process commenced once the research tools had undergone a validation process, and been translated into Arabic, (details of the research methodology are provided in Chapter 2). During weeks three to seven of the second university semester (February 2019-2020 academic year), the student participants were invited to complete the online questionnaire, titled 'Bring Your Own Device and Student Behaviour in Lectures (BYOD-SBL)'. To adhere to ethical guidelines, the students were not contacted directly during the recruitment process, rather the questionnaire was distributed via each school and participation was voluntary and anonymous. Information about the study was provided in a participant information sheet, and the students were required to provide their consent before completing the questionnaire, after which a debrief was provided and they were invited to take part in a focus group to discuss their learning experience and behaviour when using personal digital devices and (social media) applications in a lecture theatre in more depth.

Participants

In total, 344 of 440 first-year students from the three schools completed the online questionnaire (Computer Science=121, Architecture=113, English=110), of which 176 were male and 168 female. According to the university's admission regulations, for a student to join the university, they should not be more than 23 years old, therefore the participants' ages ranged from 18-23 years.

Meanwhile, 63 of these students, split into 13 groups, shared their views in the focus groups, using their native language. Since the university campus separated men and women, there were seven groups of men (32 students), and six groups of women (31 students). The participants were further subdivided into departmental groups as follows:

- English: two groups of male students (4 + 6 = 10 participants), two groups of female students (4 + 6 = 10 participants), (total = 20));
- Computer Science: two groups of male students (3 + 5 = 8 participants), two groups of female students (4 + 7 = 11 participants), (total = 19);
- Architecture: three groups of male students (4 + 6 + 4 = 14 participants), two groups of female students (5 + 5 = 10 participants), (total = 24).

Statistical Methods

The underlying model structure employed for this project was empirically derived from SCT. The Confirmatory Factor Analysis (CFA), with maximum likelihood estimation, was employed to verify that the measurement model fit the data collected. In addition, Cronbach's Alpha test for internal consistency was employed.

Confirmatory Factor Analysis (CFA). IBM SPSS Amos Application v. 25 was used for the evaluation processes. The model components, including the latent and measured variables, were predetermined according to the theoretical model, which included three components: Individual Characteristics, Environment, and Behaviour. Consequently, based on the standard-fit statistics presented in Chapter 2, the fit of each component model was evaluated as follows:

Individual Characteristics Component. The original model consisted of 21 items measuring four latent variables: Self-Efficacy (4 observed variables), Test Anxiety (4 observed variables), Negative Habits/self-regulation (7 observed variables), Surface Learning (3 observed variables), and Utility of the Course (3 observed variables). The paths between the latent variables were hypothesized according to the theoretical model. The modification indices suggested eliminating two items (Negt3 and Negt6) from the Negative Habits/self-regulation latent factor. This reduced the factor items from seven to five. Furthermore, the modification indices suggested the specification of two covariances between item error terms. Thus, the model fit was improved by adding a covariance between the error terms (circle value) of the Self-Efficacy factors (e1- e3), and the Surface Learning factors (e17-e16) (Appendix 4. E). The model was then deemed to fit the data (Figure 4.3).

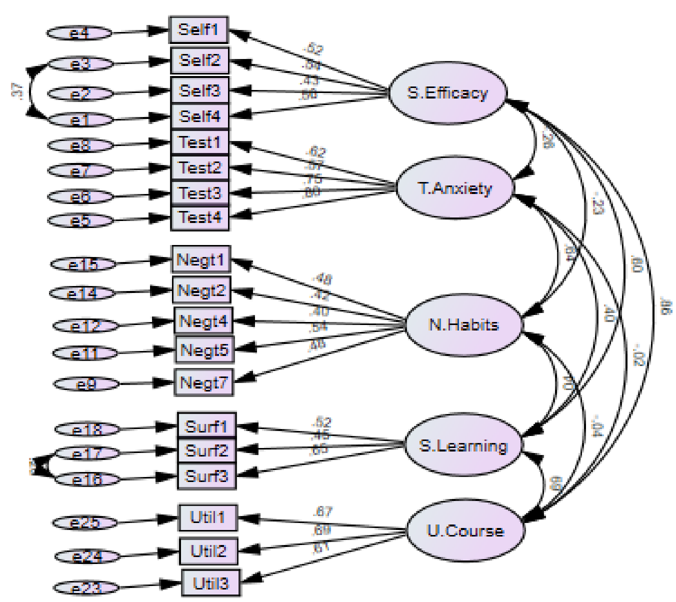

Figure 4.3. Factor Model of the Individual Component with Standardised Factor Loadings on Unidirectional Arrows. (Factors: Self-Efficacy, Test Anxiety, Negative Habits, Surface Learning, and Utility of the Course)

Table 4.1 shows the conventional adjustment statistics before and after modification. The model fit statistics were at a good level of customization. Thus, the adequacy of the model was validated, due to the CFA and the corresponding theoretical model.

Table 4.1
Model Fit Statistics Indicators' Evaluation Before and After Modification (Individual Characteristics)

Indicators	Before Modification	After Modification	Evaluation
Chi-square	533.026	251.6	X2 is reduced so it is a good fit
CMIN/DF	2.099	1.797	CMIN = excellent (Between 1 and 3 = Excellent)
TLI	.849	.903	TLI = acceptable (>0.95 excellent/<0.95 acceptable)
CFI	.872	.921	CFI = acceptable (>0.95 excellent/<0.95 acceptable)
SRMR	.145	.056	SRMR = excellent (>0.08 acceptable/ <0.08 Excellent)
RMSEA	.056	.048	RMSEA= excellent (between 0.05 and 0.08 acceptable)

Learning Environment Component. The original model consisted of nine items that measured three latent variables: Variety of Sources (3 observed variables), Multitasking (3 observed variables), and Distraction (3 observed variables). The paths between the latent variables were hypothesized according to the theoretical model. The modification indices suggested the specification of three covariances between item error terms. Thus, the model fit was improved by adding covariance between the error terms (circle value) of Distraction (e5-e7), and Variety of Sources between (e12-e13) and (e14-e12) (Appendix 4. F). The model was then deemed to fit the data (Figure 4.4).

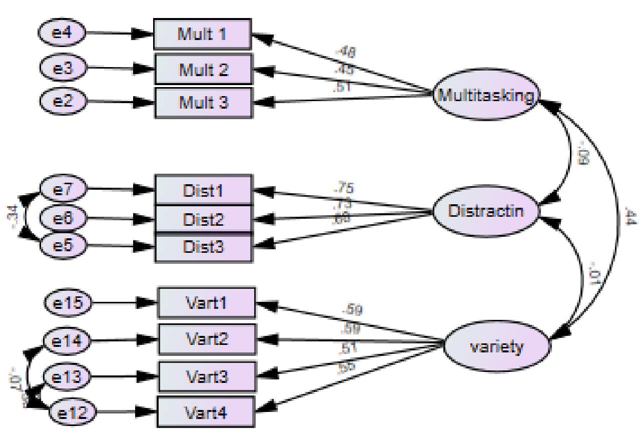

Figure 4.4 Factor Model of the Behaviour Component with Standardized Factor Loadings on Unidirectional Arrows (Factors, Multitasking, Distraction, and Variety of Sources)

Table 4.2 shows that the model fit statistics were at a good level of fit. Therefore, the model was accepted, due to the CFA and the corresponding theoretical approach.

Table 4.2
Model Fit Statistics and Indicator Evaluation Before and After Modification (Learning Environment)

Indicators	Before Modification	After Modification	Evaluation
Chi-square	46.629	81.3	X2 is a small number so it is good
CMIN/DF	1.943	2.259	CMIN = excellent (between 1 and 3)
TLI	.803	.914	TLI = acceptable (>0.95 excellent/<0.95 acceptable)
CFI	.830	.922	CFI = acceptable (>0.95 excellent/<0.95 acceptable)
SRMR	.066	.065	SRMR = excellent (<0.08 excellent/ >0.08 acceptable)
RMSEA	.060	.052	RMSEA = excellent (between 0.05 and 0.08)

Learning Behaviour Component. The original model consisted of 17 items that measured two latent variables: Non-Learning (3 observed variables) and Learning (14 observed variables). The paths between the latent variables were hypothesized according to the theoretical model. The modification indices suggested the specification of eight covariances between item error terms (circled values). Thus, the model fit was improved by adding eight covariances between the error terms of the Learning Factor (e16 - e15, e15-e10, e14-e13, e9-e12, e11-e8, e10-e9, e9-e7 and e7-e4) (Appendix 4. G). Consequently, the model's fit according to the CFA and its associated theoretical approach was established (Figure 4.5).

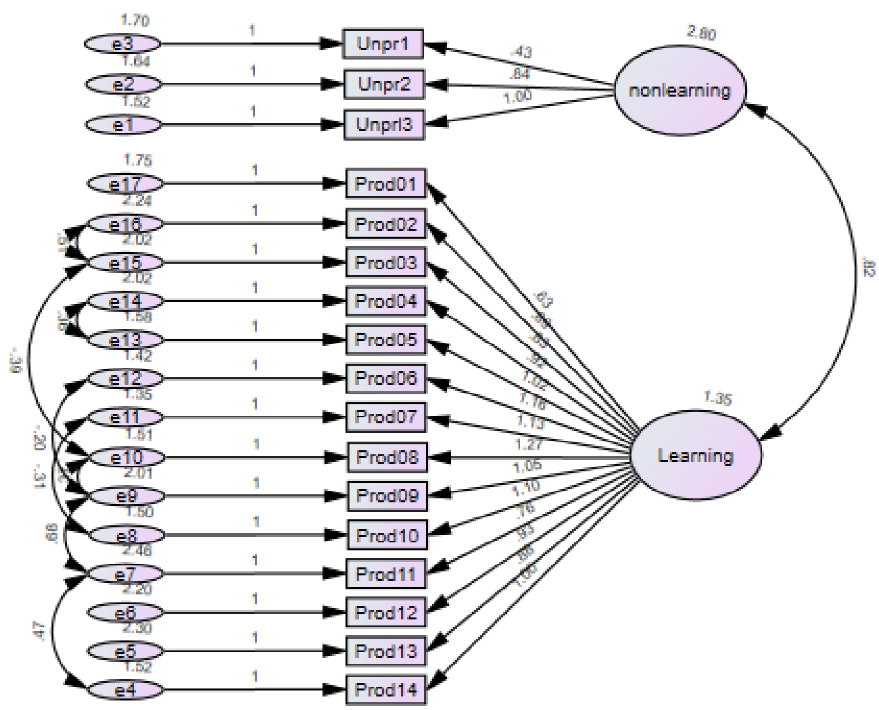

Figure 4.5 Factor Model of the Learning Activities Component with Standardized Factor Loadings on Unidirectional Arrows (Factors: Non-Learning Activities and Learning Activities)

Table 4.3 shows the conventional fit statistics before and after modification, proving that the model fits the data. The CFA application produced confidence in the three components of the theoretical model, confirming the adequacy of the model for the data. Nevertheless, another affirmative test was used for further evaluation, namely the Cronbach's Alpha test.

Table 4.3
Model Fit Statistics and Indicators' Evaluation Before and After Modification (Learning Activities)

Indicators	Before Modification	After Modification	Evaluation
Chi-square	344.419	202.6	X2 is reduced so it is a good fit
CMIN/DF	2.919	1.842	CMIN = excellent (between 1 and 3)
TLI	.887	.950	TLI = excellent (>0.95 excellent/<0.95 acceptable)
CFI	.960	.960	CFI = excellent (>0.95 excellent/<0.95 acceptable)
SRMR	.144	.043	SRMR =excellent (>0.08 acceptable/<0.08 Excellent)
RMSEA	.074	.049	RMSEA = excellent (between 0.05 and 0.08)

Cronbach's Alpha Test

The internal consistency of each of the factors was examined using Cronbach's Alpha. The alpha for all factors was greater than 0.60, and was as follows: 0.64 for Self-Efficacy (4 items), 0.75 for Test Anxiety (4 items), 0.66 for Surface Learning (4 items), 0.61 for Negative Habits/Self-Regulation (5 items), 0.69 for the Utility of the Course (3 items), 0.61 for Multitasking (3 items), 0.71 for Distraction (3 items), 0.75 for Variety of Sources (3 items), 0.89 for Learning Activities (14 items), and 0.71 for Non-Learning Activities (3 items). These analyses showed that the 10 factors' scales, as they were classified into three components, were consistent with the study's data and therefore acceptable for use in this study.

Evaluation of Statistical Tests

The model's three components were assessed using CFA and Cronbach's Alpha. Given the modification index for each CFA model, the analysis implied a modification of the Individual Characteristics component by discarding two observed variables to improve the model's adaptation to the data. The Distraction Component was improved by adding one covariance between the error terms of two latent variables. The Variety of Sources component was improved by adding two covariances between the error terms of three latent variables.

Additionally, the Learning component was improved by adding eight covariances between the error terms of its latent variables. Finally, the internal consistency of each of the ten factors was deemed to be valid, according to Cronbach's Alpha. Thus, the model derived from SCT was approved statistically and confirmed to fit the research data.

Data Analysis

The analysis of the quantitative data was divided into three main sections, according to the research questions. The first section addressed student use and self-regulation to answer the following two research questions:

Q1: Is there any difference between the students from the three schools regarding their use of personal digital devices and (social media) applications in the lecture theatre?

Q2: Is there any difference between student self-regulation and their behaviour when they bring their digital devices to the lecture theatre?

The second section examined the individual characteristics to answer the third main research question:

Q3: Is there any difference between the students from the three schools regarding their learning characteristics (i.e., self-efficacy, the course utility, TA, surface learning, negative habits/behavioural self-regulation)?

The last section examined the role of behaviour and the learning environment in the context of multitasking, distraction, and student participation in (non-)learning activities to address the following research question:

Q4: Is there any difference between the students from the three schools regarding the influence of a variety of sources, multitasking, distraction, and their participation in (non-) learning activities when using digital devices and (social media) applications in lectures?

The implications of this study's findings enhanced knowledge of the current barriers that limit students' use of personal digital devices and (social media) applications in lectures, and the potential solutions for overcoming these difficulties.

Quantitative Data Analysis

The quantitative data gathered was analysed using chi-square and ANOVA tests. The ANOVA test was used because the number of samples was more than 30 participants (VanVoorhis & Morgan, 2007) and, according to the central limit theorem, the one-way ANOVA test tolerates violations of its normality assumption well. The analysis included an examination of the current situation of personal devices and (social media) application use, student self-regulation of their behaviour, individual characteristics, and finally behaviour and the learning environment.

Student Usage and Self-regulation. To explore the first research question regarding the difference between the students from the three schools, in terms of their use of personal digital devices and (social media) applications in a lecture theatre, chi-square and one-way ANOVA statistical tests were employed. The students might use various types of devices, or various (social media) applications, such as Google, PowerPoint, and Twitter, that may promote specific attitudes and behaviours towards learning (Table 4.4). Most of the students in all three schools brought their smartphones classroom more than they did other devices. Bringing multiple devices was more noticeable among the Computer Science students, who tended to bring different devices into the classroom because they installed various software on their laptops for use during their studies. Meanwhile, the English students used a limited number of devices in addition to their smartphones, which was their primary device, and their use of laptops was rare.

The English students used their own devices during lectures regularly, as they were not native English speakers and primarily used them to access applications that helped them with translations, grammar, and spelling corrections, to improve their English skills. The need to use digital devices during lectures was mentioned by both the English and Architecture students in the free text section of the questionnaire, as in the following extracts:

English student 1: "It would be great to use the dictionary apps on my mobile phone as I come from the English school, we are often not allowed to use a mobile phone in the classroom, except in rare cases”.

Table 4.4
Students’ Responses to Questions Related to Their Behaviour in the Use of Personal Devices and (Social Media) Applications in the Lecture Theatre

Behavioural Variable	English	Architecture	Computer	Chi-square Results (α =.05)
The Device(s) that Students Mainly Bring into the Lecture Theatre.				
No device	3.1%	4.1%	5.0%	χ2(2,344) =1.147, p =.564
Laptop	0.9%	10.8%	11.0%	χ2(2,344) =22.018, p =.001
Tablet	2.2%	0.7%	11.7%	χ2(2,344) =39.755, p =.001
Smartphone	89.9%	61.3%	43.4%	χ2(2,344) =117.091, p.=00
Laptop and Smartphone	1.8%	14.9%	23.1%	χ2(2,344) =47.786, p =.000
Tablet and Smartphone	2.2%	8.2%	5.7%	χ2(2,344) =8.431, p =.015
The (Social Media) Applications that Students Usually Use During Lecture Time.				
Microsoft Word	17.6%	21.9%	26.7%	χ2 (2,344) =5.993, P=.050
Google	63.9%	51.3%	63.3%	χ2 (2,344) =11.009, P=.004
Microsoft PowerPoint	16.3%	11.9%	38.1%	χ2 (2,344) =61.158, P=.000
Twitter	23.8%	19.0%	17.4%	χ2 (2.344) =3. 379, P=.185
YouTube	24.7%	41.3%	18.9%	χ2 (2,344) =36.082, P=.000
Microsoft Outlook	23.3%	10.4%	15.5%	χ2 (2,344) =15.509, P=.000
WhatsApp	56.8%	68.4%	52.3%	χ2 (2,344) =15.476, P=.000
Chat Applications	17.6%	27.1%	5.7%	χ2 (2,344) =45.883, P=. 000
Virtual Learning Environment (VLE)	7.0%	3.0%	13.9%	χ2 (2,344) =22.419, P=.000
Other Applications	28.6%	24.5%	35.6%	χ2 (2,344) =8.220, p=.016
The Behaviour(s) That Students Usually Exhibit During Lecture Time.				
Pay Attention to the Lecture	75.3%	61.3%	50.2%	χ2 (2, 344) = 33.151, p =.000
Take Notes by Hand	67.4%	79.6%	82.2%	χ2 (2, 344) = 17.082, p =.000
Read PowerPoint Slides on Your Devices	22.9%	49.8%	54.1%	χ2 (2, 344) = 56.357, p =.000
Type Notes on Your Devices	42.3%	39.4%	37.4%	χ2 (2, 344) = 1.276, p =.528
Receive and Send Messages	15.9%	27.9%	24.9%	χ2 (2, 344) = 10.601, p =.005
Browse Internet	12.3%	26.0%	18.9%	χ2 (2, 344) = 14.823, p =.001
Check Social Media.	19.4%	26.8%	14.6%	χ2 (2, 344) = 12.770, p =.002
Play a Game on Your Device.	1.8%	13.4%	4.3%	χ2 (2, 344) = 30.759, p =.000
Other	4.8%	1.9%	1.4%	χ2 (2, 344) = 6.704, p =.035

α is the limit of the significance level, χ 2 (a, b) is the variance between groups, and p is the significance level.

Architecture student 2: “Bringing my devices and using them during the lecture helped me understand some of the ambiguous points in the lecturer's explanation[s]. In my Interior

Design major, I need to use digital devices and search some of the various sources available on the internet and check social media to find information and data".

The students from all three schools used different applications, including social media, the most common of which was Google and WhatsApp. It was noticeable that the Computer Science students mainly used Microsoft PowerPoint, while the Architecture students used YouTube and chat applications more. The students from the three schools, therefore, differed in their use of (social media) applications in their lectures.

In terms of their learning behaviour, although the students from all three schools heeded the lecture and preferred to take handwritten notes, there were significant differences between the schools. For example, the English students did not engage to the same level with taking handwritten notes as those from the other two schools, and the students from the Computer Science and Architecture schools used PowerPoint slides during lectures more than those from the English school. There was no significant difference between the students regarding entering notes on their devices, and while device-related behaviours when receiving and sending messages, surfing the Internet, and checking social media differed significantly between the schools, the usage was the highest among the Architecture students. Finally, the Architecture students also ranked the highest for using their devices to play games during lectures, which might be related to the length of time spent in lectures, and the waiting time between sessions, especially those for the design courses.

The second research question was addressed by using the two-way ANOVA analysis to explore whether there were any differences between the students from the three schools regarding self-regulation in their use of digital devices and (social media) applications in lectures. Table 4.5 presents the results of the analysis.

While there was no significant difference between the students in the three schools regarding the total number of devices they brought to class, there were significant differences in terms of the students' self-regulation of their use, both between the three schools and within each school, for example within the Computer Science school the difference was $p = .037$.

Moreover, the level of self-regulatory skills increased with the use of more applications, and when the students brought more personal devices to lectures.

These findings evidenced differences in the learning behaviour of the students from the different schools, with the level of self-regulatory skills increasing as the number of learning behaviours increased. The following extracts from the focus groups reflect the students' behaviour:

Table 4.5

Student Self-Regulation When They Bring Devices and (Social Media) Applications into the Lecture Theatre

Behavioural Variable	English (M, SD)	Architecture (M, SD)	Computer Science (M, SD)	ANOVA Between Schools and Within Each School (α =.05)
Total Number of Devices Students Typically Bring into the Lecture Theatre				
No Device	2.14 (±0.3)	2.00 (±0.0)	2.00(±0.6)	F (2,344) =1.657, p=0.105
One Device (Smartphone/Laptop /Tablet)	2.28 (±0.4)	2.30 (±0.4)	2.33 (±0.4)	English: F (2, 110) =.358, p =.699 Architecture: F (2, 113) =2.287, p=.104,
Both Devices (Smartphone+ Laptop/Tablet)	2.22(±0.4)	2.32(±0.4)	2.35(±0.4)	Computer Science: F (2,121) = 3.329, p =.037
Total Number of Applications Used During Lectures				
1-2 Applications	2.23(±0.4)	2.23(±0.4)	2.28(±0.4)	F (2, 344) =5.711, p =.001
3-6 Applications	2.46(±0.5)	2.42(±0.4)	2.43(±0.4)	English: F (2, 110) = 8.459, p =.004
7Apps and more	-	2.85(±0.3)	-	Architecture (2,113) =9.910, p=.001, Computer Science: F (2,121) =5.621, p =.018
Total Number of Different Types of Behaviours (Multitasking) Demonstrated During Lecture				
1 type	2.29(±0.5)	2.20(±0.4)	2.25(±0.4)	F (2, 344) =6.127, p =.001
2 different types	2.21(±0.4)	2.24(±0.5)	2.38(±0.4)	English: F (5, 110) = 3.822, p =.002
3 different types	2.20(±0.4)	2.21(±0.4)	2.11(±0.4)	
4 different types	2.37(±0.4)	2.16(±0.3)	2.41(±0.4)	Architecture: F (5,113) =10.076, p =.001,
5 different types	2.33(±0.4)	2.40(±0.5)	2.57(±0.5)	
6 different types	3.00(±0.0)	2.80(±0.4)	-	Computer Science: F (4,121) =7.308, p =.001

α: the limit of the significant level, M: Mean, SD: Standard Deviation, F(a,b) is the variance value, and p: significant value.

English student 1: "Using a device in the classroom can be negative or positive, depending on the behaviour of the user, e.g., positive behaviour when gaming or chatting is considered negative behaviour and can affect later academic success at the end of the year".

Architecture student 2: "I prefer to wait until the lecture is finished, then I can search for all the information presented in the lecture on Google and then develop myself further in my field through self-learning”.

Computer Science student 3: “I think that a mobile device like an iPad can have a positive impact on my studies, because I prefer to have everything on a device, like my notes"

Individual Characteristics. The third research question concerned the participants’ characteristics, such as their self-efficacy, the utility of the course, test anxiety, surface learning, and negative study habits/self-regulation to identify any differences between the students from the three schools and to understand their learning preferences.

A one-way ANOVA was conducted, and significant differences were found for self-efficacy, TA, and surface learning; the size effects provided further, specific details (Table 4.6).

Table 4.6
Comparison Between the Schools and the Learning Variables (Individual Characteristics)

Individual Learning Variable	School (M, SD)	ANOVA Between Schools (α =.05)
Self-efficacy (4-items, a = 0. 640)	English:5.5(±0.88) Architecture:5.7(±0.83) Computer Science: 5.5 (±0.69)	*F* (2,344) = 5.465, P = .004, η2 =.250 Multiple Comparisons analysis using Tukey HSD: there was a significant difference between Architecture and English (p =.014), and between Architecture and Computer Science (p =.011).
Test Anxiety (4-items, a = 0. 750)	English: 4.5(±1.46) Architecture: 4.6 (±1.19) Computer Science: 4.8 (±1.22)	*F* (2, 344) = 4.798, P =.008, η2 =.432 Multiple Comparisons analysis using Tukey HSD: there was a significant difference between English and Computer Science (p=009).
Surface Learning (3-items, a = 0. 661)	English: 5.4(± 0.98) Architecture: 5.5 (±0.87) Computer Science: 5.6 (±0.96)	*F* ((2, 344) = 4.114, P = .017, η2 =.090 Multiple Comparisons analysis using Tukey HSD: there was a significant difference between English and Computer Science (p =012).
Utility of Course (3-items, a = 0. 696)	English: 5.6(± 0.86) Architecture: 5.7 (±0.95) Computer Science: 5.5 (±0.91)	*F* (2, 344) = 2.240, P =.107, η2 =.211 Multiple Comparisons analysis using Tukey HSD: no significant differences between the schools.
Negative Study Habits/Self-regulation (5-items, a = 0. 615)	English: 4.7(± 0.95) Architecture: 4.8 (±0.87) Computer Science: 4.8 (±0.85)	*F* (2, 344) =.132, P =.876, η2 =.004 Multiple Comparisons analysis using Tukey HSD: there was no significant difference between the schools (p almost equals 1).

a = Cronbach’s Alpha, α: the limit of the significant level, M: Mean, SD: Standard Deviation, F(a,b) is the variance value, p: significant value, η2: effect size.

There was a significant difference in the students' self-efficacy between the schools, with the Architecture students scoring higher than the English and Computer Science students. All of the students experienced TA, although there was a significant difference between the English and Computer Science students ($p = .009$), showing that the latter experienced more stress than the former, whose course employed different types of assessment that might cause them to be more engaged with (social media) applications during lectures than the Computer Science students. There was also a significant difference in the degree of surface learning between the three schools, demonstrating that the use of digital devices and (social media) applications in lectures prevented the students from attaining an in-depth understanding of their content. Meanwhile, course utility and negative habits did not cause the students to use digital devices and (social media) applications during lectures, and there were non-significant differences between the schools.

Behaviour and Learning Environment. To examine the students' learning behaviour (multitasking and distraction), the use of a variety of resources, and the student's involvement in (non-) learning activities, a one-way ANOVA was conducted between the students from the three schools (Table 4.7).

There was a significant difference between the three schools, in terms of the student's perception of the use of a variety of learning resources, with a significant difference between the English and Computer Science students ($p = .024$), and the Architecture and Computer Science students ($p = .005$), in favour of the latter (Table 4.6), demonstrating that the Computer Science students were more open to using various devices during lectures, and required access to different types of resources.

Meanwhile, the Architecture students were more engaged in (non)learning activities, which distracted them from their learning process, and the English students strongly believed that they had the appropriate multitasking abilities to use their devices in lectures. The Computer Science students appeared to be less distracted than the students from the other schools, despite their significant usage of their devices during lectures. This may be because they relied more on their digital devices for their studies than the other two groups of students and ensured that they were not distracted by them. For example, free text comments Computer Science student noted, "The devices are not distracting but are useful for getting information, communicating, and understanding".

Table 4.7
Comparison of the Students' Use of Devices for (Non-)learning Activities, and Distractions During Lectures

Behavioural and Environmental Variables	Academic School (M, SD)	ANOVA Between Schools (α =.05)
Variety of Resources (4-items, a = 0. 759)	English: 5.5 (± 0.96) Architecture: 5.5 (±0.85) Computer Science: 5.7 (±0.83)	F (2, 344) = 5.846, P = .003, η2 =.198 Multiple Comparisons analysis using Tukey HSD: there was a significant difference between English and Computer Science (p=.024), and Architecture and Computer Science (p=.005).
Multitasking (3-items, a =.61)	English: 4.85 (± 1.05) Architecture: 4.83 (± 1.10) Computer: 4.81 (± 1.20)	F (2, 344) = 0.078, p =0.925, η2 = .000, Multiple Comparisons analysis using Tukey HSD: show no significant differences between schools.
Distractions (3-items, a =.71)	English: 4.3 (± 1.42) Architecture: 4.3 (± 1.36) Computer: 3.7 (± 1.49)	(F (2, 344) = 5.912, P =.003, η2 =. 034 Multiple Comparisons analyses using Tukey HSD: there was a significant difference between English and Computer Science (p=.009), and Architecture and Computer Science (p=.010). However, no difference between English and Architecture (p=.999).
Non-learning Activities (unproductive) (3-items, a =.0.71)	English: 2.4 (± 1.34) Architecture: 3.0 (± 1.46) Computer: 2.7 (± 1.53)	F (2, 344) = 4.234, p =.015, η2 = .024, Multiple Comparisons analysis using Tukey HSD: there was a significant difference between Architecture and English (p<.011).
Learning Activities (productive) (13-items, a =.0.89)	English: 3.9 (± 1.33) Architecture: 4.3 (± 1.00) Computer: 4.2 (± 1.19)	F (2, 344) = 5.688, P =.004, η2 =.032, Multiple Comparisons analysis using Tukey HSD: there was a significant difference between English and Architecture (p <.003).

a = Cronbach's Alpha, α: the limit of the significant level, M: Mean, SD: Standard Deviation, F(a,b) is the variance value, p: significant value, η2: effect size.

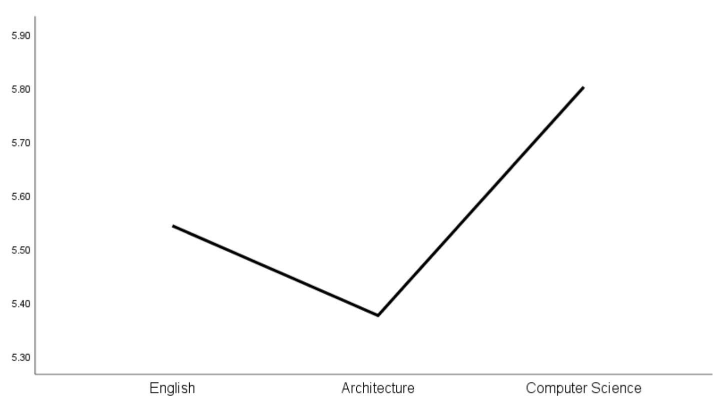

Figure 4.6 The Differences Between Schools in the Variety of Resources Accessed Via Devices

The reciprocal influence of the three SCT components (environment, behaviour, and individual characteristics) provided useful information regarding the influence of the students' use of digital devices and (social media) applications during lectures on their learning. For example, the students were able (self-efficacy) to use their devices for learning purposes, and since they believed their course was useful for their future employment, they did not seek distraction using their devices. Although the majority heeded their lectures, either keeping handwritten notes, reading the PowerPoint slides on their devices, or typing notes on their devices, they also engaged in non-learning activities, such as receiving and sending messages, browsing the Internet, checking their social media accounts, and playing games on their device. These behaviours distracted them from their learning process and caused procrastination regarding their learning tasks, demonstrating a low ability to regulate their learning (negative habits/self-regulation), which in combination with a high level of personal anxiety meant that they adopted a surface learning approach.

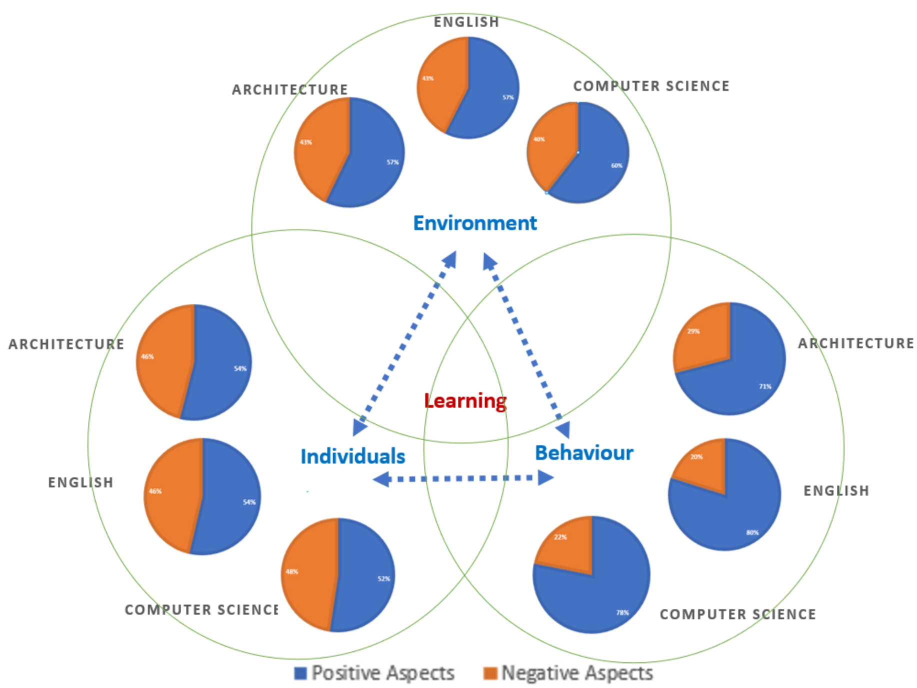

Figure 4.7 Outcome of Student Use of Digital Devices and (Social Media) Applications During Lectures; the Positive and Negative Contribution to Learning of Each SCT Component is Categorized and Calculated Statistically for Each School (The Positive Contribution Predominates the Negative)

Figure 4.7 illustrates the positive and negative contributions of the use of digital devices and (social media) applications during lectures, under the three major SCT components for each school. The mean score of each factor for each school, namely participation in learning activities, self-regulation, and self-efficacy, was calculated, and then categorized as either a negative or positive contributor to student learning. The contribution was found to be at a similar level for all the components for all the schools, with the positive contribution to learning higher than the negative.

Qualitative Data Analysis

Qualitative data obtained from focus groups can be analysed using various techniques: constant comparison analysis, classical content analysis, keywords-in-context, and discourse analysis (Leech and Onwuegbuzie (2008). Since several groups from the three schools discussed the same issues regarding the use of digital devices and (social media) applications during lectures, the constant comparison analysis technique was the most suitable method for analysing the data collected for this study. This method was introduced by Glazer and Strauss (26 April 2022, as cited in Onwuegbuzie et al., 2009, p.5) to analyse various types of data, including that from individual focus groups. Thus, the analysis of several focus groups served effectively as a proxy for theoretical sampling. Additional samples were used to assess the topics' relevance and to refine them (Charmaz, 2000). The topics that emerged from the analysis were almost identical or compatible with, the research priorities, as they reflected the focus group questions. Thus, multiple groups were used to assess whether the subjects from one group emerged from other groups, which aided in obtaining the data satisfaction and/or theoretical satisfaction required. A study design that employs multiple focus groups is called an ‘emergent-systematic focus group design’, wherein the term ‘emergent’ refers to focus groups used for exploratory purposes, and systematically used focus groups for review purposes (Onwuegbuzie et al., 2009).

All the data from this study's focus groups were transcribed and coded. Initial open coding was used to construct the relevant analytical codes by reading the textual responses carefully (Shelton, 2017). The topics that emerged and were analysed included personal device and social media use, behaviour, distraction, multitasking, and the (non-)learning activities of students in the learning environment. Every student who took part in the focus groups was anonymized with a code. The data obtained from the various focus group discussions were analysed and evaluated. The use of personal devices and (social media) application in lectures, along with student learning behaviours and student learning activities during lectures, is discussed below. The qualitative results of the analysis are discussed according to the quantitative aspects of the previous sections, supporting the findings, and comparing them with those of previous studies.

The analysis confirmed that smartphones were the device most used by the students in all three schools. In lectures, the English students primarily used their smartphones for the Google translation application and other online dictionaries, often taking photographs of the lecture presentation, as the following quotations exemplify:

English student 1: "We need to bring our devices to improve our learning of grammar, phrasing, and [for] translating new words".

English student 2: "I use my smartphone for study, as I access most of the lessons and social media applications related to my school courses [on it], as some of the electronic learning applications only require a smartphone, so accessing learning resources [is] faster and easier with less effort and time [involved]".

Meanwhile, in their lectures, the Computer Science students used their devices to access more sophisticated computer applications required by the curriculum, and therefore used laptops and tablets more than smartphones, believing that these devices were more important for their learning process than for other disciplines. The following quotation illustrates a Computer Science student's level of engagement with their digital devices said:

"It seems to me that the use of devices for the learning module we are learning is more beneficial than [for] others, as it involves both theoretical and practical learning processes". Therefore, interactive and rewarding learning takes place, and the attention and concentration of the students are at a high level, which increases understanding and cognition.

Finally, the Architecture students mainly used their digital devices in lectures to type notes, take photographs of the lecture material, check websites relevant to the course topic, and learn 2D and 3D drawing software. As an architecture student explained.

"As we are interior design students, we use our own devices for various design applications that are part of our school curriculum, like Adobe Photoshop, Bal Tool, and OneNote; such applications help us as interior designers to present our designs in the form of PowerPoint presentations, in 2D and 3D, or as video animation".

However, the English and Architecture students were not always permitted to bring their devices to lectures, although this was not the case for the Computer Science students. Nevertheless, the English and Architecture students wanted to use personal digital devices to take notes, record lectures, and to learning applications, such as Google Translate and design software, to enhance their learning. While the lecturers from these two schools had concerns regarding the use of such devices during lectures, fearing they might be a source of distraction for their students, the Computer Science students, who used digital devices and (social media) applications extensively during lectures exhibited a high level of self-regulation skills.

In terms of the (social media) applications used by the students, the quantitative analysis revealed statistically significant results for Microsoft PowerPoint, YouTube, WhatsApp, and other chat applications, as well as virtual learning environments and other such applications. The quantitative analysis of the total number of applications used and the degree of student self-regulation revealed significant differences between and within the three schools, and these findings were confirmed by the focus group discussions, as the students from all three schools mentioned that they used personal devices and (social media) application for (non-) learning activities as well as for learning purposes. The quantitative analysis of student learning behaviour also demonstrated that while there was a high capacity for multitasking across the schools, there was a significant difference in distraction in favour of the Architecture and English students. The focus group discussion evidenced the students' views of their level of multitasking ability, ranging from those who were unable to multitask, and those who could perform two or more tasks concurrently. For example, a Computer Science student mentioned that he "…can perform a variety of tasks, including browsing slides, taking notes, and browsing figures, images, or information presented during the previous lecture", believing that he was not distracted when using his digital devices during lectures. Meanwhile, one of the English students who considered themselves to be a multitasker believed that "…multitasking can increase productivity, but if it takes too much time, it will affect our focus, preventing us from concentrating completely on one task", while one of the Architecture students believed that there was no specific multitasking technique employed during lectures.

The analysis of the focus group discussions revealed that the participants believed that they might be distracted in the following three ways when personal digital devices were used during lectures:

(1) by their peers' activities on digital devices and (social media) applications, especially when their peers were engaged in activities unrelated to the lecture content, such as playing electronic games, and watching movies, video clips, or soccer games.

(2) by being tempted to engage in non-learning activities, such as checking their social media accounts, and sending messages to friends and family.

(3) by the digital notifications received on their devices; when they did not disable these notifications, they occasionally checked their smartphones when receiving a notification.

Self-regulation is one means by which the students could overcome these types of distractions. For example, as the focus group participants noted, they could disable notifications before a lecture or could use specific software to block websites/social media platforms, enabling them to access only the software/platforms necessary for their learning.

All the students involved in the groups engaged in both learning and non-learning activities on their devices during lectures, believing that they had the multitasking skills to do so, or because they were distracted. The types of learning activities they engaged in during lectures included accessing relevant educational resources, taking photos of the lecture content, visiting websites and downloading files for learning purposes. For example, as a Computer Science student explained, "…. since the lecturer writes much material on the board, and it may take me too long to write them by hand, I snap a photograph, and when I return home, I can inspect and organize it to make it easier to read and decide the key points". Many of the students also mentioned the technical issues they faced with their learning process, due to the unreliable Internet connection during lectures. Consequently, many of them brought additional Wi-Fi equipment with them, fearing that the issues would impact the submission of their assignments/online tests/coursework.

Meanwhile, their involvement in non-learning activities was highly related to the distractions present, often because they were bored during a lecture, or because they were exhausted by the lecture’s length and the effort required to stay focused. This was especially the case for the Architecture students, who, during their multiple design practical sessions, often spent time on non-learning activities as an escape. They used their devices for entertainment or other non-learning activities, to expedite time, alleviate fatigue and boredom, and during the long waiting times between design sessions.

In summary, across the three schools, the students' use of their devices and social media during lectures differed in terms of the learning and non-learning activities in which they engaged, demonstrating the specific impact of each school’s academic program on the student’s activities and use of personal devices and social media integration in the learning environment.

Discussion

Employing SCT, this study explored students’ learning behaviours from three schools at Umm Al-Qura University, when they used personal digital devices and (social media) applications in lectures. The quantitative data explored the students’ behaviour patterns related to their use, along with their self-regulation, individual student characteristics, and related behaviour and learning environment. These are discussed alongside the data collected from focus groups to gain an in-depth understanding of Saudi students' use of devices and (social media) applications for learning purposes.

Use of Personal Devices

Although there was a difference between the three schools regarding the students' use of personal devices, most of the students across all three schools preferred to bring their own digital devices to lectures to aid their learning. They primarily used smartphones, employing them for multiple reasons, including sending text messages to friends and family (non-learning activities), and to searching the Internet to support their learning process. The study conducted by Limniou et al. (2020) of UK university students found that they used personal digital devices during lectures to meet particular needs, including addressing disability issues, such as dyslexia, and reading and hearing difficulties, or because of a lack of English language skills, since the non-native speakers sought translation, grammar, and spelling corrections.

In the present study, in contrast to the students from the other two schools, the English students brought mainly smartphones to their lectures, perhaps because they were not expected to use any sophisticated applications as part of their school curriculum. However, it might also be because their smartphones allowed access to their social media accounts and their family and friends via text messaging. These findings reflected those of the study by Adhikari et al. (2016), which found that their student participants believed the use of personal devices in lectures for learning was relevant and valuable in the modern world, and the study conducted at a Saudi university by (ALmarwan, 2017), which reported that nearly 84% of the students involved used their smartphones as mobile learning tools.

In summary, the availability of information from a variety of online sources encouraged the students in the present study to use their digital devices during lectures. The Computer Science students used a wider range of devices, and used them more than other students, due to their curriculum demands. Finally, the students, mainly from the English school, raised the issue that they were not permitted to bring their devices to lectures because many of their lecturers preferred not to use such technology for the teaching and learning process.

(Social Media) Applications

This study found that there were several differences in the student's use of (social media) applications during lecture time, across the three schools, depending on the study program needs and the student preferences. For example, the Google and WhatsApp applications were used across all the schools, while the Computer Science students primarily used Microsoft PowerPoint, and the Architecture students mainly used YouTube and Chat applications. These findings partially supported those of Mahdi (2019), who reported that WhatsApp and Twitter were the social media applications most preferred by university students in the KSA, although the students in the present study did not mention using Twitter as a favoured platform. Interestingly, Al-Rahmi et al. (2018) argued that the use of social media applications should be promoted by university academics to enhance the learning process through group discussions, and Kutbi (2015) found that many Saudi students had not used social media for learning purposes. In contrast, a high proportion of the first-year undergraduate students in the present study were familiar with social media applications and were keen to use them to support their learning process. Thus, their lecturers might be encouraged not to prevent their use during lectures, but to guide their students in using them effectively (not for non-learning activities).

Although all students in this study used their digital devices to type notes during lectures, their level of engagement with other activities, such as receiving and sending messages, checking social media, and playing games on these devices varied according to the length of the lecture, and the waiting time between lectures. Similarly, in the context of UK university students, (Limniou, 2021) found that if they were unmotivated by the lecture content, and tired from the lecture's length, they were easily distracted by social media.

Student Self-Regulation

A considerable degree of self-regulation was found to be present when the students in this study brought personal devices and used (social media) applications during lectures, and their multitasking ability during lectures was considerable, with all the students presenting high levels of self-regulation. However, most of the students who engaged in non-learning activities during lectures were from the Architecture School, and they exhibited low levels of self-regulation. This may be related to their high level of self-efficacy (Yusuf, 2011), as they felt confident in their ability to learn new skills and obtain knowledge, despite spending a considerable amount of time using various (social media) applications during lectures, without employing self-regulation. This decreased level of self-regulation can be viewed as a barrier to students using such technology in lectures.

Overall, the level of self-regulation was low among all the students across the three academic schools, a finding that reflected that of Alturki and Aldraiweesh (2016), who argued that a critical constraint for Saudi higher education academics and students using various types of technology was related to self-efficacy levels. Moreover, Hussain et al. (2021) found that students' Internet self-efficacy and self-regulated learning were highly associated with students' learning processes. A recent study by (Carballo-Fazanes et al., 2020) reported that allowing students to use electronic devices in lectures can encourage negative learning behaviours, such as poor time management skills and procrastination, instead of positive learning habits, a fact that is highly related to self-regulation. Meanwhile, Anshari et al. (2017) suggested that a potential solution to supporting students with their learning process is establishing rules and regulations for the use of smartphones in class before the start of the lesson, to help minimize any distractions caused by their use. Such regulations should target enhancing student self-regulation skills and avoiding negative habits.

Finally, the present study found that the perceived usefulness of the course for future employment opportunities had a positive impact on self-regulation among the students in all three schools, a finding that supported that of Üner et al. (2020), who reported that utility value and self-efficacy positively predict self-regulation.

Test Anxiety (TA)

The level of TA was found to be the same for the students from all three schools, regardless of whether they moderated their level of TA, namely their fear of and stress regarding assessment when they studied and prepared themselves for assessments. When students experience an extreme level of TA (Tahoon, 2021; Wadi et al., 2022), it can impact their learning, as the distress and emotional and cognitive disturbance involved is present during lectures, even if they use personal digital devices to support their learning process.

All the students in the present study used their digital devices to take notes to support their learning process, although there was a significant difference between the English and Computer Science students, with the latter using their devices and (social media) applications more extensively during lectures. In their study, Cardozo et al. (2020) found that student TA was at a lower level when an active learning process was followed, compared with traditional lectures when academics merely deliver a lecture and the students take notes. Such active learning promotes students' in-depth understanding of the lecture content and reduces their assessment uncertainties. In the present study's focus groups, it was noteworthy that the Computer Science students highlighted that they struggled with their assessments when they did not receive clear instructions and sufficient feedback during lectures, which also caused them to follow a surface learning approach.

Surface Learning

According to Ramsden (2003), the surface learning approach involves the conveyance to students of the need to memorize sufficient learning material to accomplish a task, such as passing an exam or solving a problem. Meanwhile, Anshari et al. (2016) claimed that including different types of presentations in a class, such as text and video, enables students to explore different types of insights, and use the resources that best suit their learning patterns, goals, and preferences, since, unlike traditional learning methods, when students are treated as recipients of information and knowledge, they can participate in the learning process. However, the present study found that when students have access to a variety of online resources, this is sometimes not sufficient to prevent them from following a surface learning approach. As discussed previously, TA, surface learning, and the use of learning technology during lectures are highly connected, and (Bralić & Divjak, 2018) discussed how online learning opportunities can promote the adoption by students of a deep learning approach, via a traditional teaching delivery process.

Multitasking

While the quantitative results of this study showed no difference in terms of multitasking ability between the students from the three schools concerned, the qualitative analysis provided more detail about its influence on student learning. For instance, as discussed previously, the students engaged in non-learning activities and various distractions impacted them during lectures, therefore they engaged in various activities and completed various tasks concurrently. However, Borowiak (2020) argued that students' overconfidence in their perceived level of ability to use technology influences their attitude to multitasking during lectures.

Regarding the level of the student’s ability to multitask when using personal devices during lectures, their behaviour varied from those who were unable to multitask to those able to perform two or more tasks concurrently. However, Wu (2017) found that university students overestimate their abilities when multitasking, a fact reflected by the students in the present study, who agreed that multitasking impacted their attention on lecture content, preventing them from concentrating entirely on one task, which affected their overall learning. Their confidence in multitasking echoed Borowiak’s finding (2020) that digital natives experience overconfidence in their abilities, and specifically that students involved in multitasking activities perform much slower and comprehend far less than students who do not engage in multitasking. Meanwhile, the students in the present study did not believe that special skills were required for them to multitask during lectures. It would therefore be helpful for students to be made aware of the potential pitfalls of multitasking, and its impact on learning (Laxman & Holt, 2017).

This study also explored how the use of digital devices and (social media) applications can impact students' learning behaviour during lectures, and their multitasking ability was found to be related to their self-regulation skills. As Dontre (2021) argued, students should regulate their learning, and learn how to control their tendency to constantly check the notifications they receive on their digital devices and social media platforms. The present study found that one reason why students engage in multitasking was boredom during lectures, which reflected the findings of the study by Limniou et al. (2020), and Deng et al. (2021) confirmed the link between multitasking, lecture content, and technology. Moreover, the present study found that device- and social-media-related distractions impacted the students from the three schools involved differently, depending on the individuals' level of familiarity with using technology for learning purposes, and the types of devices they used. In total, three sources of distraction caused by using digital devices and (social media) applications during lectures time were noted during the focus group discussions:

1. Distraction caused by other students' behaviours. This primarily occurred when: a. their peers' device made a loud noise; b. they could view the screen of their peers' device; and c. their peers deliberately attempted to engage them in digital activities, such as playing electronic games and watching a movie or video clip;
2. Distraction caused by the student own behaviours when they used their digital device and (social media) applications for non-learning activities, such as sending texts and chatting with family and friends during lectures;
3. Distraction caused by digital notifications that tempt them to check their devices/social media platforms.

In their study, Sana et al. (2013) discussed how the use of digital devices, such as laptops, can be a substantial source of distraction, not only for the device user but for their peers. This reflected the findings of Poscia et al. (2015), whose study found that students tend to check their smartphones numerous times during class, including for non-learning activities, such as gaming, taking pictures, sending emails, and instant messaging. Meanwhile, Alfallaj and Alfallaj (2020) reported that the majority of students who use digital devices are aware of distracting their peers from lectures when using their devices for non-learning purposes. Such digital distraction does not concern students' attention being split between numerous tasks concurrently, but rather their attention being diverted from the primary educational task by the use of digital devices for non-educational purposes (Aagaard, 2019).

(Non-) Learning Activities

This study found that all the learning activities of the students involved were linked to the lecture content and delivery process and that there was a difference in terms of the degree of student participation in non-learning activities between the three schools that were related to their use of digital devices and (social media) applications during lectures, and to the low level of student self-regulatory skills. These findings echoed those of Henderson et al. (2017), who explored various types of learning activity, including meeting arrangements, keeping notes for time management improvement, revisiting and reviewing learning material, and searching for visual information to aid understanding of difficult topics. In the present study, the difference, for instance, between student productivity and in-school learning for Computer Science students versus English students might be explained by the degree of association between their device use and the study program demands regarding the use of technology, which was critical for the Computer Science students. However, when the students from all three schools used technology during lectures, their lack of self-regulation influenced their learning process negatively.

Conclusion

This study explored students’ learning behaviours regarding the use of digital devices and (social media) applications during lectures using SCT principles that addressed their characteristics and the learning environment. Several challenges and opportunities that could be addressed by further research regarding pedagogical approaches to support students’ learning process during lectures, according to their needs, emerged. The study found that most of the first-year undergraduate students in the three schools concerned liked to bring their own digital devices to lectures to use various (social media) applications, such as Google and WhatsApp. Smartphones were the most common device used, and most of the students also used their smartphones for non-learning activities when they were bored in class. The study also found that students used technology directly related to the course program and whether their lecturer permitted them to use technology during lectures. While a preference to take notes using such devices was common to all the students, some lecturers prevented them from using their own devices during lectures; the students believed this was because they did not know what they used their devices for. The students also reported that the university's Internet connection was unreliable, which sometimes prevented them from completing their learning activities, such as submitting online assignments/tests and responding to discussion forums. They expressed a need for an efficient Internet and Wi-Fi service to be provided to improve their learning productivity in lectures and on the university campus.

This study also found that the level of self-regulatory skills was greater in the students who used more digital devices and applications. The statistical analysis of the total number of applications and student self-regulation showed significant differences between the three schools, mainly in the way the students used their digital devices and (social media) applications during lectures. Those who used a greater number of digital devices in lectures were aware of the potential risk of distractions, due to the technology, and regulated their learning process more effectively than the students who did not use technology to the same extent. However, the students who believed they were able to work with various digital applications (self-efficacy) engaged in multitasking which impacted their degree of TA and surface learning.

This study provided insights regarding how technology can be integrated into lectures, according to student needs and learning preferences, considering students' characteristics and the differences in the three academic programs concerned. These findings, especially the influence of students' characteristics, should be compared with those findings in a blended learning context.

CHAPTER 5 - Academics' Perspectives on the Use of Devices and (Social Media) Applications for Teaching in Lecture Theatres

Abstract

The research project presented in this chapter examined Saudi academics' behavioural intentions regarding the use of (social media) applications (SMAs) in the lecture theatre. An online questionnaire was distributed to university academics from three Schools (English, Computer Science and Architecture) at Umm Al-Qura University. In addition, University teaching staff were invited for an interview with the researcher to provide more in-depth insight into how digital learning tools were to be integrated into their teaching. Regarding the quantitative data, comparative statistical analyses (i.e., ANOVA and chi-square) provided information about potential differences between the three Schools, while factor and Cronbach's Alpha analyses were used to explore the quantitative scale following the Technology Acceptance Model (TAM).

The principal findings revealed that although Saudi Arabian university academics use smartphones extensively in their personal lives, they were reluctant to allow their students to bring and use their digital devices to access SMAs during lectures. A further finding was that academics expect the University to offer them the relevant training and technical support they need to confidently integrate digital learning tools into their teaching. Additionally, they reported that the Internet infrastructure and reliable networks, including Wi-Fi services, would enable them to feel more confident about using SMAs in lecture theatres.

Although Umm Al-Qura University has adopted Blackboard as a Learning Management System (LMS), the university academics compared it with the accessibility and usefulness of social media (SM) platforms. In general, the findings highlighted barriers, such as lack of time, fear of loss of privacy and security, lessening of their influence over student participation, and loss of control over the lecture schedule, as inhibiting their use of SMAs in lecture theatres. The findings from this project align with the previous studies that discussed introducing policies and regulations regarding the use of digital devices in lecture theatres to minimize the impact of distractions in lectures. The implications of this project related to blended learning and the

support the academics expected from the University to overcome technological barriers and enhance their pedagogical approach to the use of technology during lectures.

Introduction

This chapter discusses the second project in this thesis, which explored Saudi academics' behavioural intentions to use digital devices and (social media) applications (SMAs) in lecture theatres to support teaching and learning. SMAs have grown in popularity among the University community and are considered as an important source for sharing information and constructing knowledge (Hashim et al., 2018). Thus, many researchers have directed attention towards exploring how SMAs could be integrated into teaching and learning (Alabdulkareem, 2015; Hashim et al., 2018; Hashim & Zamani, 2015). Previous studies have demonstrated that the adoption of SMAs in the context of education is in its infancy in Saudi Arabia (Hashim et al., 2018), with platforms, such as Facebook, YouTube, and WhatsApp not having been extensively explored regarding their potential to augment lecture delivery (Hamadi et al., 2021).

The previous chapter discussed student attitudes and behaviours concerning the use of personal digital devices and SMAs in lectures and reported that students expected to use them for learning purposes and were dissatisfied when the University Internet infrastructure proved unreliable, or when their lecturers were reluctant to permit them to use this form of learning technology. They also mentioned that their lecturers' lack of expertise in using digital devices and SMAs for learning and teaching was another significant challenge they encountered. Thus, it is vital for this project to examine academics' intentions to use digital technology for teaching and learning purposes and to discuss the findings against students' views to gain a holistic view of the current landscape in a Saudi Arabian University.

The objectives of this project were to:

1. Identify the opportunities and challenges to using digital devices and SMAs for teaching in lecture theatres from academics' perspectives.

2. Explore academics’ behavioural intentions to use digital devices and SMAs in lecture theatres for teaching purposes; and

3. Investigate how academics could integrate SMAs into their teaching during lectures.

To gain an in-depth understanding of this topic, an online questionnaire was distributed to university academics, and interviews were conducted to collect additional insights into the quantitative findings. This research project aimed to explore the digital learning integration process from academics’ perspectives, as they corresponded to students’ views ascertained in the initial project.

Theoretical Background

As this research project was intended to identify academics’ willingness to use digital devices and SMAs for teaching and learning purposes during lecture time, the Technology Acceptance Model (TAM) by Venkatesh and Bala (2008) was employed. Before discussing this model in detail, it is important to note that there are other possible models of technology integration into teaching and learning processes based on Social Cognitive Theory (SCT) and the diffusion of innovations. However, none have effectively explained academics’ intention to use technology for educational purposes. For example, Compeau et al. (1999) introduced a model of computer usage based on Bandura's theory (SCT), as was discussed in Chapter 4. This model chiefly addressed individuals’ beliefs about their ability to use computers (computer self-efficacy), from the perspectives of two outcomes linked to expectations (1. Performance-related outcomes supporting professional efficiency and effectiveness; and 2. Personal-related to outcomes for gaining rewards and a better status). However, this model did not fit in this case, as the students’ views regarding the use of digital devices and SMAs based on the initial research project related to academics’ intention to use and/or allow the use of digital learning technology in the lecture theatre. In addition, alternative models that might be used to explore academics’ use of learning technology in the lecture theatre may be based on the diffusion of innovation. Keller (2005) discussed the technology adoption process as regards knowledge, persuasion, decision, implementation, and confirmation. Although utilising this model might fulfil the aims of this study, it mainly considers collective decisions about the acceptance or rejection of technology made by the members of an organization (i.e., universities, faculty, etc.) (Kwon & Zmud, 1987). This does not offer a suitable fit to explain the decisions of individual lecturers in a context where technology use has already been approved for teaching purposes.

However, the Theory of Reasoned Action (TRA) discusses the relationships between attitudes and behaviours within human action, predicting individuals' behaviours according to their pre-existing attitudes and behavioural intentions (Fishbein & Ajzen, 1977). This theory has been criticised in terms of which attitudinal theories serve as good predictors of human behaviour and the Theory of Planned Behaviour (TPB) (Ajzen, 1985, 1991). Based on this theory, 'intentions are assumed to capture the motivational factors that influence behaviour; indicating how hard people are willing to try, and how much effort they are planning to exert to perform a particular behaviour. Generally, the stronger the intention to engage in a behaviour, the more likely should be its performance' (Ajzen, 1991 p. 181). This theory assumes human behaviour is guided by three considerations: behavioural (produce an attitude toward the behaviour); normative (influenced by perceived social pressure or subjective norm); and control (perceived behavioural control or beliefs about self-efficacy).

Two models have been developed to explore individuals' general intention to use technology by applying this combined theory: the Technology Acceptance Model (TAM) (Davis, 1989), and the Unified Theory of Technology Acceptance and Use (UTAUT) (Venkatesh et al., 2003). TAM discusses users' behavioural intention to use technology, applying the perspectives of perceived usefulness, perceived ease of use and subjective norms, also explaining the reasons for users adopting information technology in organizational and task-oriented contexts (Kim, 2014). UTAUT includes additional elements, such as performance expectations, effort expectations, social influence, facilitating conditions, gender, age, and experience. It was developed to explain acceptance as an individual's willingness to use technology, while exploring which elements directly affect the success or failure of technology, with success being equivalent to actual system usage (Ammenwerth, 2019). According to the model, each of these factors influences behavioural intention, which in turn impacts use behaviour (Jeffrey, 2015).

TAM is being employed in the current educational research study having been used previously by many researchers to explore users' intention to use technology to support mobile learning and e-learning (Lane & Stagg, 2014). It simplifies the process of technology adoption, providing explanations about factors associated with the social media (SM) adoption process for learning purposes (AlGhanmi, 2018). More specifically, when researching these two models (TAM and UTAUT) as options for examining technology use in educational contexts and previous meta-analyses on e-learning, it emerged that only a few studies employed UTAUT, while the majority applied TAM. This was apparently because TAM has been successfully applied in extended and modified forms to elaborate upon users' adoption and acceptance of social networking sites (Senyo et al., 2018; Šumak et al., 2011; Weerasinghe & Hindagolla, 2018; Wirtz & Göttel, 2016). Additionally, according to Van Raaij and Schepers (2008), UTAUT provides an accurate model, in the case of key relationships with up to four variables (gender, age, experience and voluntariness), when moderated to yield more significant coefficients. They also criticised UTAUT regarding the variety and combination of items to investigate individual's work style, the availability of assistance, the possible resources required to facilitate conditions and individual's perceptions about how other people think they should use the new technology, the perception that others are supportive of new technology, and the view that those who use the system have a higher social status and greater social influence. These two relatively broad ranges of items combine to facilitate conditions and social influence that make it difficult to predict items with psychometric constructs. Therefore, TAM has been adopted to examine academics' behavioural intention to use learning technology in various environments. However, it has been criticised about the influence of social factors to compare perceived usefulness (Al Kurdi et al., 2020; Setyohadi et al., 2017). Another criticism of the TAM model is related to the deficits in testing for the technology-specific knowledge that university academics need to possess to integrate new technologies with established teaching processes successfully (Scherer et al., 2019). Despite the critique, this model has been widely used in the educational context (Granić & Marangunić, 2019). Based on Jeffrey (2015), the TAM model has been widely used in the literature due to its validity and increasing utility. A majority of studies have addressed the application of TAM in the domain of information and computer technology (Marangunić & Granić, 2015). Recently the literature detailing the acceptance and adoption of SMAs and other educational and information systems models affirmed that this is the most widely used model in the educational context, as when examining students' and academics' acceptance or adoption of SMAs provides reliable findings (Acarli & Sağlam, 2015; Al-Qaysi et al., 2021; Dumpit & Fernandez, 2017; Leong et al., 2018; Scherer et al., 2019).

To date, TAM has variously been applied to emerging technologies such as information systems (Pai & Huang, 2011), wireless Internet (Kim & Garrison, 2009; Lu et al., 2003), collaborative technologies and e-learning (Cheung & Vogel, 2013; Huang, 2015). Various versions of TAM have been used in different forms to the initial model to explain technology acceptance in multiple contexts. The first version of TAM developed key determinants in detailed components and their interactions as discussed previously. To address difficulties in understanding the predictors of TAM variables, the model was extended by incorporating novel factors and significant variables (Wixom & Todd, 2005). An updated version of TAM2 was been introduced by Venkatesh and Bala (2008); Venkatesh and Davis (2000) to provide a more holistic model, explaining and predicting attributes that influence users' technology adoption behaviours, including six additional determinants: computer self-efficacy, perception of external control, computer anxiety, computer playfulness, perceived enjoyment, and objective usability (Venkatesh, 2000). Therefore, Venkatesh and Davis (2000) presented TAM2, identifying and theorizing the general determinants of perceived usefulness, namely subjective norm, image, job relevance, output quality, result demonstrability, perceived ease of use, and two moderators, namely experience and voluntariness. TAM2 hypothesises that perceived ease of use and demonstrability of results both directly and positively affect perceived usefulness. In addition, the relationship between job relevance and output quality will moderate perceived usefulness, such that the higher the output quality, the stronger the impact of job relevance on perceived usefulness.

Perceived usefulness is influenced by the individual norms and visual changes that can be classified as social influences; whereas job relevance, output quality, and demonstrability of results can be categorized as properties associated with the system. Perceived ease of use is informed by perceived control, enjoyment, playfulness, and SMAs-related anxiety, and can vary between individuals. From a psychological point of view, Venkatesh and Bala (2008) pointed out that the determinants of perceived ease of use are suggested primarily as variations in individual differences and general beliefs about what is being studied. These variables are grouped into three categories: control beliefs, intrinsic motivation, and emotions. Furthermore, perceived usefulness is viewed as an instrumental belief ideologically similar to extrinsic motivation, and concentrates on theory (as opposed to emotions) about the benefits of using a system (Venkatesh & Bala, 2008). TAM3 also expanded the number of determinants thought to affect "Perceived Usefulness" and "Perceived Ease of Use" (Figure 5.1).

TAMs first component of "Perceived Usefulness", defined by the degree of use of digital devices and SMAs in lecture theatres increases the effectiveness of teaching. "Perceived usefulness" concerns the degree to which a person believes that a particular technology is beneficial in terms of augmenting aspects of their life (Chang & Tung, 2008). The factors influencing "Perceived Usefulness" are: 1) Subjective Norm (SN): the perception (according to social consensus) that certain behaviour should or should not be exhibited. 2) Image, (IU): The extent to which digital devices and SMAs renewal are viewed as improving the social status of individuals. 3) Job Relevance, (JR): Perceptions regarding the degree to which the use of digital devices and (SM) application is professionally relevant (teaching). 4) Output Quality (OQ): The degree to which a person believes the use of digital devices and SMAs positively improves the performance of teaching activities; and 5) Result Demonstrability (RD): The degree to which the use of digital devices and SMAs results are perceived as tangible.

In this study specifically, the second TAM component, "Perceived Ease of Use", can be defined as the degree to which an individual considers SMAs use to be simple or complex. "Perceived Ease of Use" is influenced by two categories of variables:

(A): Anchor variables that include:

(1) Use of digital devices and SMAs Self-Efficacy (SMS): The degree to which an individual believes they can perform teaching-specific tasks/jobs via the use of digital devices and SMAs.

(2) Perceptions of External Control (PEC): The extent to which a person believes organizational and technical infrastructures are in place to support the use of digital devices and SMAs by academics.

(3) SM Anxiety (SMA): The degree to which a person experiences feelings of fear or apprehension when encountering the possibility of using digital devices and SMAs in teaching contexts.

(4) SM Playfulness (SMP): The level of cognitive awareness a person has when participating in digital-based interactions.

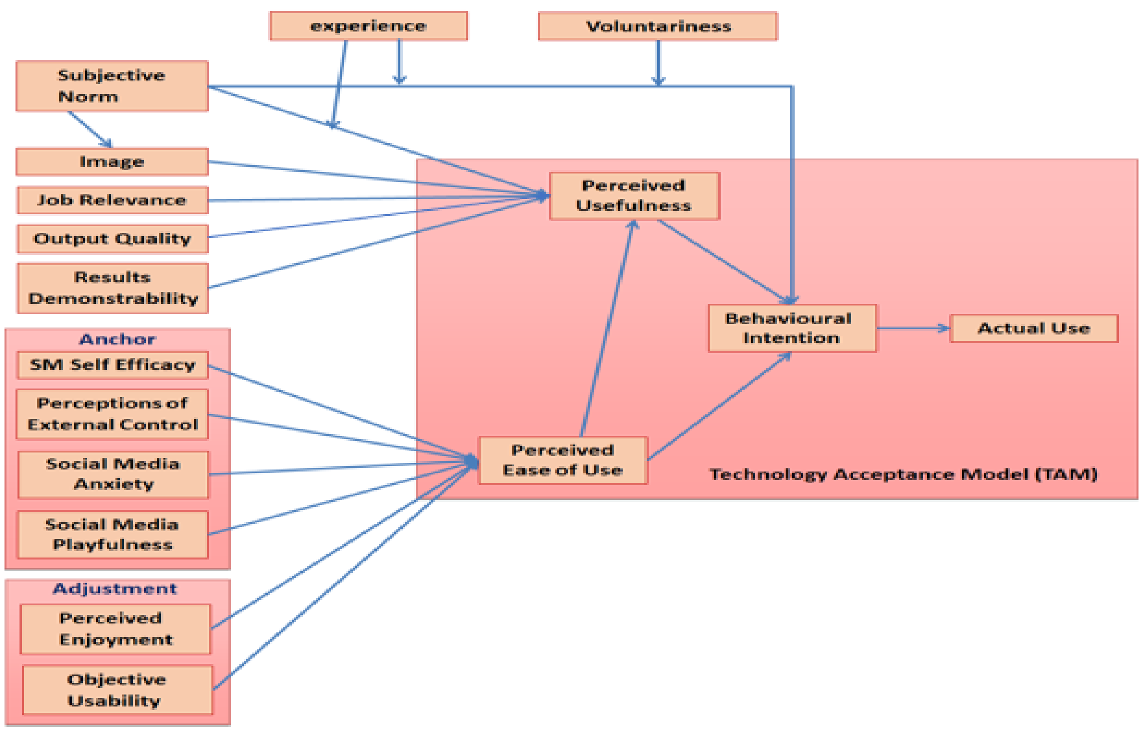

Figure 5.1 Determinants for the Adoption of SM application in Technology Teaching (Venkatesh & Bala, 2008, p. 280).

(B): Adjustment variables include:

(1) Perceived Enjoyment (PE): The extent that using digital devices and SMAs is considered enjoyable (i.e., apart from any performance consequences); and

(2) Objective Usability (OU): The effort required to complete certain tasks when digital devices and SMAs are being used.

The third TAM component of Behavioural Intention (BI) refers to the level at which a person consciously creates a plan to perform or not practice certain behaviours in the future. Correspondingly, behavioural intention can be modified by two factors: Experience and Voluntariness.

(1) Experience (E): The experience-based knowledge or teaching-specific skills an individual may develop concerning the usability and effective use of SMAs in teaching contexts.

(2) Voluntariness (V): The extent to which a person considers digital devices and SMAs adoption voluntary or mandatory.

The fourth TAM component concerns the Actual Use of digital devices and SMAs and is defined as the frequency, duration, and intensity of the individual daily use of the adopted technology.

In comparison to the initial TAM model, TAM3 incorporates a broader range of components when seeking to study various interactions with learning technology (Al-Qaysi et al., 2021; Jeffrey, 2015), including SMAs (Al-Qaysi et al., 2020; Scherer et al., 2019).

Although educational researchers have criticised the TAM model for its lack of actionable guidance (Lee et al., 2003), Venkatesh and Bala (2008) addressed this concern by dividing it into two phases: pre-and post-implementation. In educational contexts, the pre-implementation phase encompasses steps leading up to the actual implementation of new technology. Meanwhile, the post-implementation phase encompasses the steps immediately following implementation. Both stages are vital for implementing new technologies in educational settings (Scherer et al., 2019). To conduct this research, TAM3 (Figure 5.1), as adopted by Jeffrey (2015), considering all the determinants introduced by Venkatesh and Bala (2008), has been adopted to explore academics' intention to use digital devices and SMAs in the lecture theatre setting. As previously discussed, TAM3 is suitable for identifying the relevant determinants of SMAs adoption and use by academics. In addition, the model is characterized by its efficient methodology when identifying and determining all the variables that specifically describe users' behaviour. In their meta-analysis, Scherer et al. (2019) demonstrated the acceptance of digital technologies by academics in lectures using core TAM variables.

Methods

This study employs a mixed research methodology, combining quantitative and qualitative approaches as detailed in Chapter 2. An online questionnaire and interview schedule comprising pre-determined questions were the key research instruments used for this research project.

Questionnaire

To investigate academics' intention to use SMAs in lectures, a seven-point Likert scale questionnaire (1 = strongly disagree to 7 = strongly agree) was inspired by TAM3 (Appendix 5. B). The questionnaire comprises 47 questions, which were divided into the three most important determinants regarding the use of SMAs in a lecture theatre (Appendix 5. C), and includes:

1. Demographic questions (5 items) such as (gender, teaching role, teaching experience and school type). 2. Multiple choice questions regarding the use of SMAs in teaching, application usage, and obstacles in the use of technology for teaching purposes (8 items); and 3. 47 items on the TAM3 scale regarding the perceived usefulness and perceived ease of use, as inspired by (Venkatesh & Bala, 2008). Specifically, the *Perceived Usefulness* factor consists of 5 factors as follow: (i) Subjective norm (3-items); (ii) Image of use of SM (4-items); (iii) Job relevance ''Role of the SM in academic teaching'' (4-items); (iv) Output Quality (3-items); and

(v) Results Demonstrability (3-items) (Acarli & Sağlam, 2015; Venkatesh & Bala, 2008). *Perceived Ease of Use* consists of 8 factors: (i) SM Self-efficacy (4 items), adapted 3 items by Al-Aufi and Fulton (2014), and 1 item from Isaac et al. (2017). (ii) Perceptions of External Control (4 items), adapted by Venkatesh and Bala (2008). (iii) Perceived Enjoyment (2 items), adapted by Venkatesh and Bala (2008). (iv) SM Anxiety (3 items), adapted by Venkatesh and Bala (2008). (v) SM Playfulness (4 items), adapted by Venkatesh and Bala (2008). (47 items), adapted by Venkatesh and Bala (2008). (vi) Voluntariness is measured according to three items developed by Venkatesh and Bala (2008). This variable evaluates whether SMAs are adopted because they are required administratively or if they are used voluntarily. (vii) Experience is measured by an item that relates to the number of years the user has used SMAs for teaching and which is reflected in the number of years of academic practice. This item is included in the demographic part of the questionnaire. Finally, at the end of this questionnaire, there is also an open question for the participants to give their comments on the use of SMAs in teaching.

The online questionnaire was written in English, which all target participants are fluent in. The questionnaire was piloted with two UQU University professors and ten Saudi postgraduate students studying at the University of Liverpool. Following the piloting phase, all the feedback obtained was analysed to check the acceptable reliability of the questionnaire's constructs. The pilot study was performed to ensure the feasibility of the selected format (i.e., questionnaire) before the implementation of the main tools. The pilot study offered the students an opportunity to evaluate the validity and reliability of the instruments before they were introduced to the Saudi university lecturers, as discussed in Chapter 2.

The Interview

After completing the online questionnaire, the university academics were invited to participate in interviews, to clarify the findings from the quantitative study in depth. This study aimed to explore the lecturers' behavioural objective, which was to utilise digital devices and SMAs in a lecture theatre, their views about the value of SMAs in the teaching delivery method, and current SM/technology integration processes. The interview schedule comprised 13 pre-determined questions, as discussed in Chapter 2 (Appendix 2.D).

Participants

195 participants were involved in this study from three Schools at the university (English, Architecture and Computer Science). Specifically, the School of Computer Science has 85 faculty members (2 Professors, 2 Associate Professors, 31 Assistant Professors, 15 Lecturers, and 35 Assistant Lecturers). The School of English employs 60 academics (2 Professors, 7 Associate Professors, 39 Assistant Professors, 12 Lecturers, and 8 Assistant Lecturers). The School of Architecture has a faculty member of 50 academics (10 Professors, 9 Associate Professors, 14 Assistant Professors, 7 Lecturers, and 10 Assistant Lecturers). From these, 161 academics contributed their responses regarding the use of SMAs in a lecture environment, although only 109 completed the questionnaire in full (54 male, 55 female) (Table 5.1). The questionnaire recruitment process began in the third week of semester 2 of the academic year 2019-2020 and ended in the seventh week of the same semester. Data collection was carried out during the COVID-19 pandemic, which may have adversely influenced the recruitment process. Although the interviews were influenced by the COVID-19 pandemic, a representative participant sample from each school expressed their personal views regarding the use of SMAs. The total number of participants who engaged in the interviews was 13 (eight males and five females in total). Table 5.1 illustrates the number and the gender of the participants who contributed via the interview process by School.

Table 5.1
Total Participants in the Questionnaire and Interviews

	Questionnaire			Interview		
School	Male	Female	Total	Male	Female	Total
Computer Science	12	21	33	1	3	4
Architecture	34	4	38	4	0	4
English	8	30	38	3	2	5
Total	54	55	109	8	5	13

Statistical Methods

The model's underlying structure, as it was applied in this project, is empirically derived from the theoretical TAM3 Model. The Confirmatory Factor Analysis (CFA) with maximum likelihood estimation was utilized to verify the measurement model fits the collected data. In addition, a Cronbach's alpha test for internal consistency was employed to verify the reliability levels for each variable.

Confirmatory Factor Analysis (CFA). The researcher used the IBM SPSS Amos Application v. 25 to conduct relevant statistical analyses. The model components, including the latent and measured variables, were predetermined according to the theoretical model. The model included two components: Perceived Usefulness and Perceived Ease of Use. Consequently, the fit for each model component was evaluated - using standard-fit statistics, as discussed in Chapter 2.

Perceived Usefulness Component. The theoretical model consists of 13 items selected to measure four latent variables: Enjoyment (2 observed variables), Self-efficacy (4 observed variables), External control (3 observed variables), and SM Anxiety (4 observed variables).

The pathways between the latent variables were hypothesized according to the theoretical model. The modification indices suggested the specifications for covariance between item error terms (Appendix 5.D). Thus, the model fit was improved by adding covariance between the error terms for the Anxiety Factor (e14-e15). Then the model was accepted (Figure 5.2).

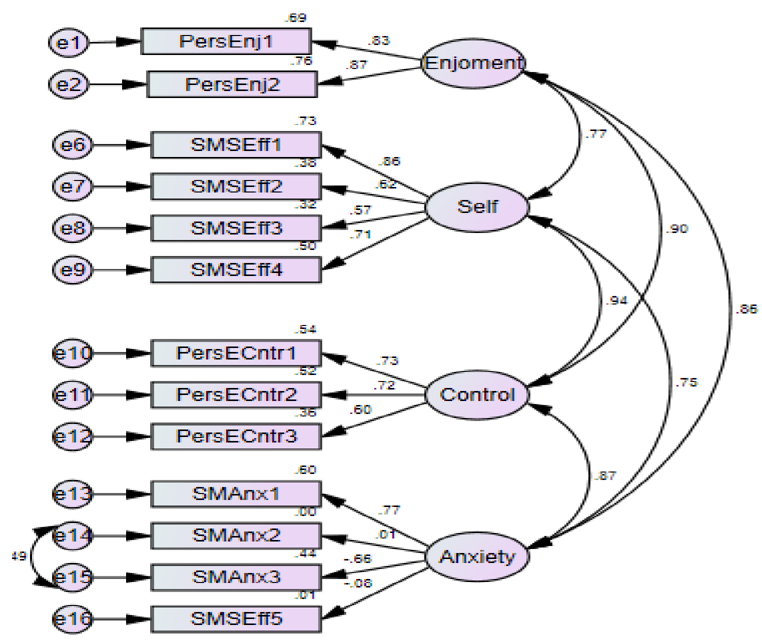

Figure 5.2 Factor Model of the Perceived Usefulness Component with Standardized Factor Loadings on Unidirectional Arrows. (Factors: Perceived Enjoyment Self-Efficacy, External Control, and Anxiety).

Table 5.2 details the conventional adjustment statistics both before and after modification. The model fitting statistics achieved a good level of customization. Thus, the adequacy of the model has been validated in light of the CFA and the corresponding theoretical model.

Table 5.2
Model fit Statistics and Indicators' Evaluation before and after Modification (Perceived Usefulness Component)

Indicators	Before Modification	After Modification	Evaluation
Chi-square	161.264	35.2	X2 is a small number so it is a good
CMIN/DF	2.733.	2.025	CMIN = excellent (between 1 and 3)
TLI	.783	.911	TLI = excellent (>0.95 excellent/<0.95 acceptable)
CFI	.836	.942	CFI= excellent (>0.95 excellent/<0.95 acceptable)
SRMR	.155	.078	SRMR= excellent (<0.08 excellent/ >0.08 acceptable)
RMSEA	.127	.061	RMSEA = acceptable (between 0.05 and 0.08)

Perceived Ease of Use Component. The theoretical model consists of 13 items which measure five latent variables: Job Relevance (3 observed variables), Output quality (2 observed variables), Subjective Norms (3 observed variables), Result Demonstrability (3 observed variables), and Image (2 observed variables). Pathways between the latent variables were hypothesized in consideration of the theoretical model. Modification indices suggested removing one observed variable from the Subjective Norms latent variable (subjN3) and, one observed variable from *Result* Demonstrability (ResultD3), (Appendix 5. E). Therefore, the two observed variables were discarded, as depicted in (Figure 5.3).

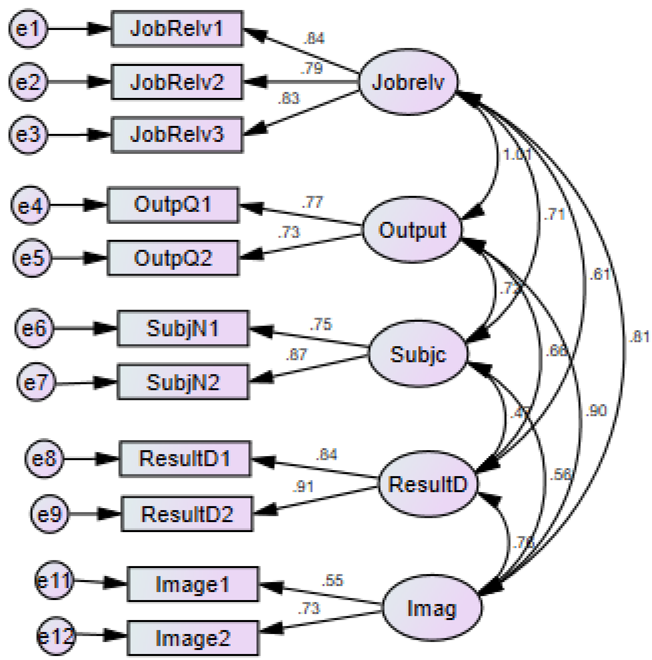

Figure 5.3 Factor Model showing the Perceived Ease of Use Component with Standardized Factor Loadings on Unidirectional Arrows. (Factors: Job Relevance, Output Quality, Subjective Norms, Result Demonstrability, and Image).

Table 5.3 shows the conventional fit statistics before and after adjustments were made to the model. Thus, the model is approved based on CFA and the related theoretical model.

Table 5.3
Model Fit Statistical Indicators 'Evaluation before and after Modification (Perceived Ease of use Component)

Indicators	Before Modification	After Modification	Evaluation
Chi-square	103.5	65.2	X2 is a small number so it is a good fit
CMIN/DF	1.881	1.629	CMIN = excellent (between 1 and 3)
TLI	.910	.944	TLI = excellent (>0.95 excellent/<0.95 acceptable)
CFI	.937	.959	CFI= excellent (>0.95 excellent/<0.95 acceptable)
SRMR	.178	. 060	SRMR= excellent (<0.08 excellent/ >0.08 acceptable)
RMSEA	.090	. 076	RMSEA = acceptable (between 0.05 and 0.08)

Cronbach's Alpha Test. The level of internal consistency of each of the factors was evaluated using Cronbach's alpha measure. The alpha for all factors was greater than 0.60 (Babbie, 1992; Creswell, 2014), and the results for each variable were as follows: The Perceived Usefulness Variables (13 items) was 0.865 for Self-efficacy (4 items), 0.856 for External control (3 items), 0.904 SM anxiety (3 items), and 0.864 for Enjoyment (3 items). Moreover, the Perceived Ease of Use Variables (15 items) was 0.877 for Subjective Norms (3 items), 0.780 for Image (2 items), 0.862 for Output Quality (3 items), 0.856 for Job Relevance (4-items), and 0.862 for Result Demonstrability (3-items). Overall, these analyses demonstrate that the ten-factor scales, as classified into two components here, are consistent with the study data and appropriate for this study's parameters.

Statistical Tests Evaluation. Each of the two components in the model was assessed using CFA and Cronbach's alpha approach. In consideration of the modification index for each CFA model, the researcher was requested to justify the *Perceived Ease of Use* component by discarding two observed variables to improve the model's adaptation relative to the data. The model fit for the *Perceived Usefulness* component was improved by adding the covariance between error terms to one of the latent variables. The internal consistency for each of the nine factors was valid based on Cronbach's alpha approach. Thus, the model derived from TAM3 was considered to fit well with the research data.

Data Analysis

The analysis of quantitative data is divided into three main sections here, to correspond to the research questions. The first section discussed lecturers' behaviour toward digital devices and SMAs when these were used in a lecture theatre. The research question relating to this issue was as follows:

Q 1. Do the behaviours of the academics from the three Schools (English, Architecture and Computer Science) differ when using digital devices and SMAs in the lecture environment?

The other research questions posed in this research project were formulated to explore differences between academics' responses regarding Perceived *Usefulness* and *Perceived Ease of use* of SMAs. The research questions were:

Q 2. Do the views of the academics from the three Schools (English, Architecture and Computer Science) differ regarding the *Perceived Usefulness* of SMAs (subjective Norms, Image, Output Quality, and Job Relevance)?

Q. 3. Do the views of the academics from the three Schools (English, Architecture and Computer Science) differ regarding the *Perceived Ease of Use* of SMAs (Self-Efficacy, External Control, Anxiety, and Enjoyment)?

The final section will examine lecturer intention based on prior experience using digital devices and SMAs for teaching purposes in the lecture theatre. Specifically, the last research question posed was:

Q 4. Does previous experience using digital devices and SMAs in the lecture environment, affect academics' behavioural intention and use?

The findings of this research project were expected to advance understanding of the current barriers limiting KSA academics from using digital devices and SMAs in the lecture theatre, by explaining why academics may be reluctant to adopt digital learning technology for teaching and learning purposes in the lecture theatre environment, and how any difficulties and/or teaching constraints identified may be overcome by comparing the responses of academics from the three different Schools (English, Architecture and Computer Science).

Quantitative Data Analysis

The quantitative data were analysed using the chi-square and ANOVA tests. The ANOVA test was preferred because the participants numbered more than 30, and according to the central limit theorem, the one-way ANOVA test tolerates violations of the normality assumption well (VanVoorhis & Morgan, 2007).

Academics' Behaviours regarding the use of digital devices and SMAs in a lecture theatre.

Chi-square and one-way ANOVA statistical tests were conducted to compare the lecturers' behaviours across the three Schools when using digital devices and SMAs while teaching in the lecture theatre. The factors considered were the type of personal device, the applications used (Table 5.4), the reason for using SMAs (Table 5.5), and the barriers faced by academics when using SMAs in a lecture theatre (Table 5.6).

Table 5.4
Lecturers' Responses to Questions Related to their Behaviours of Using Devices and SM in the Teaching delivery process.

Behavioural variable	English (%)	Architecture (%)	Computer Science (%)	Chi-square results (α =.05)
The device(s) that lecturers mostly use in the teaching delivery process.				
Desktop	6.40%	5.50%	4.58%	$\chi2(2,109)$ =.159, p =.924
Smartphone	33.02%	33.94%	30.27%	$\chi2(2,109)$ =1.83, p =.400
Tablet	7.33%	8.25%	3.70%	$\chi2(2,109)$ =1.638, p =.441
Laptop	21.10%	21.10%	17.43%	$\chi2(2,109)$ =.083, p =.959
The applications that lecturers usually use in the teaching delivery process.				
Microsoft PowerPoint	24.77%	28.44%	26.60%	$\chi2(2,109)$ =3.216, p=.200
Microsoft Outlook	14.68%	6.42%	10.09%	$\chi2(2,109)$ =5.067, p =.079
Facebook	.91%	10.09%	3.66%	$\chi2(2,109)$ =10.753, p =.005
Snapchat	.0%	.0%	2.80%	$\chi2(2,109)$ =5.764, p =.056
Twitter	2.80%	4.60%	3.70%	$\chi2(2,109)$ =.597, p =.742
WhatsApp	16.51%	30.27%	16.51%	$\chi2(2,109)$ =14.307, p =.001
Instagram	.90%	5.5%	1.80%	$\chi2(2,109)$ =4.644, p =.098
YouTube	14.67%	20.18%	13.76%	$\chi2(2,109)$ =2.086, p =.352
Other applications	8.25%	2.08%	5.50%	$\chi2(2,109)$ =3.531, p =.171

(α is the limit of significance level, χ 2 (a, b) is the variance between groups, and p is the significance level).

Overall, there were no differences in the digital devices that lecturers mainly used in lecture theatres. In all the schools, most academics used their smartphones more than any other devices. Compared with other schools, multiple devices were deemed more prevalent within the School of Architecture, which made it possible to incorporate various devices into the lecture theatre. On the other hand, except for smartphones and laptops, computer science lecturers utilised a limited number of devices.

WhatsApp, Microsoft PowerPoint, and YouTube were the most popular applications used by university academics to augment their teaching. The School of Architecture lecturers made the greatest use of these three programs, followed by Facebook. This may be due to the relevance of these applications to fulfil certain teaching requirements, such as project presentations, student collaboration, and sharing learning videos and course materials. SMAs were used by academics in the lecture theatre for various reasons based on the qualitative comments that the lecturers left at the end of the questionnaire. For example, Computer Science and Architecture lecturers used YouTube applications to facilitate students learning experience via the visualisation process, while English lecturers used YouTube applications to facilitate discussions in lectures. Other applications used by KSA academics were Blackboard Virtual Learning Environment, Slack, WordPress, Trello, and Pinterest. An English lecturer explained how the teaching process adopted SMAs due to technical issues in the lecture theatre that were experienced in a lecture theatre converting the “slides to PDF and uploading them to “Trello” and asking the students to open the file on their smartphones/laptops so “they were able to follow it”. An architecture lecturer also preferred to explain presentation slides using external resources and links before and after the lecture, noting that these resources could be distributed to the students via SM channels. Students were also encouraged students “to share their work and communicate with others to look into the subject from a social perspective”.

Table 5.5 explains why academics used SMAs in their lectures. Although the majority of the academics from all the schools mentioned using SMAs to communicate with their students and sending and sharing information with their students, there was a statistically significant difference between the behaviours of Architecture and Computer Science lecturers. In addition, there was a significant difference between all the schools regarding feedback, with Architecture lecturers providing more online feedback than others. Another question sought to explore whether university academics typically use SMAs in their daily lives. Most of them reported using SM for multiple purposes and stated that they were familiar with the utilities of these applications. Thus, their attitudes and beliefs appeared to be the main factors influencing their behavioural intentions to use SMAs in lectures.

Table 5.5
The Purpose(s) of Using SMAs for Teaching purposes and in Daily Life.

Behavioural variable	English	Architecture	Computer	Chi-square results (α =.05)
Teaching aim(s) of using SMAs for the teaching delivery process.				
Share information about your course	22.0%	24.8%	12.84%	$\chi2(2,109)$ =6.315, p =.043
Receive assignments	11.9%	16.5%	6.4%	$\chi2(2,109)$ =5.332, p =.070
Communicate with your students	22.9%	29.4%	23.8%	$\chi2(2,109)$ =3.731, p =.155
Share learning material with your students	19.3%	26.6%	16.5%	$\chi2(2,109)$ =4.828, p =.089
Provide feedback	7.3%	17.4%	8.3%	$\chi2(2,109)$ =7.906, p =.019
Design quizzes	5.5%	05.5%	2.8%	$\chi2(2,109)$ =.870, p =.647
Reply to your students' posts	11.0%	17.4%	09.2%	$\chi2(2,109)$ =3.826, p =.148
Distribute videos and weblinks relevant to your course topic.	20.2%	18.3%	11.9%	$\chi2(2,109)$ =2.529, p =.282
Another purpose	2.8%	1.8%	1.8%	$\chi2(2,109)$ =.229, p =.892
Lecturer's use of SMAs in daily life.				
Post personal resources (e.g., images, thoughts)	25.7%	22.0%	16.5%	$\chi2(2,109)$ =2.844, p =.241
Chat with friends and relatives	29.4%	27.5%	25.7%	$\chi2(2,109)$ =.537, p =.765
Reply to comments on others' posts	22.0%	22.9%	15.6%	$\chi2(2,109)$ =1.673, p =.433
Online shopping	18.3%	13.8%	12.8%	$\chi2(2,109)$ =1.452, p =.484
Play games	2.8%	5.5%	4.6%	$\chi2(2,109)$ =1.283, p =.527
Become informed about future travel plans	11.9%	9.2%	8.3%	$\chi2(2,109)$ =.670, p =.715
Keep informed about personal interests (e.g., sports, art, music)	19.3%	22.0%	22.9%	$\chi2(2,109)$ =3.257, p =.196
Other	2.8%	3.7%	.9%	$\chi2(2,109)$ =1.486, p =.476

(α is the limit of significance level, χ 2 (a, b) is the variance between groups, and p is the significance level)

Table 5.6 contrasts the academics' views across the three Schools regarding the barriers which prevented them from using SMAs when teaching. It seems that Architecture lecturers had many considerations regarding privacy and security, while there was a significant difference between academics from the three Schools regarding lack of university infrastructure and loss of control over teaching. Finally, a statistically significant difference was found regarding fear of loss of control over teaching, with Computer Science lecturers expressing greater concern than others.

Table 5.6
The Barriers Academics faced when Using SMAs for Teaching Purposes, with Devices and SMAs Use in a Lecture Theatre.

Barriers	English (%)	Architecture (%)	Computer (%)	Chi-square results (α =.05)
Fear of losing my privacy and security	11.0%	14.7%	10.1%	$\chi2(2,109)$ =1.039, p =.595
Anxiety about using SM	5.5%	5.5%	4.6%	$\chi2(2,109)$ =.007, p =.996
University infrastructure	15.6%	11.0%	5.5%	$\chi2(2,109)$ =5.721, p =.057
No interest in using SM	6.4%	3.7%	5.5%	$\chi2(2,109)$ =1.140, p =.566
Lack of time	14.7%	11.0%	13.8%	$\chi2(2,109)$ =1.596, p =.450
Lack of training	8.3%	7.3%	1.8%	$\chi2(2,109)$ =4.343, p =.114
Unaware of how SM could support teaching	1.8%	3.7%	2.8%	$\chi2(2,109)$ =.738, p =.691
Loss of control when teaching	5.5%	7.3%	13.8%	$\chi2(2,109)$ =8.881, p =.012
No opportunity to integrate SM into teaching	6.4%	5.5%	6.4%	$\chi2(2,109)$ =.347, p =.841
Lack of monitoring of students' engagement with lecture	11.9%	10.1%	8.3%	$\chi2(2,109)$ =.451, p =.798
Other	6.4%	1.8%	4.6%	$\chi2(2,109)$ =3.164, p =.206

(α is the limit of significance level, χ 2 (a, b) is the variance between groups, and p is the significance level).

Figure 5.4 illustrates the percentage difference between the three Schools (English, Architecture and Computer Science), while Figure 5.5, Figure 5.6 and Figure 5.7 illustrate the academics' responses by School. For example, the English lecturers considered the three main barriers to using SMAs in teaching to be infrastructure, lack of time to work on another teaching approach, and monitoring the student learning process.

Meanwhile, the Architecture lecturers expressed concerns about privacy and security issues, infrastructure, and lack of time to work on another teaching approach, while Computer Science lecturers rated the highest barriers concerns about losing control of their teaching, lack of time and privacy and security issues. The academics' comments on the open-ended questions at the end of the questionnaire underlined that the aforementioned barriers were the main concerns.

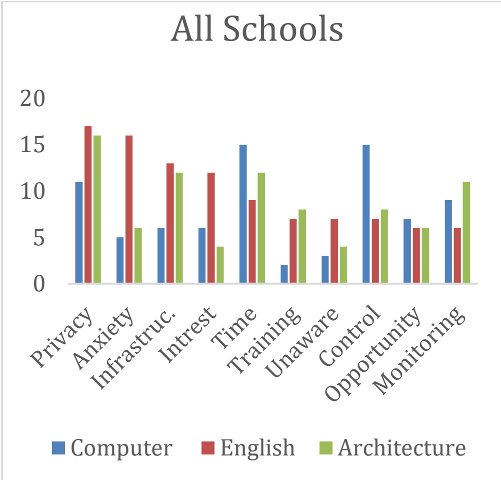

Figure 5.4 The barriers facing lecturers in all schools

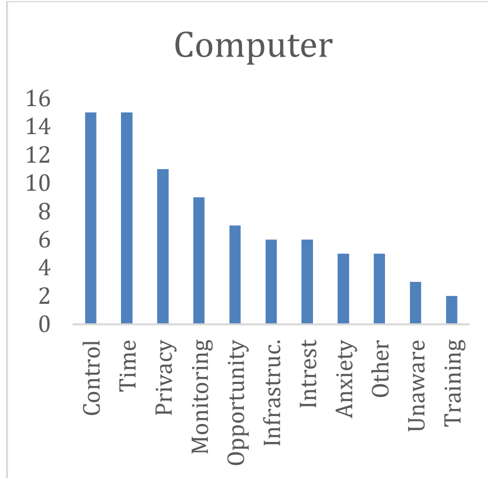

Figure 5.5 The barriers facing Computer Science lecturers

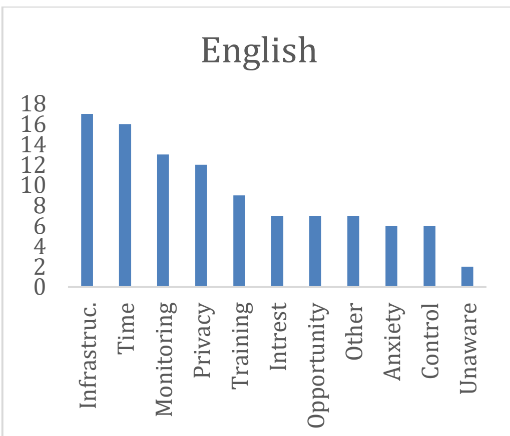

Figure 5.6 The barriers facing English lecturers

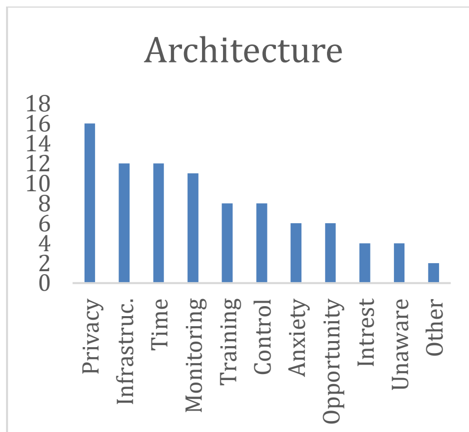

Figure 5.7 The barriers facing Architecture lecturers

Perceived Usefulness and Perceived Ease of Use dimensions. The intention of the lecturers to use SMAs in the lecture theatre was examined over the TAM3 components of "Perceived usefulness" and "Perceived ease of use", and a statistical comparison was undertaken between the three Schools to identify differences in academics' behavioural intentions to use SM. Perceived usefulness was composed of several components, as presented in (Table 5.7). A one-way ANOVA statistical analysis was conducted to identify potential differences between the three Schools. Overall, there was not any significant difference between the three Schools regarding subjective norms, image, output quality, job relevance, and result demonstrability, while the size effect analysis identified a difference between the schools in several cases.

Table 5.7
Comparisons between the Schools Based on the Perceived Usefulness Variables of SM.

Perceived Usefulness variable	School (M, SD)	ANOVA between Schools (α =.05)
Subjective Norms (3-items, a = 0. 877)	English:3.92 (±1.3) Architecture:4.31(±1.1) Computer Science: 4.47 (±1.2)	F (2,109) = 1.868, P = .159, η2 =.034 A simple effect size comparison shows that: there is no significant difference between any of the schools.
Image (4-items, a = 0. 780)	English: 5.18 (±1.23) Architecture: 5.52 (±0.99) Computer Science: 5.51 (±0.97)	F (2, 109) = 1.212, P =.302, η2 =.022, A simple effect size Comparison shows that: there is no significant difference between any of the schools.
Output Quality (3-items, a = 0. 862)	English: 4.53(± 1.46) Architecture: 5.00 (±1.45) Computer Science: 4.61 (±1.52)	F ((2, 109) = 1.057, P = .351, η2 =.020, A simple effect size comparison shows that: there is no significant difference between any of the schools.
Job Relevance (4-items, a = 0. 856)	English: 4.75(± 1.54) Architecture: 5.09 (±1.22) Computer Science: 4.68 (±1.28)	F (2, 109) = 0.951, P =.390, η2 =.018, A simple effect size Comparison shows that: there is no significant difference between any of the schools.
Result Demonstrability (3-items, a = 0. 862)	English: 5.12 (± 1.17) Architecture: 5.46 (±1.23) Computer Science: 5.60 (±0.84)	F (2, 109) = 1.816, P = .168, η2 =.033, A simple effect size comparison shows that: there is no significant difference between any of the schools.

a = Cronbach's Alpha, α: the limit of the significant level, M: Mean, SD: Standard Deviation, (F(a,b) is the variance value, p: significant value, η2: effect size).

Almost all the factors were rated as lower for English lecturers relative to those from the Computer Science and Architecture disciplines, with image and result in demonstrability factors rated highest within all the other factors. For example, all the academics highly rated the image factor, considering that the use of SM for teaching purposes in a lecture theatre setting would enhance their prestige and popularity within the University community. Additionally, the academics from all Schools considered that the result demonstrability factor (contact with university members increasing the interactions between them) would positively inform their behavioural intention to use SMAs during the lecture. For example, an English lecturer left the following comments regarding the open-ended question at the end of the questionnaire:

"Sometimes the use of SMAs involves students in discussions and participations, which motivates them to freely express their opinions and ask questions about the subject topic enhancing the traditional way of communication. This creates a fresh, active, and less threatening atmosphere in the lecture theatre".

In terms of the job relevance of teaching work, it was rated higher by Architecture lecturers than by lecturers from the other two Schools. The Architecture lecturers believed the use of SMAs for teaching purposes would allow them to perform their work differently. Based on the academics' responses to the open-ended question at the end of the questionnaire, an Architecture lecturer mentioned: "The use of SMAs in class does not alter my teaching ability, but it is one way to add value to my performance. This is a completely different way to deliver teaching compared to the traditional approach and it should be considered as an alternative".

Finally, four factors were included to explore the "Ease of Use" dimension from TAM regarding the academics' behavioural intention to use SM in the lecture theatre to teach: self-efficacy, external control, SM fear, and enjoyment. A one-way ANOVA statistical test was employed to explore the differences between academics' responses, and Table 5.8 depicts the statistical results regarding the comparisons for academics' responses from all three schools.

Table 5.8
Comparisons between the Schools for the Ease-of-Use Variables of SM

Ease of Use variable	School (M, SD)	ANOVA between Schools (α =.05)
Self-efficacy (4-items, a = 0. 865)	English: 4.43(± 1.13) Architecture: 4.80 (±1.19) Computer Science: 4.80 (±0.97)	F (2, 109) =1.391, P =.253, η2 =.026, A simple effect size comparison shows that: there is no significant difference between any of the schools.
External control (3-items, a = 0. 856)	English: 4.80 (±1.37) Architecture: 5.02 (±1.27) Computer Science: 5.24 (±1.0)	F (2, 109) =1.061, P =.350, η2 =.020, A simple effect size comparison shows that: there is no significant difference between any of the schools.
SM anxiety (3-items, a = 0. 904)	English: 3.71 (±0.67) Architecture: 3.85 (±0.88) Computer Science: 3.93 (±0.90)	F (2, 109) =.657, P =.521, η2 =.012, A simple effect size comparison shows that: there is no significant difference between any of the schools.
Enjoyment (3-items, a = 0. 864)	English: 5.28 (±1.42) Architecture: 5.50 (±1.29) Computer Science: 5.28 (±1.0)	F (2, 109) =.342, P =.711, η2 =.006, A simple effect size comparison shows that: there is no significant difference between any of the schools.

(a = Cronbach's Alpha, α: the limit of the significant level, M: Mean, SD: Standard Deviation, F(a,b) is the variance value, p: significant value, η2: effect size)

Like the factors explored when examining the "Perceived Usefulness" dimension, there were no significant differences noted between the academics' responses. However, the size effect varied, with lecturers from the School of English rating all factors lower than the lecturers from the other Schools. All the academics highly rated the enjoyment factor regarding the intention to use SMAs for teaching purposes in the lecture theatre, considering that they had moderated the ability to integrate them without feeling anxious. The academics were not affected by fear (i.e., anxiety, nervousness, and discomfort), but expressed that they would appreciate support regarding the integration of SMAs into their teaching in lecture theatres.

This finding corresponds to the extent to which academics considered that the university infrastructure (External Controls) influenced their intention to use SMAs for teaching purposes during lectures. Notably, it was mainly the Architecture lecturers who thought that making use of SM for teaching purposes in the lecture theatre compulsory would not necessarily positively influence behavioural intention. Table 5.10 reveals there was a significant difference between the schools (i.e., size effects revealed the further difference between English and Computer Science ($p = .024$) between the English and Architecture lecturers ($p = .001$)).

Table 5.9
Comparisons Between the Schools Based on Voluntariness factor to Use SMAs

The variable	School (M, SD)	ANOVA between Schools ($\alpha = .05$)
Voluntariness (3-items, a = 0. 882)	English: 5.55 (±0.76) Architecture: 4.74 (±0.84) Computer Science: 5.02 (±0.92)	$F(2, 109) = 9.026$, $P = .001$, $\eta 2 = .146$, A simple effect size comparison shows that: there is a significant difference between English and Computer Science ($p = .024$), and between English and Architecture ($p = .001$).

(a = Cronbach's Alpha, α: the limit of the significant level, M: Mean, SD: Standard Deviation, F(a,b) is the variance value, p: significant value, η2: effect size).

When combining all the factors comprising Perceived Usefulness, Ease of Use, and the overall intention to use SMAs for teaching purposes in a lecture theatre (Table 5.10), a simple effect size comparison of the 'Perceived Usefulness' and the 'Ease of Use' shows there is no significant difference between Schools with both components. In addition, the academics in each school positively perceived the 'Ease of Use' of SMAs when teaching.

Table 5.10
Comparisons between the Schools' Devices based on Usefulness, Ease-of-Use, and Intention of SMAs Use.

Variable of SM use	School (M, SD)	ANOVA between Schools (α =.05)
Usefulness (17-items, a = 0. 948)	English: 4.70(±1.13) Architecture: 5.08 (±0.93) Computer Science: 4.98 (±0.92)	F (2, 109) =1.409, P =.249, η2 =.026, A simple effect size comparison shows that: there is no significant difference between any of the schools.
Ease of Use (13-items, a = 0. 957)	English: 4.56 (±0.90) Architecture: 4.79 (±0.94) Computer Science: 4.91 (±0.67)	F (2, 109) =1.027, P =.362, η2 =.019, A simple effect size Comparison shows that: there is no significant difference between any of the schools.
Intention (30-items, a = 0. 804)	English: 4.63 (±0.96) Architecture: 4.93 (±0.83) Computer Science: 4.89 (±0.71)	F (4, 109) =1.424, P =.245, η2 =.026, A simple effect size Comparison shows that: there is no significant difference between any of the schools.

(a = Cronbach's Alpha, α: the limit of the significant level, M: Mean, SD: Standard Deviation, F(a,b) is the variance value, p: significant value, η2: effect size).

Academic Behaviour and Intention to use digital devices and SMAs. Lecturer's intention to use digital devices and SMAs in the lecture theatre was explored about the lecturer's prior experience (the number of devices and applications currently used in the lecture theatre for teaching purposes, the number of courses they were involved in, and their years of teaching experience) (Table 5.11). A two-way ANOVA was employed to explore this research question, searching for a difference between Schools and within Schools. Overall, there was no difference between and within the schools regarding the number of devices, as the majority used three devices, and the English lecturers used 3-4 applications when teaching in the lecture theatre.

In terms of the total number of hours academics spent with SMAs in the lecture learning environment, there was no significant difference noted between and within the three schools, as the Computer Science lecturers spent more time than the other academics using SMAs. This was anticipated, as their program already relies most heavily on the use of information technology. Regarding the total number of courses taught by academics, there were no significant differences observed between the schools, although it seems that the Computer Science lecturers had less experience than the other academics, which might have influenced their teaching experience in terms of using SMAs for teaching purposes in the lecture theatre. It was also found that English lecturers' intention to use SMAs increased, as they taught more courses, and felt more confident about using the applications during lectures.

Table 5.11
The Effect of SMAs Use, Courses, and Experience Related Academics' Behavioural Intention Associated with Devices and SM in a Lecture Theatre.

Behavioural Intention	English (M, SD)	Architecture (M, SD)	Computer (M, SD)	ANOVA between Schools and within each School (α =.05)
A total number of devices lecturers normally use in a lecture theatre.				F (4,109) =0.659, p=0.107
One device	4.31 (±0.7)	4.68(±1.2)	4.70(±0.6)	English: F (2, 38) =1.146, p =.330
Two devices	4.85 (±0.9)	5.05 (±0.5)	4.86 (±0.7)	Architecture: F (2,38) = 0.773, p =.469
Three devices	4.53 (±1.2)	5.05 (±0.7)	5.42 (±0.5)	Computer Science: F (2,33) =1.784, p =.185
The total number of applications that are used during the lecture time.				F (4, 109) =1.236, p =.266
1-2 Applications	4.24(±1.0)	4.96(±1.1)	4.71(±0.7)	English: F (2, 38) = 3.798, p =.032
3-4 Applications	4.97(±0.7)	4.96(±0.5)	4.99(±0.7)	Architecture: F (2, 38) =.109 p =.897
≥ 5 Applications	5.41(±0.0)	4.77(±0.9)	5.18(±0.8)	Computer Science: F (2,33) =0.824 p =.448
Hours in using SMAs for teaching in a lecture theatre.				F (4, 109) =0.749, p =0.561
1 -2 Hours	4.57(±1.1)	4.65(±1.1)	4.75(±0.7)	English: F (2, 38) = 0.116, p =.891
3-4 Hours	4.74(±0.4)	5.16(±0.6)	4.98(±0.7)	Architecture: F (2,38) = 1.426 p =.254
5 Hours	4.65(±0.8)	4.86(±0.6)	6.20(±0.0)	Computer Science: F (2,33) =2.254 p =.122
Course(s) that lecturers usually use SM in the teaching delivery process.				F (4, 109) =0.264, p =0.900
1 course	4.63(±1.1)	4.76(±1.0)	4.92(±0.8)	English: F (2, 38) = 0.034, p =0.966
2 courses	4.56(±0.9)	5.13(±0.5)	4.86(±0.7)	Architecture: F (2,38) =0.660 p =.523
3 courses	4.69(±0.4)	5.01(±0.6)	4.91(±0.4)	Computer Science: F (2,33) =0.021 p =.979
Teaching experience in higher education.				
1-4 Years	4.32(±1.4)	4.61(±1.0)	5.12(±0.8)	F (4, 109) =.961, p =0.433
5-10 Years	4.58(±0.8)	5.02(±0.5)	4.79(±0.5)	English: F (2, 38) = 0.198, p =0.821
≥ 11 Years	4.68(±0.8)	5.08(±0.8)	4.64(±0.7)	Architecture: F (2,38) =1.153 p =.327
				Computer Science: F (2,33) =1.175 p =.323

(α: the limit of the significant level, M: Mean, SD: Standard Deviation, F(a,b) is the variance value, p: significant value).

Qualitative Data Analysis

All the interview responses were transcribed and encoded. By listening to tape recordings, the researcher gained full access to relevant information concerning interactions. Each lecturer who participated in the interviews was given a specific code to anonymise their identity. Topics that emerged and were analysed included device use, SMAs' usefulness, ease of use, and lecturers' intentions about the learning environment, corresponding to the variables identified in the thematic analysis discussed in chapter 2.

Devices Use. Additional to the quantitative results, the interviews revealed the smartphone was the device most frequently used by academics in the lecture theatre setting in all three Schools, whereas the Architecture lecturers used multiple digital devices in their lectures. When the academics were asked if they allowed their students to use their own digital devices during lectures, their responses affirmed this, pointing out the importance of using digital devices in the lecture theatre only for specific learning activities.

Architecture lecturer: "I do not allow the students to use smartphones and other digital devices and SM when giving a lecture. I allow them only to use it for specific learning tasks".

Computer Science lecturer: "In my opinion, a smartphone is only useful for certain desired learning activities".

The use of SMAs instead of LMS. Although Blackboard was the main LMS used in UQU, the academics were dissatisfied with the learning environment, the support they received and its functionality. Therefore, they compared this virtual learning environment with SMAs, observing that they preferred them over Blackboard.

University infrastructure and university policy on the use of SMAs: Everyone agreed that the university needs to invest more in the campus infrastructure. The response below from an architecture lecturer represents the view held by academics at other Schools as well:

"If basic requirements, such as a high-performance infrastructure were given on campus and in lecture theatres (network, Wi-Fi, etc.), we could use SMAs effectively for student learning".

The lecturers interviewed indicated that UQU's Internet infrastructure restricts access to certain SMAs, such as YouTube and certain instant messaging programs. Nevertheless, students can access most of the platforms via their mobile networks. The academics reported it as a potential issue as their teaching work was affected by the university's actions to block several

SM platforms, forcing them to use other SMAs or work on those platforms that were available. All the academics interviewed at UQU confirmed that they had voluntarily used SMAs to improve their teaching, indicating that Umm Al-Qura University had officially accepted SMAs for teaching, but they had concerns about this use for teaching and learning purposes. For example, a computer science lecturer said that he preferred “UQU not to officially adopt SM, but to leave it up to the lecturers’ personal choices. Currently, the age difference between academics is evident, and they all have various perspectives and use different pedagogical tools, so a higher education policy creates dilemmas that are without much impact, this matter should stay that way until the benefits of SM become apparent".

The academics also considered the lack of training on how and why they and their students could use digital applications during lecture time. Although they have already used learning technology to enhance their teaching, they needed support to prepare the adjust their material to new and updated systems. For example, the quote from the computer science lecturer below represented well the discussion around this area.

“I don't know how to manage my students over the lecture time, or how to use SM correctly… please support me regarding the digital applications and how they work and how can I use SMAs during the lecture without distracting the students? What are the advantages of using SMAs compared to the traditional teaching methods?”

Finally, they also mentioned that the University has provided several free applications, such as Blackboard and Microsoft Teams, with limited functionalities for practical subjects, such as Architecture which expects students “to have pencils in hand to draw, take pictures, and save huge image files. For example, Blackboard didn't support us with the image uploading process” which led academics to find another web-based application.

The use of SMAs for teaching and learning purposes in a lecture theatre: Some other lecturers have also mentioned that the use of SMAs has highly linked to "…the course/subject in the school", while their experiences with SMAs differed across all schools. For example, a computer science lecturer used “Telegram for chat, and discussion with students and Duo for online meetings”, while an architecture lecturer used “Facebook and Messenger to communicate with the students and set up working groups to download some information and learning materials on closed pages so that the students can share them directly”. Many of the lecturers used Twitter to share news and provide course information to their students, while Snapchat was reportedly one of the most widely used tools for learning in schools. The YouTube application was popular among many lecturers from different schools, as it has been used “as a virtual library to support learning content and to give students access to videos to better illustrate complex concepts, procedures, and ideas” (Computer Science Lecturer). An architecture lecturer has also mentioned the importance of using SMAs for learning purposes, as students could “save material and resources online through YouTube, Instagram, or any other SM platform which allow them to create a library of data from which they can obtain the information they need to complete an assignment”. Further opportunities mentioned by other lecturers allow students to relate to study groups, access multiple educational channels, watch videos or share documents, receive information from multiple sources to further their understanding, post a tweet and get a comment allowing them to discuss and write questions.

The integration of SMAs into the teaching process. It has been mentioned by the academics that there were not any recommendations from the University on how they would integrate SMAs into their teaching approach, which has not assisted teachers with the teaching design process. For example, an architecture lecturer stated: “This is made possible by attending workshops intended for academics who have used SM and for those who have not. The lecturers can then determine a method of integration that is appropriate for the courses they teach”. Lecturers might also have different needs for their modules (Computer science lecturer: "My approach to learning is a collaborative one, where groups of students work together to solve a problem or a task"). Although the academics have discussed interesting ways to integrate SMAs into their courses, such as students accessing SMAs before a lecture to reinforce ideas and theories or presenting part of a case study via SMAs and discussing it with students, they all mentioned the need for central rules.

Benefits for students and teachers. Many points have been mentioned by academics when they have been asked about the benefits of the use of digital (social media) applications in a lecture theatre. Although they have emphasised the importance of interactivity and the feedback process, they have also mentioned the potential importance to provide equal opportunities to all in the development process.

Computer Science lecturer: "…people can be good speakers but not so good in the writing skills or they can be good on the writing communication skills but without having strong verbal communications skills. Different types of digital tools require them to develop different communication skills".

Architecture lecturer: "It is effective for lecturers to manage the administrative work; for example, it's the fastest, easiest, and most effective way to manage 140 WhatsApp workgroups rather than using Blackboard groups".

Also, although this project was not highly affected by the COVID-19 pandemic (mainly only several interviews took place over the beginning of the pandemic), the academics found that SMAs (i.e., Dropbox, Microsoft Teams) were very helpful for teaching and learning, as they had witnessed how communication and web-based tools could help them and their students to share information and material resources easily.

Issues about the Bring Your Own Device policy. The academics involved in this study shared the same beliefs regarding the impact on their learning when they would be allowed to bring their digital devices into a lecture theatre. Several academics believed that most students used digital devices for entertaining reasons during lectures, and this might discourage them from taking learning and assignments seriously. An English lecturer drew a clear line stating, "as soon as the lecturer is in the lecture theatre, the smartphone switches off. Nobody has the right to disrupt the teaching", while others were negative about allowing their students to use their digital devices "but also in some cases should be forbidden depending on the lecture course. For example, if the goal of the course requires students to think and search, they could use applications such as Google over the lecture time". Similarly, an English lecturer said that for his lecture it is essential for the students to "watch YouTube videos" which might have "a positive effect on student performance". Additional issues regarding the Bring Your Own Device policy which influenced the teaching process in a lecture theatre were related to privacy protection and rules about controlling SM use during lecture time. Many other lecturers demanded the development of a series of ethical regulations for how SMAs could be used in a lecture theatre for both students and academics (Booklet).

Anxiety (i.e., fear, nervousness, or discomfort associated with the use of SMAs) was also discussed by the academics who were interviewed in this research project. Academics discussed their own experience and/or student integrity issues regarding the use of digital devices and applications in a lecture theatre. Below there are two quotation examples which represent the discussion that took place during the interview process regarding the anxiety that technology brought to academics.

Computer science lecturer: “One of the concerns is that students will film a lecturer in an inappropriate situation and send a tweet to everyone. All these fears are justified. I've experienced such cases”.

English lecturer: “Some academics feel that technology cannot be trusted due to integrity issues (i.e., copy, and paste material from the Internet). Many lecturers, including myself, question the credibility of using technology in the lecture theatre”.

Perceived Usefulness and Ease of Use. Overall, the academics believed that the use of SMAs could be useful for teaching when group management, delivery of online quizzes, course slide disseminations, and assignments were required. Also, the academics that took place in this interview/research project made a clear link between the perceived usefulness to their perceived acceptance from the students.

Architecture lecturer: “It depends on how often you use SMAs in your class. In our time, SMAs have become fashionable for use in educational practice and promote the lecturer's image as an academic".

Additionally, the lecturers connected the ease of use with direct communication, emphasising speed and flexibility, and highlighting the option of a fast upload process.

Computer science lecturer: “SMAs make it easy for students to get instant feedback and communicate with others (i.e., students and/or teachers). I think the use of SMAs could change the way of teaching. Time is saved by giving students instant answers to their questions. If there was an error in a project, an immediate response would save time for teachers and students".

Discussion

Academic faculty adoption of SMAs remains in its infancy, despite a widespread agreement over the critical nature and success of its adoption. As a result, lecturers are often cautious about devoting their full attention and effort to using this tool for instructional reasons (Hashim et al., 2018). In this context, this researcher sought to ascertain academics' behavioural intentions towards using smartphones and SMAs in the lecture theatre, and how SM tools can be integrated into instructional approaches from the lecturer's perspective. Therefore, the quantitative and qualitative findings are discussed in light of the literature and previous research.

Lecturers' Behaviour and Devices

There were no differences in terms of the devices that academics mainly used in lecture theatres. In all schools, the majority of lecturers used their smartphones more than other devices. By comparison, desktop usage proved to be low among all academics from the three schools. Compared with the other schools, multiple devices were more prevalent within the architecture School, resulting in the incorporation of various devices into the lecture theatre. In contrast, except for smartphones and laptops, computer science lecturers use a limited number of devices. Meanwhile, English and architecture lecturers are more likely to use tablets.

According to the qualitative findings, the reasons for using smartphones more than other devices such as laptops and tablets as mainstream devices is due to their easy accessibility and increasing use, as smartphones are the dominant device used by academics, according to the current study. Additionally, it has been discovered that using mobile devices in the classroom enables academics to blur the lines between formal and informal education. Additionally, due to the findings of the previous chapter's student surveys, the students developed a greater reliance on smartphones than on other devices.

A similar previous study conducted by Busulwa and Bbuye (2018) ascertained that smartphones are becoming more accessible, as they are considered standard educational tools, like books, pens, and pencils. According to Anshari et al. (2017), smartphones are now the most extensively used devices in the educational context. They also noted that the use of various devices in class, emphasizes a key benefit of smartphone usage, which is having instant and appropriate access to information, including presentation of course content, discussion forums, course readings, and videos to view lecture topics. Additionally, Bijlsma et al. (2019) discovered that academics frequently used their smartphone applications to collect student feedback, develop lessons, and take improvement-oriented actions in response to student feedback. They added that students report a slight improvement in the quality of teaching when augmented by technological interventions.

SMAs in Lecture Theatres

Regarding the SMAs used by academics, the quantitative analysis identified WhatsApp, Microsoft PowerPoint, and YouTube as the applications most used by academics to assist with the learning process. Academics at the School of Architecture make extensive use of these three applications, as well as several other applications. This is probably due to the course and the subject requiring the use of SMAs in teaching, particularly when in design studios.

Additionally, the academics surveyed mentioned other applications they used in class, including Telegram, Facebook Messenger, Zoom, and Snapchat. Zoom is an application designed specifically for screen sharing and communicating via sound and images. The lecturers also mentioned hosting sessions on Snapchat to answer students' questions about the course. Many educators prefer Snapchat to Instagram, YouTube, and even Twitter. Although, the majority of lecturers noted that they use Twitter to make course announcements and share news. Snapchat is one of the most frequently used tools for classroom instruction. It is more beneficial than other apps, particularly after school. These findings can guide other educators who are incorporating SMAs into their courses.

Arshad and Akram (2018) argued that, while SM platforms were not explicitly created for educational purposes, they have excellent potential to initiate collaboration and promote the dissemination of information and exchange of resources among the members of academic society. Despite this, the interview findings reveal that currently, UQU University requires academics to use Blackboard as their primary platform. The University is pushing faculty members to use this LMS for communication and instruction. The academics observed that they believed this was because the University's objective was to document instructional activities. Moreover, they explained that they are required to use further applications in addition to Blackboard to readily communicate with students, particularly in light of the circumstances of the COVID-19 pandemic. Thus, to facilitate understanding of the use of SMAs in the university setting, the investigated lecturers recommended that academic institutions consider local applications of SM in the learning environment and update their regulated rules and policies accordingly.

In the above, the current situation regarding the use of devices and SMAs in teaching contexts was discussed. Details of the behaviour of the lecturer when using the various applications available in the lecture theatre were also collected, as were the different types of applications, and their potential. The findings revealed that SMAs provide a variety of utilities to support the teaching process. The opportunities that SM offers to augment academic teaching are also well known. According to the researcher, the difference in opinions and the diversity of behaviour do not provide a practical benefit that can be accepted by everyone. In addition, many of the applications were not able to sufficiently support lecturers to deliver a satisfactory and effective teaching experience.

Based on the comments made, the academics agreed there is a need to develop a pedagogical approach with SM to anticipate the various changes to traditional teaching methods. Some lecturers proposed methods they had tried to use for some applications - for example, notifying students to follow a “hashtag” related to the course on Twitter to start a pre-discussion to prepare students for a lecture, instructing students to preview videos on YouTube about the topic of the lecture and then discuss it in class. Additionally, the lecturers mentioned downloading text files via Google Docs and then sending a link to students via WhatsApp. These individual efforts reflected some of the positive changes academics perceived in students' behaviour, including participation, interaction, collaboration, enjoyment, and perception of additional learning resources. In addition, the faculty members took advantage of many of the practical functions of SM, such as file sharing, discussion groups, quick feedback, tutorial videos, and noting the effectiveness and availability of their own devices.

Similar findings were perceived in the previous literature. For example, Moghavvemi et al. (2018) found YouTube to be an effective tool to enhance the learning experience when the video was relevant to the course topic. In addition, Chawinga (2017) emphasized that the response rate of students using Twitter through an open-ended question experiment was remarkable, while there was almost total silence in class (F2F). Vivakaran and Neelamalar (2018) stated that Facebook and WhatsApp were the most popular SM platforms among faculty members, followed by Google, LinkedIn, Google Scholar, and ResearchGate. Previously, Arshad and Akram (2018) found that the most preferred SM platforms for educational purposes were Facebook, LinkedIn, YouTube, and Twitter.

Alabdulkareem (2015), stated that Saudi academics and students are willing to use SM for educational purposes because they believe it will enhance their educational experience. He added, however, that practice in this field is limited, and that the importance of evaluating one's use of SM is essential to improve his/her teaching skills. These results are in line with the findings of Manca and Ranieri (2016), who stated that the use of SM remains restricted. In some cases, academics are not interested in incorporating these tools into the teaching environment for reasons such as institutional limitations, cultural resistance, and pedagogical challenges. However, there are differences in how academic lecturers use or perceive SMAs across academic disciplines, and this is largely determined by the academic discipline they teach. In general, the findings highlight the questionable attitudes toward the benefits and challenges of SMAs in higher education, as there appear to be more barriers than benefits. Khan et al. (2016) stated that supporting learning which promotes collaborative and reflective independent opportunities through the use of SMAs may also create and maintain a student community and promote projects or group assignments. This is a point which has been also revealed from the findings of this research project.

Teaching Purposes

Lecturer behaviour towards SMAs manifests in two ways: in class and daily life. The significance of teaching intent became clear, with the most frequently used purposes being "Communicate with students in the lecture class", "Send information about the course", and "Share learning material with students". However, other teaching purposes such as "Receive Assignments", "Create Tests", "Respond to Student Contributions," and "Distribute Videos and Web Links Relevant to Course Topic" were shown equally to all academics. A survey by Lupton (2014) found that 97% of the 711 participants surveyed used SM for academic purposes, such as developing personal networks, self-promotion, research, teaching, and support. Additionally, the findings from the lecturers' interviews indicate that academics from the three schools strongly advocate the use of SM in the classroom. They emphasized several reasons for this, including the following: 1) How the new generation of students perceives technology; 2) If the new generation has the potential to capture student's attention more than the traditional approach; 3) Contribute to improved learning outcomes; 4) Students who participate feel more confident when asked questions and participating in discussions; 5) Enable the creation of separate groups for each course; 6) Promote group discussion; 7) Simplify and modernize the educational system; and 8) Provide a range of academic methods, both applied and theoretical.

However, the current study found the attitude of academics toward SMAs is now high. This finding is significant as Vivakaran and Neelamalar (2018) affirmed that research concentrating on a teacher-centred approach to analysing academics' perspectives regarding the usage of SM platforms for teaching purposes is limited.

In the literature, Sobaih et al. (2016) concluded that SM use is considered a high priority for educational reasons, notably as a learning and teaching tool, and so it may be developed as a creative and effective teaching and learning tool. Gruzd et al. (2018) create a comprehensive picture of SM use in new educational initiatives by examining the variety of media used and the different aims related to SM use. They discovered that lecturers' attitudes toward SM had attained near-optimum levels. Consequently, this conclusion is consistent with Tezer et al. (2017), who reported that academics with more favourable attitudes toward SM were typically more academically successful than those with negative attitudes. Additionally, they demonstrated that prospective lecturers with SM account outperformed those without.

If it compares the use of SMAs by lecturers to assist with other aspects of daily life, the analysis shows that lecturers use digital applications significantly in their daily lives. This reveals that most lecturers are safe to use SM in their daily lives, rather than for teaching. It may also be imperative to disclose the attitudes of some academics, which corroborate some of the comments made by lecturers. For example, they consider that SM is not a learning/teaching platform, as it is used for communication, whereas other specific educational platforms are used for educational purposes. Despite the impact of SM on teaching and learning activities in higher education, the acceptance and introduction of this technology in the context of teaching and learning are not yet well understood (Manca & Ranieri, 2016).

Alharbi and Lally (2017) confirmed that academics respond positively when discussing technology they use in their free time, with most of them believing that the use of SM is essential. According to Alharbi et al. (2019), academics in Saudi Arabia have responded positively to the use of technology in their private lives. However, the majority do not have the technical knowledge necessary to use technology effectively when teaching. In an earlier study, Alzahrani (2015) noted that faculty members reported a high level of awareness of the importance and usefulness of technology, and tended to employ technology-based pedagogical approaches.

The findings from this study indicated that academics have previously utilised SMAs in the learning environment for a variety of purposes. However, it should be noted that lecturers have distinct opinions regarding the differences between their daily life and their professional practice. In each case, when discussing educational purposes they mentioned scientific communication, sharing information and documents, sending links to instructional videos, soliciting feedback, and transmitting evidence. Thus, a similar argument could be made regarding behavioural intent to use SMAs to teach in the classroom.

Academics' beliefs about how students use SMAs for academic and non-academic purposes are almost identical. As a result, some educators expressed concerns about the use of

SM for other purposes. They identified reasons for non-learning, mentioning students' individuality, and the commitment and management of the lecturers. They, therefore, recommended that strict guidelines be included in the course program, so students know what is expected from the outset.

Barriers

Based on the quantitative results obtained, it was observed that academics in most schools encounter significant barriers to using SMAs in the lecture theatre. The lecturers at the architecture school were more afraid of loss of privacy and security than those from the other two schools. There was also a significant difference between schools with two barriers: lack of university infrastructure and loss of control over teaching. Due to the lack of university infrastructure, the English school was the highest and computer science the lowest. In addition, compared to English and architecture, the School of Computer Science experienced the greatest loss of control over teaching.

This research project identified barriers to the integration and use of SMAs for teaching. The significant barriers encountered include lecturers' fears about loss of privacy and security, lecturers' concerns about the use of SM, lack of university infrastructure, lecturers' lack of interest in using SM, lecturers' lack of understanding about how SM can support a lack of learning time, lecturers' loss of control over teaching, and lecturers' inability to integrate SMAs into learning.

These barriers reveal the difficulties academics face when they are ready to use SMAs in the classroom. These might also be related to their support for teaching in school. This can also help lecturers in different programs demonstrate different teaching behaviours in the classroom. Kong and Song (2015) observed that electronic devices and SM offer opportunities and challenges in the contexts of higher education and provide advantages and cause frustration to students and lecturers, as academics also have to solve technical problems and create backup plans for students when their devices do not work properly.

Alhassan (2016) identified some potential barriers to the use of mobile learning technologies, such as the cost of using a smartphone for mobile learning and; the opposition of students or faculty members to the use of the mobile learning style that the university may face. Anshari et al. (2017) found that some challenges with smartphone integration were that it led to distraction, addiction, a lack of practical skills, and low-quality personal interaction. It is impossible to perform all teaching tasks through SM because it is a comprehensive tool. However, SMAs are easy to learn and can be used readily by lecturers, but not all are prepared to do so.

In terms of the barriers that cause academics to avoid using SMAs in the classroom, two stood out: a lack of university infrastructure and perceived loss of control over teaching. In terms of the practical concern, numerous challenges associated with using SMAs in a lecture theatre were noted, including Internet connectivity, privacy, time constraints, misunderstandings, and audience control, as well as low compatibility with a wide variety of devices, and the challenges associated with the fact that some of these applications are supported for theoretical subjects, but not for practical subjects.

During the interviews, the academics identified a significant critical barrier to using SMAs in a lecture theatre: 1. Since SMAs provide access to a wealth of resources not available through traditional teaching methods, debates about the lecture format inevitably arise. Therefore, this means that SMAs allow for the exploration of broader concepts and topics to enrich teaching and certain points that were off-topic in the lecture or course. 2. Students may approach lecturers for clarification and address issues they were ill-prepared to address. As a result, some lecturers stopped using SMAs to avoid embarrassment. This situation is linked to the lecturer's inability to maintain control over the class, the lecture content, and the duration of the lecture.

Accordingly, academics must adapt their teaching methods to fulfil the new requirements associated with the use of technology in lecture theatres. Huang (2017) reported that lecturers, particularly those who are older and more experienced, struggle to develop new routines and navigate the emotional strain of adapting to new technologies and changing expectations. As a result, resistance to change was found to play a significant role in determining whether mobile devices were adopted by participants.

Training to Use SM for Teaching

The majority of lecturers consulted expressed a need for training in how to use SMAs in the classroom effectively. Training suggestions included the following: 1) Individuals who require adaptation and instruction in the use of SMAs in the classroom. 2) Training must include details of the method of use, process, and technique, emphasizing effective learning outcomes. 3) Training must focus on delivering teaching and course content and content creation using SM technologies. 4) Training should involve organized workshops and include demonstrations of how SM improves teaching and learning quality. However, some question the need for training, claiming that SM is simple to use, and that each lecturer employs their unique method of instruction.

These results are consistent with the previous literature, which recommends training for lecturers on how to use SMAs for teaching. According to Prieto et al. (2017) study on the acceptance of mobile technology by future lecturers, the design of educational practices is important. It requires an emphasis on the usefulness of such technologies to benefit classroom practice and reduce anxiety overuse. For this reason, it was suggested to design a training program that would focus on the various functionalities and use of these technologies in real-world contexts during practical activities. Ogbonnaya (2019) recommended that academic lecturers require training on how to effectively integrate SM platforms to incorporate SMAs into classrooms. This opinion was also shared by Alabdulkareem (2015), who indicates that the infrastructure is available; however, there is no complete pedagogical approach. Thus, it has been suggested that training was needed to evaluate the current situation and improve the skills involved in using existing opportunities.

This study revealed that a restricted campus infrastructure represents a major obstacle to the Internet and applications' compatibility with various theoretical courses. Additionally, university lecturers require more effective Internet infrastructure and networks, including Wi-Fi services, on campus and in university classrooms. Quantitatively, university infrastructure was identified as one of the most frequently cited barriers preventing academics from incorporating SMAs into classroom instruction.

Perceived Usefulness

The five variables indicating the perceived usefulness of SMAs were evaluated both quantitatively and qualitatively, and subjective norms, image, output quality, job relevance, and result demonstrability were identified as variables. The findings indicated that experience of SM usage in teaching contexts positively influenced perceived usefulness.

Moreover, it emerged that academics have compelling reasons for utilizing SM for instructional purposes and that the university is lacking in terms of offering assistance to academics to utilize SMAs for instructional purposes. This finding is consistent with Scherer et al. (2019) who argue that subjective norms have a significant influence on lecturers' perceptions of the educational utility of technology. Additionally, this is consistent with Acarli and Sağlam (2015) and Venkatesh and Davis (2000), who argued that perceived usefulness is influenced by the subjective concept of norms as a process of social impact that informs the main factors associated with behavioural intention. Furthermore, Huang (2017) demonstrated that subjective norms influenced the "intentional behaviour" associated with mobile learning.

When using SMAs to complete classroom activities, the lecturer's image was evaluated both quantitatively and qualitatively. A simple effect size comparison revealed no significant differences between the schools. However, for each school, the scaled value was identified as being slightly high. Thus, there was a clear perception that prestige, popularity, university support and certain aspects of teaching necessitated the use of SM. Lecturers expressed favourable opinions during the interviews, that doing so positively influenced the lecturer's image. They felt assured that the lecturer's image would not be damaged by the regular use of platforms if done for a specific purpose and according to clear regulations. In contrast, a distorted image was created when the lecturer failed to communicate with students or if they used SMAs for non-educational purposes. Students prefer lecturers who utilize SMAs, enabling them to reach a larger audience to promote their image.

Another perspective arose when interviewing lecturers about their perceptions of being members of the teaching faculty, and whether the majority of those who care about them believed they should teach. Today, SM has evolved into a fashion statement that is incorporated into classroom practice and serves to enhance the image of the lecturer as an academic. The literature contains the assertion that perceived usefulness is also motivated by the concept of the image as a process with social impact (Acarli & Sağlam, 2015; Venkatesh & Davis, 2000). Concerning the benefits of using SM, the image enabled more frequent and rapid interactions with interested groups, resulting in more mutual relationships (Cox & McLeod, 2014; Van Den Beemt et al., 2020). Additionally, SM enabled educators to cover and share more than their perspectives (Cox & McLeod, 2014).

Finally, the lecturers' comments demonstrated the importance of SM, as represented by subjective norms and individuals who shape behaviour or are influential members of the teaching profession. However, it is associated with reduced motivation to use SM as a result of insufficient university support. Along with the lecturer's image, the data could be promoted through the use of SM in the lecture theatre. Additionally, lecturers indicated their level of belief concerning the relevance of SM in the lecture theatre but also acknowledged the possibility of requiring a supportive educational environment.

Both quantitative and qualitative evaluations of "output quality", as a characteristic of the SM system yielded positive results. Thus, perceptions of high quality and the benefits of SM production are evident in all lecturers' responses, as they roughly correspond to SM's production quality. Furthermore, qualitative findings indicated that SM produces tangible classroom outcomes. These observations also indicate that academics are satisfied with the results obtained when SM is used in the lecture theatre. Additionally, they are confident that doing so ensures they can satisfy educational requirements. They are also pleased with the quality of the results obtained through the use of SM in the learning environment and have confidence that these will be designed to meet academics' infrastructure, training, and control requirements. Thus, the perceived benefits of SMAs in the lecture theatre are self-evident from the lecturers' perspective.

The findings indicated no statistically significant difference between the schools in terms of "Job relevance" when using SM. However, the interviews with lecturers revealed debate and disagreement about the "job relevance" of using SM in the classroom. Additionally, lecturers indicated their level of belief in the relevance of SM in the lecture theatre but acknowledged the possibility of requiring a supportive educational environment. This finding is consistent with the literature since it is stated that perceived usefulness is also influenced by job relevance as a cognitive instrumental process (Acarli & Sağlam, 2015; Venkatesh & Davis, 2000).

“Result Demonstrability” was assessed as a measure of perceived usefulness associated with the system's characteristics. There was no difference observed quantitatively. All the academics indicated a favourable attitude toward the verifiability of the results in terms of clarity, contact with colleagues, and explanations of the benefits/disadvantages of using SM. Consequently, the findings also indicated a positive correlation between the demonstrability of the results and perceived usefulness when using SMAs for teaching. This finding is consistent with the literature, as perceived usefulness has been shown to influence the concept of demonstrability of results as a cognitive instrumental process (Acarli & Sağlam, 2015; Venkatesh & Davis, 2000).

Perceived Ease of Use

The variables indicating 'Ease of Use' as a means to employ SMAs for teaching were quantitatively and qualitatively evaluated. They are also considered variables showing individual differences. They include self-efficacy, external control, SM anxiety, and enjoyment.

A comparative analysis of self-efficacy shows no significant differences between schools. Thus, academics from the three schools were ‘more or less’ positive about the benefits and tasks SM can offer. They include improving teaching quality, access to new instructional materials, and increasing confidence when using search engines to locate information. Additionally, the lecturer's self-efficacy is also reflected in the lecturer's belief in their ability to perform teaching tasks taking advantage of SM functions, for example, file sharing, discussion groups, quick feedback, instructional videos, virtual classes, quiz design, as well as efficient accessibility via their own devices. In addition, the academics were aware of the benefits of using SMAs in the classroom, such as diverse applications, inexpensive, accessibility, user-friendliness, user-friendly interfaces, and constant use. Moreover, they acknowledged that SMAs use can improve student interest, attendance, curiosity, enthusiasm, interaction, and engagement.

According to Huang (2017), self-efficacy was critical in determining lecturers' perceptions of the scale of 'Ease of Use' and 'Anxiety' associated with mobile learning. In the context of e-learning, Park et al. (2012) reported that self-efficacy has a positive effect on perceived 'Usefulness' but a negative effect on lecturers' fears about mobile learning. Self-efficacy and 'Ease of Use' were both judged to be high in this study, whereas anxiety was low, which is consistent with the findings of those two previous studies. Additionally, Scherer and Siddiq (2015) described lecturers' self-efficacy, as partially explaining perceived 'Ease of Use,' as it challenges beliefs about an individual's ability to perform tasks using technology.

Furthermore, self-efficacy could be interpreted as the perception of competence based on previous experience with mastery that facilitates future commitment or anticipation of commitment as regards certain activities; they also determine perceptions of task difficulties and possible mastery (Bandura, 1999; Scherer & Siddiq, 2015; Tschannen-Moran & Hoy, 2007). Huang (2017) identifies self-efficacy as a significant factor influencing lecturers' acceptance or rejection of mobile devices in the classroom, with the greatest direct effect on the behavioural intention for this type of learning. Consequently, academics interviewed recommended a university engagement activity that would increase lecturers' use of SM. Additionally, they requested additional measures to enhance lecturers' self-efficacy when using personal devices and SMAs to facilitate teaching.

The quantitative analysis of the 'External Control' measure shows no significant difference between schools. Thus, the lecturers were not very satisfied with the organizational and technical infrastructure at the university. Thus, the lecturers' comments revealed some complaints about network efficiency on the UQU campus and in the classroom. Additionally, the lecturers agreed to a certain extent regarding the level of control, resources, skills, and knowledge that would facilitate the use of SMAs when teaching.

In terms of the organizational and technical infrastructures implemented by the university, having an internet connection is key, as losing it could complicate the teaching process. According to Huang (2017), a high-quality wireless Internet environment is vital for lecturers and students who wish to have a positive mobile learning experience. In addition, they regarded it as a necessary condition demonstrating behavioural intention.

The previous literature has indicated that certain negative behaviours may influence SM use for teaching. According to Baragash and Al-Samarraie (2018a), browsing web resources and SM can negatively affect students' online homework, especially in Web-IL (Web-Individual Learning). In contrast, Wingo et al. (2017) focused on educators' perceptions of online teaching and found that online teaching typically offers academics opportunities for professional development and greater control over their class schedules.

According to the qualitative findings reported here, lecturers need access to manageable platforms to allow them to control the learning environment and restrict access to it for their students. Some lecturers demanded classroom apps that they could manage, while also assuring student and lecturer engagement. Therefore, they require a control system to monitor students' use of devices during class, and policies governing SM use in the learning environment. Students and lecturers are expected to also follow a set of ethical guidelines when using SM. However, the university's administrators must maintain their ethical oversight by inserting a section on personal devices and SM in the student policy book (rights and obligations).

Quantitative analysis reveals no significant differences between the schools in respect of ‘Anxiety’ as all academics experienced less anxiety when using SM to teach. Aspects such as fear, nerves, and discomfort did not affect lecturers’ SM anxiety about use. Rather anxiety proved to be related to lecturers' concerns about trustworthiness, control of presentations, abuse, and invasion of privacy. One of the concerns about using SM is that students will film the lecturer in an inappropriate situation or send a tweet to SM. In addition, caution was urged about plagiarism, copying, and pasting from the Internet. Now Google can perform a multitude of functions many lecturers question the credibility of using technology in education. Sánchez et al. (2020) found that the design of educational interventions is crucial when wishing to emphasize the usefulness of using mobile technologies in learning practice and reduce fears. It is possible to reduce concerns by developing a training program focused on the various functionalities and uses of these technologies in authentic contexts and practical activities.

‘Enjoyment’ as a user-friendliness variable is expressed about certain aspects of joy, pleasure, and fun that a lecturer can experience when using SM in teaching. Quantitatively, a simple comparison detailing the effect size of ‘Enjoyment’ showed no significant differences between schools. The scoring level revealed comparative correspondence in terms of the enjoyment of using SM. In the literature, more attention is paid to playful perceptions (perceived enjoyment) as a determinant of user behaviour. This is identified as the degree to which a current or potential user believes that a social network site will bring a sense of joy and pleasure (Dumpit & Fernandez, 2017; Sledgianowski & Kulviwat, 2009). One of the goals of online services is to provide an engaging and enjoyable user experience to motivate and engage users. Consequently, the literature suggests service providers should continually provide a user-friendly experience when using their websites, as user-generated content services are influenced significantly by perceived joy (Dumpit & Fernandez, 2017; Oum & Han, 2011).

It emerged that the lecturers interviewed had varying intentions about the usage of SMAs in a lecture theatre. This could be connected to the widespread notion that SM is utilized for recreational and entertaining purposes. However, this was also reflected in suggestions and comments made underlining the importance of controlling and regulating SM use in the classroom to ensure that students' educational and utilitarian goals are met. Interestingly, this debate parallels that raised in earlier studies. They indicated that perceived ‘Usefulness’ is a variable that predicts intended the use of SMAs. It also relates to the type of technology employed, whether for pleasure or utility purposes (Dumpit & Fernandez, 2017; Ernst et al., 2013; Moqbel, 2012; Sledgianowski & Kulviwat, 2009). Dumpit and Fernandez (2017) claimed that because SM may be utilized as a hedonic technology, it fosters communication and entertainment among users. As a consequence, users may adopt additional technologies for more efficient procedures and practical applications.

Regarding the 'Voluntary' nature of SM use in the classroom, the qualitative analysis reveals a significant difference between schools. This finding fits with the literature, stating that perceived usefulness also influences the concept of volunteering as a process of social impact (Acarli & Sağlam, 2015; Venkatesh & Bala, 2008).

Quantitatively, the results reflect the fact that lecturers positively perceive the 'Usefulness' of SMAs for teaching. Consequently, the behavioural intentions scale shows no significant difference between schools. This result is consistent with the previous literature and confirms that both perceived 'Usefulness' and the perceived 'Ease of Use' had a significant direct influence on behavioural intention, and were identified as the chief reasons for the acceptance of mobile learning (Elkaseh et al., 2016; Hart & Laher, 2015; Huang, 2017; Kim, 2014).

Regarding SM, Arshad and Akram (2018) suggested that a person's propensity for SMAs functions (collaboration, communication, and resource sharing) catalyses their adoption. In addition, perceived 'Usefulness' and 'Ease of Use' convey the relationship between these incentives and outcomes. The remainder of the literature identified the two components, 'Usefulness' and 'Ease of Use' as intrinsic to SM when compared to other technologies. Therefore, when lecturers regularly use information and communication technologies, they often use SM to collaborate with colleagues in one way or another (Arshad & Akram, 2018; Koh & Lim, 2012).

Time, Courses, and Experiences

In terms of the total number of hours that academics dedicate to SM in the classroom, there were no significant differences between the lecturers' intentions at all schools. By comparison, the average number of hours Saudis spend in general utilizing SM networks is 3 hours and 6 minutes per day per person (Hosain AlHazmi, 2021). This average might suggest that using SM in class involves wasting time, which is at a premium as lectures are typically only

45 minutes. A similar study by Alharbi (2013) found that some Saudi academics are unwilling to use technology because classes and lectures do not exceed 45 minutes. This explains why the majority of academics use SM in their spare time. It is well known that the challenges of embracing technology-based learning and leveraging technology vary between academics and students. Several studies, such as those by Alharbi (2013) and Alshahrani and Al-Shehri (2012) contend that the majority of Saudi academics are not expected to use technology in their classes, and most do not do so because class time spent in pairs is insufficient. On the other hand, Abe and Jordan (2013) found that SM encourages the participation of students in real-time in courses that permit lecturer-student interactions. SM apps could be used as a cheap tool for educators to use, and also develop students' intellectual skills.

Concerning the total number of courses, there were no significant differences between schools in terms of lecturers’ intention to use digital devices and SMAs in a lecture theatre due to the increasing number of courses. Regarding the increase in the total number of years of experience of lecturers, there were no significant differences between schools in terms of the intentions of lecturers to use SM for their teaching. In addition, there was no significant difference in terms of academic intentions within any school. On the contrary, Pavlou and Vryonides (2009) confirmed a connection between lecturers’ attitudes and length of teaching experience.

Conclusion

In conclusion, this research project found that almost all academics rely heavily on smartphones in their personal lives. This finding is consistent with the fact that a large percentage of Saudis own smartphones. In addition, there is a consensus in the literature that these devices will comprise a component of educational requirements. Consequently, academics may choose to integrate smartphones into the classroom, learn how to create interactive classrooms using technology, and enhance students’ interactions.

The chief obstacles to the use of these technologies were the resistance of academics to students’ use of personal devices in the classroom. Therefore, this study confirms what previous researchers have called for to establish appropriate rules to ensure the use of these devices for educational purposes and to avoid any distractions when using them in the classroom. In addition, usage regulations should be established to ensure that students comply with these rules, so that faculty members are in a position to accept those students who choose to use smart devices during lecture time.

The university infrastructure is also considered one of the most cited obstacles preventing lecturers from using SMAs in classroom teaching. Therefore, this project reveals that academics demand more effective Internet infrastructure and networks, including Wi-Fi services, on campus and in lecture theatres. Umm Al-Qura University hired Blackboard as its main LMS. However, academics criticise it when comparing it with the accessibility and usefulness of SM platforms, possibly due to a lack of training and technical support.

Despite the daily use of SM, this study affirms the findings of previous studies, emphasising that the adoption of SM in Saudi universities is still at an early stage. In addition, these results align with the previous literature that confirms academic lecturers need to be trained to use SM in their teaching, and more research is needed to determine how SM platforms can be effectively integrated into educational settings. Hence, this study suggests that greater efforts need to be made to ensure lecturers have the requisite skills for classroom use.

The study highlighted some additional barriers that prevent academics from using SM in their classroom teaching, e.g., lack of time, fear of loss of privacy and security, lack of control over student participation, and loss of control over the class. Furthermore, these barriers relate to the classroom environment from different dimensions, as lecturers teach through a blended learning approach using F2F and SM platforms. Lecturers noted that lecture time may be insufficient to allow SMAs to use and expressed fears about loss of privacy and security online, and difficulties managing student participation resulting in the ability to control the classroom environment.

The research identified WhatsApp, Microsoft PowerPoint, and YouTube as the most popular applications used by UQU academics to assist with the teaching process. However, the lecturers interviewed mentioned additional processes that were achieved through additional applications such as Telegram, Snapchat, and Zoom. Based on previous studies, it was found that SM, such as YouTube videos on the topic of the lecture, could be incorporated into the teaching approach in an informative-educational way to enhance engagement, critical thinking, and accelerated deep learning.

UQU academic lecturers agree that the new generation of students is accustomed to using technology and SMAs have become an important part of their lives. However, they reported some negative views regarding the use of SMAs in the classroom, confirming that performing all teaching tasks using SM as a comprehensive teaching tool is challenging. As a result, UQU lecturers have driven the development of teaching applications available through SM platforms that can be managed by lecturers in the classroom, ensuring the active participation of students and lecturers, linked only to learning services, and avoiding distractions. One interpretation of this is that academics require the development of SM platforms that are explicitly aimed at classroom activities.

This study shows no significant differences in terms of either perceived usefulness or ease of use. However, UQU academics are positive about the usefulness and ease of use of SMAs for teaching. Consequently, the scale of behavioural intentions also shows no significant differences between the schools. Therefore, academics have the behavioural intention to use SMAs in teaching. These findings are consistent with those identified in the literature, which confirms that both perceived usefulness and perceived ease of use have a significant direct impact on behavioural intention and are the main drivers of the use of SM technologies in education. Additionally, this study supports the previous literature, which states that if scientists routinely use information and communication technologies, they often use SM.

According to the interviewed lecturers' suggestions, control of the blended environment during lecture time can be achieved using three methods: (i) the adoption of regulations on the use of SMAs in the classroom; (ii) designing a university intranet; and (iii) meeting the primary needs of lecturers, in terms of training and technical support, the network and internet infrastructure, as well as the establishment of a sophisticated practical SM platform allowing academics to readily control of the teaching environment during lectures.

CHAPTER 6 - Evaluation of Blended Synchronous Teaching and Learning (BSTL) via Kahoot/Padlet platforms (Student and Lecturers view)

Abstract

This research project explores the use of Blended Synchronous Teaching and Learning (BSTL) by applying web-based learning platforms. Saudi students' and lecturers' views were examined in synchronous lecture sessions using two different web-based platforms, Kahoot and Padlet. The researcher surveyed students using a questionnaire and interviewed the lecturers. Factor analysis and Cronbach's Alpha were used to explore the students' engagement response to the questionnaire (quantitative analysis). The transcripts of the interviews with the lecturers were analysed to identify the lecturers' attitude, experience, and satisfaction with the teaching and learning processes, communication, feedback, and students' participation and interaction (qualitative analysis).

The findings indicated that the students exhibited a high engagement level during the synchronous lecture, but the self-regulation scores were poor. The KSA academics felt that this approach increased interactions between teachers and/or students, increased student participation, facilitated communication and feedback, and enabled teachers and students to monitor teaching and learning processes in real-time. It was concluded that this approach effectively overcame the technological barriers that students and lecturers usually face that lead to a lack of student engagement and participation, a lack of control by the lecturers and a lack of monitoring of the teaching and learning process. The findings also suggest, however, that high levels of engagement do not necessarily lead to high levels of self-regulation. This finding tallies the findings of the case studies in the first project (Chapter 4) and affirms the fact that students need to be trained to use such technologies for educational purposes. Additional research is required to fully understand this complex relationship across different learning contexts.

Introduction

The previous two chapters explore how students and lecturers from three different university schools perceived that technology could support the learning and teaching processes in a lecture theatre. They used digital devices, social media applications and the (LMS) that the University has adopted. The lecturers and students that took part in the study had little to no experience with (WBL) applications that could support teaching and learning. While social media applications are widely used for non-educational purposes by KSA academics and students, their use in education has been informal and extremely limited.

The survey findings reported in the last two chapters show that Saudi higher education provision is heavily reliant on the face-to-face (F2F) approach, which incorporates listening and note-taking (Aljarf, 2020). During the COVID-19 pandemic, however, face-to-face classes were restricted, and students were encouraged to enroll in distance education courses remotely from their homes (Alhur, 2021; Layali & Al-Shlowiy, 2020). Both academics and students made extensive use of online learning platforms such as Zoom, Microsoft Teams, and WebEx (Alahmadi et al., 2020; H Al Shammari, 2021; Ospina García et al., 2021). The COVID -19 situation impacted teaching methods and increased reliance on technology. These circumstances highlighted the importance of a study such as this one and how necessary it is to keep lecturers informed about the benefits of integrating technology into teaching approaches to enhance learning. It should be noted that this research was carried out during exceptional circumstances where there was an urgent need to apply technology in education.

This research project explored a cutting-edge technical approach and tools for integrating devices and social media to mitigate challenges and meet the needs of students and lecturers. The (BSTL) approach using two web-based learning platforms, Kahoot and Padlet, was selected for evaluation. The two platforms were developed following psychological recommendations. Kahoot is built on Malone's theory for a game-based student response system (GSRS) (Wang, 2015), whereas Padlet connects Collaborative Learning Theory and the

Interactionist Approach (Mahmud, 2019). More details about the two web-based platforms are provided below.

The previous two projects established that students use social media applications for various purposes, including communication, emailing, lecture recording, photocopying slides, translation, and drawing. The use of these applications was primarily driven by student initiative and was not officially supported by the academic programs and/or course objectives.

There are two ways of teaching and learning using technology that could be used in blended classes: synchronous and asynchronous teaching and learning. Blended learning can be implemented asynchronously when students participate in traditional face-to-face classroom lectures and engage in online post-class activities via online learning platforms (e.g., Moodle and Blackboard) (He & Zhao, 2020; Szeto, 2015). According to Li et al. (2020), blended synchronous learning should bring together cyber and physical classrooms. With the accelerated development of Internet technology and the increasing need for personalized learning in terms of time, place, and resources, blended synchronous learning that provides students with real-time instruction has received increased attention (Szeto, 2015).

Additionally, blended synchronous learning has the advantage of being able to include students who are not able to be in the classroom physically for various reasons including social restrictions due to the COVID-19 pandemic (Bower et al., 2015; Dahmash, 2020). Research indicates that blended synchronous learning can help learners achieve a greater number of learning outcomes (Li et al., 2020). For example, Bower et al. (2015) used cross-case analysis to identify four distinct types of learning outcomes in blended synchronous learning: a) increased engagement; b) sense of community; c) more flexible access to learning, and d) increased student satisfaction. The results of this analysis can be used in the design for active learning and guide the selection of the most suitable technologies to meet communication requirements with varying degrees of co-presence depending on technological and human factors.

Numerous factors, including lecturer and student involvement, available technologies, learning activities, and the environment, can influence the success of blended synchronous learning (Dziuban et al., 2018). These variables can be summarized in the two dimensions of instructional design and technical support. To begin, lecturers engaging in blended synchronous learning should enhance their instructional skills to accommodate this approach of learning and seek to balance the experiences of face-to-face and remote students (Bower et al., 2015). Additionally, when blended synchronous learning is web-based, the convenience and reliability of the web-based application have a significant impact (Wang, 2015; Wang et al., 2009).

With information technology playing a supportive role in blended synchronous learning, determining the success of an adopted information system is critical in terms of popularizing its use (Valverde-Berrocoso et al., 2020). Li et al. (2020) identified several digital applications that could be used to facilitate blended synchronous learning, including Skype, Adobe Connect, Saba Centra, Google social media products, and virtual worlds such as Second Life. User satisfaction with an information system is contingent upon three factors: the quality of the information, the system, and the service (Almarashdeh, 2016). Specifically, information quality refers to the usefulness of the content presented in a system (e.g., text and video). The term "system quality" refers to the stability and convenience of the technologies used in the system (e.g., ease of use). Finally, service quality refers to the assistance and support provided to users (Almarashdeh, 2016).

This research project explores how (BSTL) using the application of web-based learning platforms, Kahoot and Padlet, could enhance teaching and learning processes. Specifically, the two primary objectives of the research are to explore:

1. Students' perspectives on the use of blended synchronous teaching and learning via web-based learning platforms (Kahoot and Padlet) in terms of the learning settings and behaviours, engagement, self-regulation, and other individual characteristics.
2. Academics’ perspectives on the use of web-based learning platforms for teaching in terms of the lecturer’s attitude, experience and satisfaction of teaching and learning processes, challenges and opportunities, communication, and feedback, as well as students’ participation and interaction.

Technical Background

This research project explores how adopting a BSTL approach could enhance teaching and learning processes. It provides an evaluation of two learning tools that are currently available and an assessment of how students engage with such tools. The two learning tools selected for this study are the web-based learning platforms, Kahoot and Padlet, which both allow students to respond to questions online.

Web-Based Learning Platforms (Student response system)

This research project presents an evaluation of the practical implementation of web-based learning platforms in the learning environment of a lecture theatre. Two popular and free-to-use web-based platforms, Kahoot and Padlet, were selected for this study. This investigation aimed to examine the views of students and lecturers on the impact of these technologies on the school curriculum, and the course objectives. The integration of these technologies into lecture sessions is expected to overcome some barriers relating to student engagement and participation and will allow lecturers to control and monitor the teaching and learning process. These two platforms are also known as Student Response Systems (SRS) as they allow students to get actively involved in online activities, thus assisting lecturers in increasing their engagement and motivation for learning (Naveed, Muhammed, et al., 2017). According to Doung-in (2019), Kahoot and Padlet are also digital formative assessment tools that allow students to interact with their peers and their lecturers during lectures. Both platforms are also easy to use. Doung-in (2019) found that students' perception of online digital tools as part of the educational approach to learning was generally positive and confirmed that Kahoot is the most favourable application, followed by Padlet and then Poll-Everywhere.

Padlet was founded in 2008 by Nitesh Goel as a digital resource that provides a simple and user-friendly interface for information sharing, collaboration, and creativity (Coleman, 2021). Padlet can be used to create an online dashboard that displays and presents information on each topic for a class. Hence, it is classified as an online interactive learning tool (Rashid et al., 2019). Padlet can be accessed through the university LMS (Blackboard) or as a stand-alone web link that could be accessed using a password set up by lecturers (Deni & Zainal, 2018).

The Padlet application can be viewed as an open online bulletin board that allows users to post questions and comments (Abdulaziz, 2021; Artikova, 2021). Padlet allows lecturers to upload videos, photos, or documents for students to view and respond to. Students can comment on, discuss, or contribute to the material posted. When a person posts to the group, their name is published so that everyone knows who the author of the comment is (Artikova, 2021; Lysunets & Eogoryad, 2015). However, Padlet also allows lecturers to create a space where students could contribute to online activities anonymously.

As a web-based learning platform, Padlet has been evaluated by several researchers from the perspective of student engagement, collaboration, and immediate lecturer feedback (Kleinsmith, 2017). The researchers have found that Padlet motivates students to participate in classroom activities, reduces learning anxiety, encourages interaction between students and lecturers, and improves language accuracy through peer learning (Rashid et al., 2019).

Using Padlet to teach and learn is still quite innovative and, to date, research has found that it enhances learning and teaching performance (Ismawardani & Sulistyanto, 2019). Fiester and Green (2016) state that Padlet allows students to actively participate in a lecture when they might otherwise be distracted. They liken Padlet to a virtual notebook that allows students to create, collect ideas, pictures, quotes, and video clips and modify and share their ideas thus encouraging student creativity

Academics also encourage students to post their questions on the online wall of the Padlet application and read their peers' responses (Lysunets & Eogoryad, 2015). It allows lecturers to set the level of privacy and anonymity through the application's control functions (Zainuddin et al., 2020). Thus, Padlet is considered to be a great addition to the other applications already used in lectures (Dunbar, 2017) and is being described as an interactive communicative learning tool rather than simply a collaborative web tool such as Blog, Wiki, and Google Drive (Sangeetha, 2016). Security and sharing options allow for quick sharing and protect information as needed. The Padlet creator (lecturer/teacher) is the only user who can edit any previously shared options unless they grant access to others. The Padlet creator can also be the Padlet moderator. A moderator can view all posts before they are posted. In this way, lecturers can filter contributions before they are "published" on the Padlet wall (Dunbar, 2017). In a study that aimed to examine the effects of using the Padlet digital learning tool to teach English vocabulary to Saudi females, Alabbad and Huwamel (2020) found that the vocabulary instruction given using Padlet was effective in improving the English lexical knowledge of the learners. They also found that the student's attitudes toward the tool were positive. Finally, the results showed that Padlet's implementation of communicative language lessons was critical to the participants' English vocabulary development.

Kahoot is a free game-based digital platform developed by the Norwegian University of Science and Technology (kahoot.com) in 2006. It can be used as a (SRS) where students participate in pre-made playful quizzes, discussions, and surveys (Dellos, 2015). Kahoot can combine an SRS, existing school-based technical infrastructure, social networking, and gaming into a single learning platform where students can use their own devices (Wang & Tahir, 2020). Ismail and Mohammad (2017) consider Kahoot to be a promising and practically workable formative assessment tool for learning that enables students to learn in a fun and entertaining environment.

Students do not need to create a Kahoot account to access the quizzes and can access the online spaces from any device (i.e., tablet, mobile and laptop) through a web browser (Byrne, 2013). It is only lecturers who need to create an account to develop online quizzes. Several options are available when writing quiz questions, such as uploading videos, and pictures, selecting images, choosing a specific file to use, and music to stimulate students to think or add optimistic energy to the quiz (Dellos, 2015).

In the Kahoot quiz, students can compete for points by answering various questions on the topic of the lecture set by the lecturer. The winner is announced at the end of the session (Wang, 2015). Students can use their devices and their real names or nicknames to participate as individuals or as a group and they can receive formative feedback through discussion with their lecturers (Kapsalis et al., 2020).

Wang (2015) examined the feedback that students received from lecturers when using Kahoot and found that the most apparent difference between a game-based student response system (GSRS) and a classic (SRS) is the commitment to gamification. Hu (2020) defines gamification as a set of activities and processes that utilize or apply game mechanics to address issues related to learning and education. He added that it has the potential to improve learning and teaching by increasing learner engagement. As a game-based tool, the Kahoot platform can be used widely in many courses without losing the positive engagement, motivation, and impact of learning. Umit Yapici and Karakoyun (2017) found that students' motivation increased after using the application and they reported mainly positive attitudes towards learning using the application. However, students who do not perform very well in Kahoot online quizzes may feel frustrated and this negatively impacts the benefits of using Kahoot for learning purposes. Holbrey (2020) found that integrating synchronous online learning into lecture theatres, particularly while using Kahoot, did not cause any technical difficulties and successfully enabled active participation and interactive learning. She also confirmed that the students appreciated Kahoot's competitive nature; besides the immediacy of the feedback on their knowledge, they reported further improvement in their engagement and concentration.

In general, there are many reasons to choose Kahoot as a valuable and fun tool for teaching and learning. Kahoot encourages active student learning by boosting student participation, motivation, collaboration, and knowledge sharing through a competitive experience; using audio and dots in Kahoot significantly affects concentration, engagement, joy, motivation, perceived learning, and learning dynamics. It is interesting to note that using Kahoot without points and audio gave the worst results (Wang & Lieberoth, 2016). The use of Kahoot for teaching compared to traditional teaching significantly improved attendance, participation, motivation, attention, and satisfaction for promoting the students learning performance (Yeh et al., 2017). Compared to Quizzes and Google forms, Kahoot offers more focus, engagement, joy, perceived learning, motivation, and satisfaction (Holbrey, 2020; Ismail & Mohammad, 2017; Kapsalis et al., 2020; Umit Yapici & Karakoyun, 2017; Wang, 2015). That is because Kahoot offers three different types of educational games (i.e., First, lecturers might replace traditional exercises with games that motivate students to work harder and monitor their progress in real-time. Second, knowledge-based multiplayer games can enhance classroom participation and motivation. Third, game development projects can teach computer science or software engineering (Wang, 2011), each of which may be integrated with a typical face-to-face lecture to improve learning, motivation, and engagement.) Students must share the screen while playing Kahoot, and Kahoot must be played synchronously (Guo, 2017). More evidence of using game-based learning platforms experimenting with the use of PollEveryWhere and Kahoot provided by Limniou and Mansfield (2019) shows that integrating (game-based) student response systems with the teaching approach increased student engagement in learning, enhanced student-lecturer interactions, and enabled students to develop relevant research skills.

To conclude, Padlet and Kahoot both support formative feedback in a lecture theatre. However, while Padlet is used to support constructive discussions through the integration of various digital tools (i.e., videos, images, web links), Kahoot supports the discussion through gamification and competition between students. There are various other similar platforms, such as PollEveryWhere and Mentimeter, that could be used in a lecture theatre, but Kahoot and Padlet were selected for use in this study as they are free web-based platforms which support student learning engagement and their interaction with the lecturers and the whole class (Doung-in, 2019; Rashid et al., 2019; Wang & Tahir, 2020). Notwithstanding this difference between them, Padlet and Kahoot both perform distinct functions that fit in with the BSTL approach. In this research, these two web-based platforms have been explored. When describing students' responses or lecturers' perspectives, the discussion is tied to a single concept: "web-based learning platforms" that result in the teaching and learning activities performed in the lecture based on the BSTL approach. However, in this study when there are findings related to specific platform functionality, then they will be discussed separately.

Student Engagement

Student engagement has been a topic of discussion for many researchers who have provided various definitions to describe how engagement intersects with motivation, active learning, expectations, and learning value (Becker et al., 2017). Most researchers discuss student engagement from the behavioural, cognitive, and affective/social perspectives (Lee et al., 2019; Luo et al., 2021; Zhoc et al., 2019). According to Reeve (2012), motivation and engagement are inherently related (one influences the other) because engagement is primarily the result of motivational processes, whereas motivation is the source of engagement. This study focuses on student engagement rather than motivation, as student engagement results from a variety of factors such as behaviour, cognition, and emotion.

Therefore, assessing students' level of engagement in the learning activity entails evaluating their "behavioural engagement", that is, their concentration, attention, and effort. "Emotional engagement" refers to task-facilitating emotions such as interest and the absence of task-withdrawing emotions such as distress. "Cognitive engagement" is the learners' use of sophisticated rather than surface-level learning strategies, and "agentic engagement" refers to how students try to enrich the learning experience (Chiu, 2022; Reeve, 2012).

Marks (2000) discusses behavioural engagement from the perspective of the level of effort that a student devotes to learning or the degree of achievement (i.e., grades), while Lewis et al. (2011) discuss it regarding “the degree to which learners' thoughts, feelings, and behaviours are actively engaged in the learning process" (p. 251). Lee et al. (2019) discuss student engagement specifically about activities, such as time spent on learning tasks, task performance, and grades thus turning academic performance into a measure of student engagement. Zainuddin et al. (2020) state that a student’s interest and enthusiasm for learning could be connected to their participation and engagement, which are in themselves highly connected to self-efficacy, teaching presence, perceived usefulness, and learning persistence (Jung & Lee, 2018), influencing student satisfaction (Garnham & Betts, 2018). Individual attitudes, thoughts, and behaviours, as well as interpersonal communication, all contribute to engagement. Thus, student engagement involves devoting time, energy, thought, effort, and, to some extent, emotions to their learning. In the school context, the psychological perspective on student engagement is particularly prevalent. Hence, student engagement is interpreted as an individual's internal states (including affection and cognition) and behaviours (Zhoc et al., 2019).

Earlier research suggests a four-component model of the engagement scale. For Finn and Zimmer (2012) the four dimensions of engagement are: academic, social, cognitive, and emotional (affective); while for Reeve and Tseng (2011), the four dimensions are: behavioural, emotional, cognitive, and agentic. Other dimensions have been taken into account by other researchers. Appleton et al. (2006) developed the Student Engagement Instrument (SEI) based on the psychological and cognitive perspective of engagement. Psychological engagement includes three factors, namely, the lecturer-student relationship, peer support for learning, and family support for learning. Cognitive engagement includes control and relevance of schoolwork, future aspirations and goals, and extrinsic motivation. Luo et al. (2021), on the other hand, have proposed a six-component engagement scale model, including the factors of student-student, and lecturer-student relationships, a sense of belonging, cognitive, affective, and behavioural engagement. Lee et al. (2019) have proposed a five-factor engagement scale for students engaged in the synchronous online environment, namely:

i. Academic engagement, refers to observable behaviours associated with the learning process. They are the necessary behaviours for attaining the 'threshold' level of learning.

ii. Cognitive engagement, involves the spending of thoughtful energy to comprehend complex ideas that go beyond the minimal requirements.

iii. Social engagement with peers, refers to the interaction between students and their peers, where peer collaboration occurs for learning and knowledge construction. Peers can have a beneficial effect on academic development, knowledge acquisition, analytical and problem-solving skills, and self-esteem.

iv. Social engagement with lecturers, refers to interactions between students and lecturers that occur within a learning face-to-face environment.

v. Online engagement, refers to students' use of information technologies (including the internet and other digital technologies) to support learning.

Generally, it appears that students evaluate synchronous online interactions positively because they provide instant feedback and interaction with peers and lecturers that enhances students' engagement in an online synchronous learning environment (Strang, 2013; Watts, 2016; Zhoc et al., 2019). Thus, this research project will examine student engagement from the perspectives of learning behaviour (Appleton et al., 2006; Luo et al., 2021); engagement with lecturers (Appleton et al., 2006; Lee et al., 2019; Reeve & Tseng, 2011; Zhoc et al., 2019); engagement with peers (Appleton et al., 2006; Lee et al., 2019); online engagement (Luo et al., 2021; Luo et al., 2019; Tsay et al., 2018; Zhoc et al., 2019); cognitive learning (Lee et al., 2019; Reeve & Tseng, 2011); and, synchronous engagement (Wdowik, 2014).

Web-based Learning Tools and Pedagogical Theories

Gamification is a commonly used term for incorporating games into educational activities. It refers to the creation of pedagogical systems based on gaming designs but deployed in non-game environments, such as in education (Deterding et al., 2011). The pedagogical theories of collaborative learning theory, Malone's theory for the (GSRS), and the interactionist approach have something in common with Kahoot and Padlet as web-based learning platforms (Wang, 2015). Using Kahoot and Padlet students can communicate, exchange ideas, and work together to carry out online learning activities. By being involved in online learning activities, they can also build their understanding and knowledge based on their previous experiences and interact with others (Chen, 2021).

More specifically, collaborative learning processes take place through student-student interactions (Lin, 2015), and collaborative learning can be conceived in the case of a person who contributes to the construction of collaborative knowledge by interacting with others to share their understanding (Gašević et al., 2019). The role of the lecturer changes from that of class "leader" to class "moderator" (Rutherford, 2014). Students have the opportunity to work together to achieve the goal of the learning process. The two platforms, Kahoot and Padlet, offer students several collaborative opportunities to share their thoughts and ideas. For example, (Dewitt et al., 2015). indicate that students could learn and generate new ideas when using Padlet for collaborative learning in the format of a debate. According to the collaborative learning theory, learning takes place in a joyful environment for students (Dewitt et al., 2015). Padlet and Kahoot have been identified as learning tools which support an enjoyable and friendly environment and help foster a sense of community (Korkealehto & Siklander, 2018; Shuker & Burton, 2021).

The interactionist approach. This approach is based on the belief that students can learn by interacting with others. Consequently, the learning process can be straightforward if students receive understandable information and can discover the meaning through negotiation to generate results and provide feedback (Mackey et al., 2013). Padlet gives students and their lecturers the ability to communicate whenever they want. Unlike in face-to-face interaction, students interact with one another to complete various tasks or discuss a particular topic. As a result, they have time to reflect, correct their mistakes and comment, thus, enhancing their learning (Algraini, 2014).

Additionally, Malone's theory of gaming, which is based on the (GSRS) proposes that challenge, fantasy, and curiosity could act as intrinsic motivational factors for learning (Wang, 2015). According to Lin and Chang (2018), Kahoot complements pedagogical practices with innovative technological solutions. Accordingly, they describe Kahoot as a digital game-based student response system that enables educators and learners to engage in competitive knowledge games using the current infrastructure in educational environments which encompasses a challenge (i.e., goals with uncertain results), fantasy (the students are captivated by intrinsic or extrinsic fantasy), and curiosity (i.e., sensory curiosity through graphics and sound and cognitive curiosity through which the player must solve a puzzle).

Integrating the web-based learning platforms, Kahoot and Padlet, in teaching and learning combines the pedagogical approaches of collaborative learning and the Malone theory of gaming to enhance learning, thus increasing student engagement from different perspectives (collaboration, motivation, interaction with lecturer and the whole class). Collaboration, providing and receiving feedback, having equal learning opportunities for all students, providing an opportunity for reflection on the class input, and sharing photos, video clips, and other documents to exchange information with peers are essential features of Kahoot and Padlet that enhance student learning engagement.

Methods

This study applies a mixed research methodology that encompasses the quantitative and the qualitative approach as shown in Chapter 2. An online questionnaire and an interview with pre-determined questions were chosen as the research instruments. The students were surveyed using the questionnaire and the lecturers' perspectives were explored using interviews.

Student Questionnaire

A questionnaire was developed consisting of 74 data collection questions (Appendix 6. B). The purpose of the questionnaire was to collect students' perspectives on blended synchronous teaching and learning using Kahoot and Padlet and their experiences outside of the lecture. The questionnaire comprised three components, as follows:

Section A contained 11 questions that focused on gathering the participants' demographic information and general information about their digital device use, online sessions, and the use of Kahoot and Padlet during the lecture (6 items).

Section B included the engagement scale that consisted of 38 items, categorized under six factors, all of which related to the student’s engagement with their learning processes and their perceptions when Kahoot and/or Padlet were integrated into a synchronous lecture. The engagement scale was developed on scales used in previous literature, specifically: i. the Student Engagement Instrument (SEI) developed by Appleton et al. (2006); ii. the conceptual model developed by Luo et al. (2021) that considers students’ sense of belonging and engagement in online learning; and iii. the Engagement Scale for students engaged in the synchronous online environment was developed by Lee et al. (2019). The engagement scale developed for this project was designed based on 6 factors: learning behaviour (7 items) (Appleton et al., 2006; Luo et al., 2021); engagement with lecturers (9 items) (Appleton et al., 2006; Lee et al., 2019; Reeve & Tseng, 2011; Zhoc et al., 2019); engagement with peers (6 items) (Appleton et al., 2006; Lee et al., 2019); online engagement (8 items) (Luo et al., 2021; Luo et al., 2019; Tsay et al., 2018; Zhoc et al., 2019); cognitive learning (3 items) (Lee et al., 2019; Reeve & Tseng, 2011); and synchronous engagement (5 items) (Wdowik, 2014). More details on the questionnaire development can be found in Appendix 6. C.

Section C contained 25 items that were drawn up to assess an individual's learning characteristics using information drawn from the first project's questionnaire (Chapter 4). In both the B and C sections students were expected to rate their preferences on a 7-point Likert scale (ranging from 1 point: strongly disagree – 7 points: strongly agree).

Finally, at the end of the questionnaire, an open-ended question was set which allowed participants to provide further comments regarding the integration of Kahoot and Padlet with a synchronous lecture session. The questionnaire, which was developed on Qualtrics, was distributed to students following the lecture. The participants were given a consent form and participant information sheet to inform them about the aims of this study and gain their consent before their participation. The participants were under no obligation to participate in this study and their participation was anonymous.

The questionnaire was distributed across three different schools (English, Architecture, and Computer Science) within the Umm Al-Qura University over a period of two months (2nd Semester - 2020-2021 Academic Year). 11 lecturers within the three schools were recruited to use blended synchronous teaching and learning, using either one or both platforms (6 lecturers used Kahoot only while 3 lecturers used Padlet only and 2 lecturers used both platforms). The survey was filled in by 4 cohorts of students from the English school, 4 cohorts of students from the Computer Science school and 3 cohorts of students from the Architecture school. 239 students followed the synchronous lectures in all out of which 180 students fully completed the online questionnaire (75% completion rate: 40 students from the Computer Science school, 60 students from the Architecture school and 80 students from the English school).

Interview for Lecturers

The 11 lecturers from the three schools (English, Architecture and Computer Science) at Umm Al-Qura University who integrated Kahoot and/or Padlet into their teaching were interviewed to explore their views on the use of these applications and the teaching and learning process. Due to the COVID-19 restrictions, the interviews took place over WhatsApp and Skype and each interview was 30 minutes long. The participants were asked to provide their views on the pre-determined questions which were prepared to explore the lecturers' views and thoughts about the use of Kahoot and/or Padlet in their teaching process.

Procedure

The researcher contacted the directors of each school, asking them to circulate an invitation email to the school teaching staff members asking them if they would like to participate in the research project on the use of Kahoot and/or Padlet in blended synchronous lectures. The school directors then provided the researcher with the contact information of lecturers who expressed an interest in participating. The researcher contacted the interested parties via email, mobile, or WhatsApp and distributed the information sheet on the research project and consent form.

As neither Kahoot nor Padlet had previously been used at the University, the researcher had to provide training to interested lecturers on how to use the two web-based platforms in the lecture room. The researcher sent YouTube video links to each lecturer describing the two platforms. The YouTube videos discussed the application process and showed how the platforms could be used to deliver lecture content. The researcher provided the lecturers with the opportunity to ask for further information on how the two web-based platforms could be integrated into a synchronous lecture using the blended learning approach. The lecturers were then given the option to choose the platform that best suited their needs, and each lecturer designed their learning activities using the preferred platform.

At the end of the synchronous lecture session, students were requested to complete an online questionnaire which included questions about the Kahoot and/or Padlet integration process and their learning experience. The lecturers who used the web-based platforms were invited to participate in an interview regarding their experience via Skype or WhatsApp.

The Kahoot and Padlet integration process. An example of how Padlet was used to support a blended synchronous lecture is given in Figure 6.1 The students were shown how to use Padlet before the lecture. The lecturer then presented the Padlet wallboard to the students to spark an online discussion focused on the material and questions presented by the lecturer. The students expressed their views and debated the questions. The lecturer acted as a facilitator guiding the discussion.

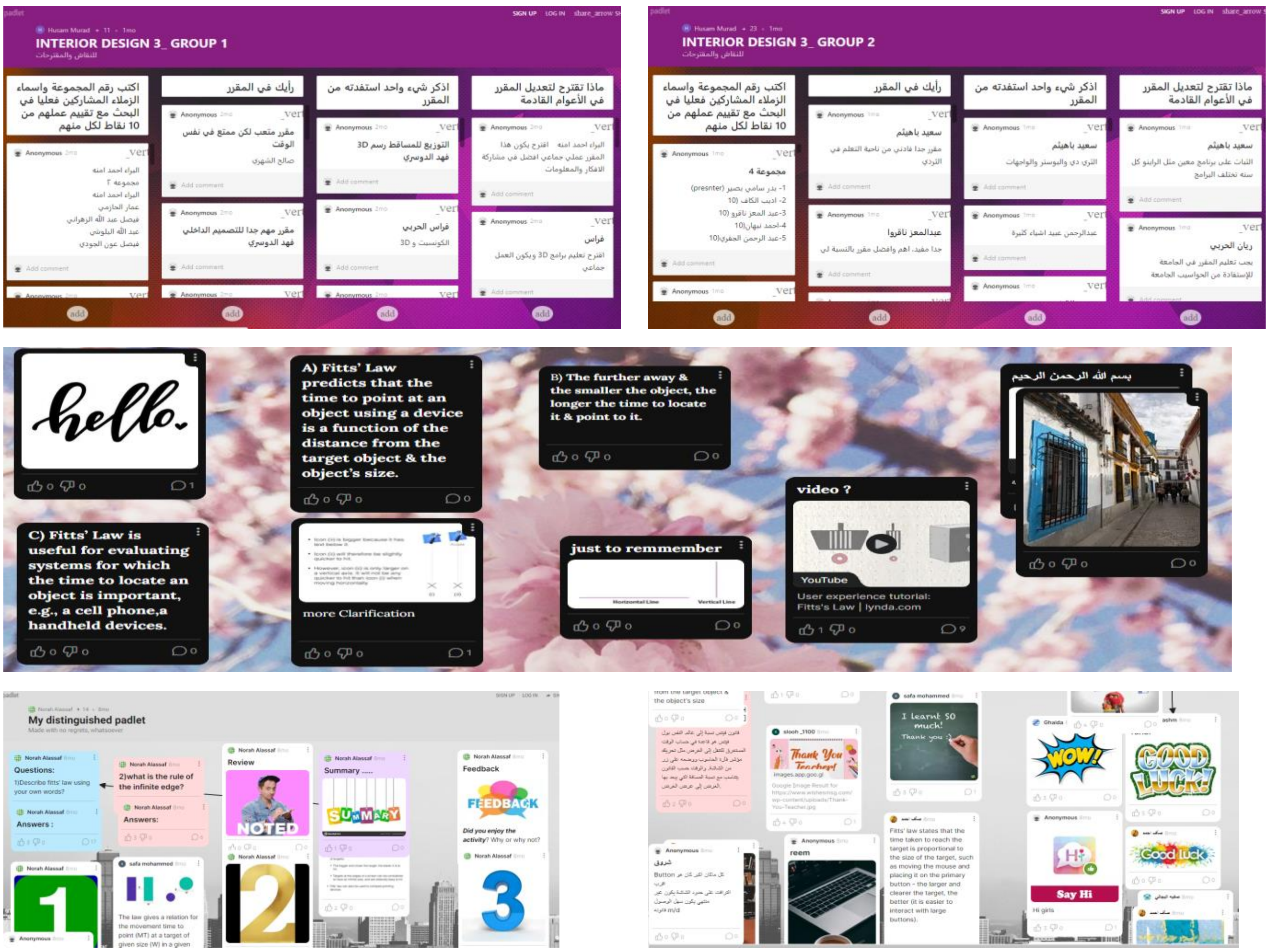

Figure 6.1 Example of a Padlet session illustrating the learning activities submitted by students on the Padlet Wallboard.

A similar process was followed during the lecture that integrated Kahoot. An example of how Kahoot was used to support a blended learning synchronous lecture is presented in Figure 6.2.

The online tasks that were prepared by the lecturer included questions based on the lecture topics and assigned textbooks. Students did the Kahoot quiz and gained points for correct responses to questions and quick response times. Following each session, the lecturer discussed the material presented in the Kahoot questions and provided formative feedback to students.

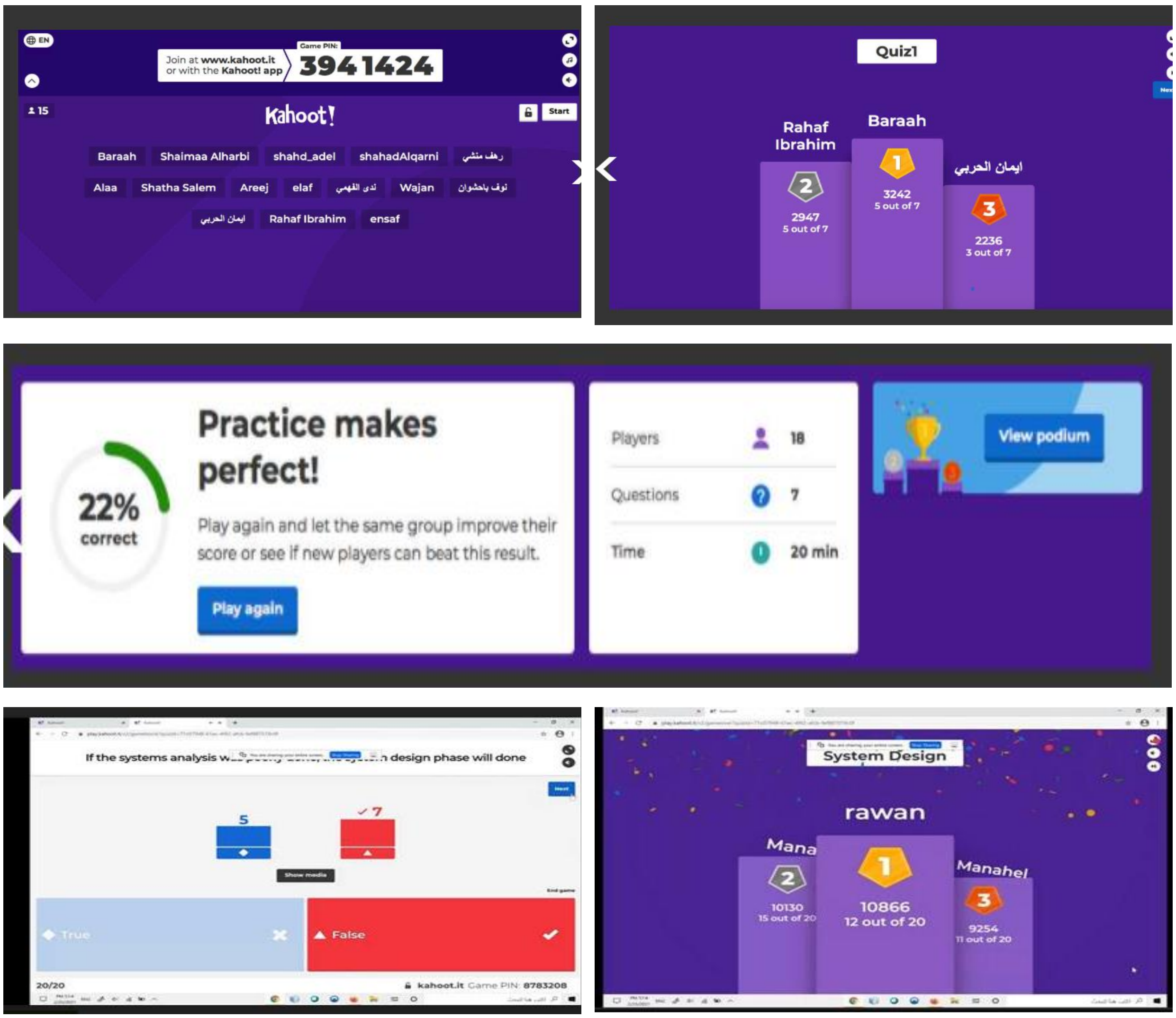

Figure 6.2 An example of a Kahoot session showing quiz questions and results.

Statistical Methods

This project's main measurement model is the student engagement scale which has been theoretically validated by previous research (Appleton et al., 2006; Lee et al., 2019; Luo et al., 2021). This includes the Digital Motivation Learning Scale that was introduced in the first research project which evaluated the individuals' learning characteristics (i.e., test anxiety, self-efficacy, behavioural self-regulations, etc.). The Confirmatory Factor Analysis (CFA) with maximum likelihood estimation was used to verify whether the measurement model fitted the collected data. In addition, Cronbach's Alpha test for internal consistency was employed.

Confirmatory Factor Analysis (CFA)

The researcher used IBM SPSS Amos Application v. 25 for the evaluation processes. The two components of the questionnaire that were analysed were the student engagement scale and individual student characteristics, including the latent and measured variables of each component that were predetermined based on the theoretical analysis. Consequently, the fit of each component model was evaluated - using the standard-fit statistics discussed in Chapter 2.

Student Engagement Scale. The original model consisted of 38 items that measure six latent variables: Behavioural Engagement (7 observed variables), Engagement with Lecturers (9 observed variables), Engagement with Peers (6 observed variables), Synchronous Engagement (5 observed variables), Online Engagement (8 observed variables), and Cognitive Engagement (3 observed variables). The paths between the six latent variables were hypothesized using the theoretical model. Modification indices suggested removing some observed variables from the Engagement with Lecturers latent variable (TeacSu01 and TeacSu08), Engagement with Peers latent variable (Peer01, and Peer02), and Online Engagement latent variable (Onlinl06 and Onlinl07). Additionally, it was required to justify covariance between errors (circle value) such as Lecturer factor (e29-e32), (e9-e10), Synchronous factor (e18-e19), and Cognitive factor (e40-e41) (Appendix 6.D). The model was subsequently accepted (Figure 6.3).

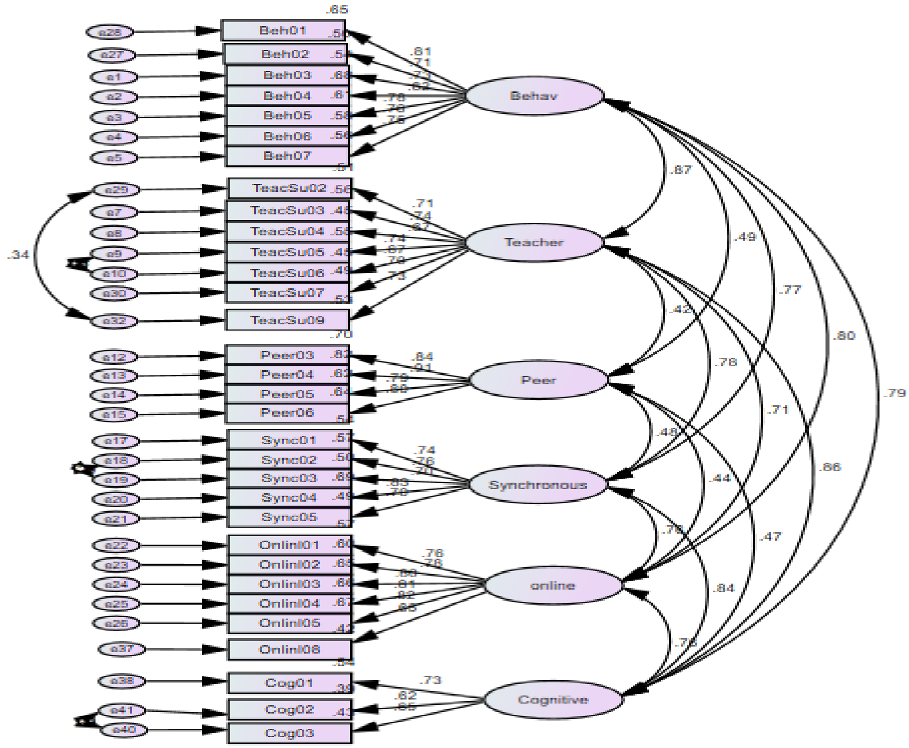

Figure 6.3 Factor model of the student engagement component with standardised factor loadings on unidirectional arrows. (Factors: behavioural engagement, engagement with lecturers, peer engagement, synchronous engagement, online activities engagement and cognitive engagement).

Table 6.1 shows the conventional fit statistics before and after the modification of the model. The model's fitness statistics were improved to gain a better fit. Thus, the adequacy of the model was validated considering the CFA and the corresponding theoretical model.

Table 6.1
Model fit statistics and indicators' evaluation before and after modification (learning engagement)

Indicators	Before Modification	After Modification	Evaluation
Chi-square	1462.9	826.8	X2 is reduced so it is a good fit
CMIN/DF	2.251	1.782	CMIN = excellent (between 1 and 3)
TLI	0.808	0.900	TLI = acceptable (>0.95 excellent/<0.95 acceptable)
CFI	0.823	0.903	CFI= acceptable (>0.95 excellent/<0.95 acceptable)
SRMR	0.211	0.056	SRMR= excellent (<0.08 excellent/ >0.08 acceptable)
RMSEA	0.078	0.066	RMSEA = acceptable (between 0.05 and 0.08)

Individual Characteristics Component. This model consists of 21 items that measure five latent variables: Test Anxiety (4 observed variables), Utility of the Course (3 observed variables), Surface Learning (3 observed variables), Self-Efficacy (4 observed variables), and Negative Habits

(7 observed variables). The paths between the latent variables were hypothesized using the theoretical model. Modification indices suggested removing four observed variables from the Negative Habits latent variable (ACneg7, ACneg6, ACneg5, ACneg3). In addition, the modification indices suggested a change to improve the model's standard of error terms (circled values) only in the self-efficacy factor (e24-e27) (Appendix 6. E). The model was subsequently deemed to be acceptable (Figure 4.6).

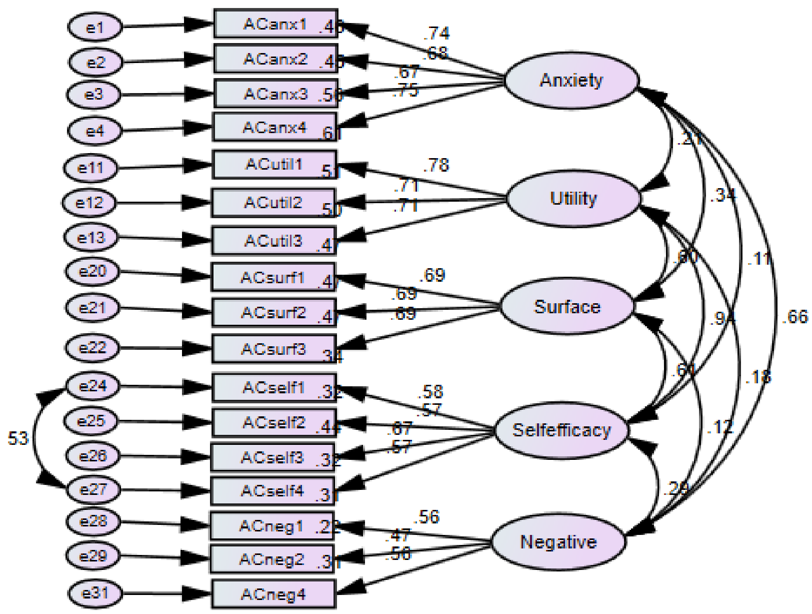

Figure 6.4 Factor model of the individual characteristics with standardised factor loadings on unidirectional arrows. (Factors: test anxiety, the course utility, surface learning, self-efficacy, and negative habits).

Table 6.2 shows the conventional fit statistics before and after the modification of the model. The model's fitness statistics have been improved for a better fit. Thus, the adequacy of the model has been validated considering the CFA and the corresponding theoretical model.

Table 6.2
Model Fit Statistics Indicators Evaluation (Individual Characteristics)

Indicators	Before Modification	After Modification	Evaluation
Chi-square	466.6	201.0	X2 is reduced so it is a good fit
CMIN/DF	1.794.	1.675	CMIN = excellent (between 1 and 3)
TLI	.853	0.906	TLI = acceptable (>0.95 excellent/<0.95 acceptable)
CFI	.873	0.917	CFI= acceptable (>0.95 excellent/<0.95 acceptable)
SRMR	0.144	0.082	SRMR= acceptable (<0.08 excellent/ >0.08 acceptable)
RMSEA	.057	0.061	RMSEA = acceptable (between 0.05 and 0.08)

The CFA application resulted in more confidence in the two components of the theoretical model, which confirmed the adequacy of the model for the data.

Cronbach's Alpha Test

The internal consistency for each of the factors was examined using Cronbach's Alpha. The alpha for all factors was greater than 0.60 (Babbie, 1992; Creswell, 2014) as follows: 0.854 for behavioural engagement (7 items), 0.857 for engagement with academics (9 items), 0.874, for online engagement (8 items), 0.884 for engagement with peers (6 items), 0.862, for synchronous engagement (5 items), and 0.871 for cognitive engagement (3 items).

Moreover, the individual characteristics variables were 0.874 for test anxiety (4 items), 0.862 for self-efficacy (4 items), 0. 852 for learning utility (3 items), 0. 854 for surface learning (3 items), and 0.847 for variety of sources (4 items), finally, 0.879 for negative habits (self-regulation) (7 items). This analysis shows that the scales of the ten factors, classified into three components, are consistent with the study data and acceptable for use in this study.

Evaluation of Statistical Tests

The model's two components were assessed using CFA and Cronbach's Alpha. Given the modification index for each CFA model, the analysis implied a modification of three latent variables of the student engagement model to improve the model's adaptation to the data. The modification implied discarding two observed variables from three latent variables: Engagement with Lecturers, Engagement with Peers, and Online Engagement. Therefore, The Distraction Component was improved by adding one covariance between error terms of two latent variables. It was required to justify covariance between errors (circle value) for Engagement with Lecturers, Synchronous Engagement, and Cognitive Engagement.

Additionally, the analysis implied a modification of the Individual Characteristics Model by removing four observed variables from the Negative Habits (behavioural self-regulation) latent variable. In addition, the modification indices suggested a change to improve the model's standard of error terms (circled values) only in the self-efficacy factor.

Finally, the internal consistency of the factors of each model was valid based on Cronbach's Alpha. Thus, the model was approved statistically and confirmed to fit the research data.

Data analysis

Both the quantitative and qualitative data were analysed. The Chi-Square and ANOVA tests were used to further analyse the students' responses to the student engagement questionnaire after using the Kahoot and Padlet web-based learning platforms in synchronous lectures. All the interviewees' responses were transcribed. Each of the lecturers who took part in the interviews was given a code to anonymize their identity. The replies to the following research questions will provide a more in-depth understanding of the impact of the integration of Kahoot and Padlet applications into Higher Education in Saudi Arabia.

Q1. Are there any significant differences among the students from the three schools (English, Architecture and Computer Science) in terms of student preferences on blended synchronous teaching and learning via web-based learning platforms (Kahoot and Padlet)?

Q2. Are there any significant differences among the students from the three schools (English, Architecture, and Computer Science) in learning engagement (i.e., behavioural engagement, engagement with lecturers, online engagement, engagement with peers, synchronous engagement, and cognitive engagement) following their participation in blended synchronous teaching and learning sessions using web-based learning platforms (Kahoot and Padlet)?

Q3. Are there any significant differences among the students from the three schools (English, Architecture, and Computer Science) in the student’s characteristics (i.e., self-efficacy, course utility, surface learning, variety of sources, test anxiety and negative habits) following their participation in blended synchronous teaching and learning sessions using web-based learning platforms (Kahoot and Padlet)?

Q4. Does blended synchronous teaching and learning via web-based learning platforms (Kahoot/Padlet) meet lecturers' expectations of technology-enhanced education?

Quantitative Analysis

The first question aimed to explore student views regarding their participation and engagement in learning when Kahoot and/or Padlet web-based platforms are integrated into a synchronous learning environment. Table 6.3 shows students' engagement when different devices and Kahoot and Padlet applications were used in lectures during the first lockdown period due to the COVID-19 pandemic. There were no significant differences in the use of devices among the students from the different schools. They presented similar behaviours during lectures. Only a small number of Computer Science students used their PC. These results are in alignment with the findings of the first Bring Your Own Device project that was conducted during the COVID-19 pandemic. The project found that the use of different devices for learning purposes did not change because of the pandemic. Based on student responses, there was no statistically significant difference among the students from the three schools in terms of the use of devices during the lectures, although the English students used more devices than the students at the other schools.

The number of lectures the students used Kahoot or Padlet was connected to whether the students had ever used the Kahoot and/or Padlet platforms in a lecture; the analysis revealed a significant difference across all schools. This finding demonstrated that the students were not equally familiar with the platforms. The analysis also revealed no significant differences among the students from the three schools regarding their reasons for engagement with the Kahoot and Padlet platforms during the lecture, with most of the students highlighting the following three main reasons: 1. "Felt enthusiastic about the use", 2. "Was interested in participating in learning activities", and 3. "Expected other courses to include tools during the lecture". Students from the English and Computer Science schools also highlighted the importance of enjoyment achieved using these web-based platforms.

Table 6.3
Students' responses to questions related to their engagement behaviour of using blended learning synchronous teaching and learning via web-based learning platforms (Kahoot and Padlet).

Behavioural variable	English	Architecture	Computer Science	Chi-square results (α =.05)
Which of the following devices have you used over the Kahoot or Padlet lecture?				
Smartphone	38.1%	35.2%	26.7%	$\chi^2(2,180) = 4.800$, $p = .091$
Laptop	33.7%	47.7%	18.6%	$\chi^2(2,180) = 1.364$, $p = .506$
Tablet	48.1%	33.3%	18.5%	$\chi^2(2,180) = 0.294$, $p = .863$
PC	41.7%	50.9%	<5. %	$\chi^2(2,180) = 2.210$, $p = .331$
Students' devices when using Kahoot or Padlet during a lecture?				
One device	40.0%	30.3%	22.7%	
Two devices	41.3%	37.0%	21.7%	$\chi^2(4,180) = 2.655$, $P = .617$
Three devices	<5 %	<5 %	<5 %	
Have you ever used Kahoot and/or Padlet platforms during your lecture?				
None	33.3%	40.0%	26.7%	
1-2 lectures	52.4%	28.0%	19.5%	$\chi^2(6,180) = 14.762$, $P = .022$
3-5 lectures	7.5 %	<5 %	<5 %	
More than 5 lectures	<5 %	<5 %	<5 %	
Reasons why students were engaged with using Kahoot or Padlet during lecture.				
Became distracting from your learning.	8.8%	5.0%	2.5%	$\chi^2(2, 180) = 2.009$, $p = .366$
Felt enthusiastic about the use	25.3%	18.5%	17.5%	$\chi^2(2, 180) = 1.752$, $p = .416$
We're interested in participating in learning activities	21.3%	18.3%	27.5%	$\chi^2(2, 180) = 1.203$, $p = .548$
Better communicated with peers				
Better communicated with lecturers	n<5%	n<5%	n<5%	$\chi^2(2, 180) = 2.011$, $p = .366$
Received valuable for your learning feedback	2.5 %	10.0 %	5.0%	$\chi^2(2, 180) = 3.706$, $p = .157$
Enjoyed the learning activities	2.5 %	1.7 %	7.5 %	$\chi^2(2, 180) = 2.845$, $p = .241$
Expected other courses to include tools during lecture	16.3%	6.7%	22.5%	$\chi^2(2, 180) = 5.249$, $p = .072$
	12.5%	16.7%	15.5%	$\chi^2(2, 180) = .495$, $p = .781$
What is it like participating in the Kahoot or Padlet lecture?				
Just attend the lecture.	7.5%	16.7%	7.5%	$\chi^2(2, 180) = 3.560$, $p = .169$
Keep notes.	11.3%	5.0%	17.5%	$\chi^2(2, 180) = 4.045$, $p = .132$
Access learning resources.	6.3%	16.7%	15.1%	$\chi^2(2, 180) = 4.164$, $p = .125$
Watch module-related videos.	3.8%	5.0%	0.0%	$\chi^2(2, 180) = 1.940$, $p = .379$
Ask questions to lecturers directly.	21.3%	15.0%	10.0%	$\chi^2(2, 180) = 2.610$, $p = .271$
Be involved in online learning activities.	30.0%	11.7%	30.0%	$\chi^2(2, 180) = 7.394$, $p = .025$
Discuss with my peers the predetermined questions by lecturers.	6.3%	3.3%	5.0%	$\chi^2(2, 180) = .614$, $p = .736$
Collaborate with peers.	2.2%	2.8%	7.5%	$\chi^2(2, 180) = .670$, $p = .715$
Complete assignments and tests.	8.8%	18.3%	7.5%	$\chi^2(2, 180) = 3.922$, $p = .141$

α is the limit of the significance level, $\chi^2(a, b)$ is the variance between groups, and p is the significance level.

Table 6.4
Students' engagement in each school for different settings when they follow a synchronous lecture supported by Kahoot and Padlet.

Behavioural variable	English (M, SD)	Architecture (M, SD)	Computer (M, SD)	ANOVA among schools and within each School (α =.05)
Engagement due to students' attendance in the class whether physical or online:				
Synchronously in a physical environment (classroom)	5.27(±1.13)	5.52(±0.80)	5.58(±.75)	F (2, 180) =.869, p =.353, η2 =.005 English: F (1, 80) = 1.041, p =.311, η2 =.013
Synchronously in an online environment (Zoom/Microsoft Teams) through the chat function	5.52(±.97)	5.46(±1.00)	5.62(±.73)	Architecture: F (1,60) =.067, p =.797, η2 =.001 Computer Science: F (1,40) =.028, p =.868, η2 =.001
Engagement due to student-student dialogue:				
Synchronously in a physical environment (classroom)	5.24 (±1.10)	5.27(±.72)	5.35(±0.66)	F (2,180) =1.477, p=.211, η2 =.033 English: F (3, 80) =1.490, p =.224, η2 =.056
Synchronously in an online environment (Zoom/Microsoft Teams) through the chat function	5.07 (±1.27)	5.68 (±.98)	5.80 (±0.84)	Architecture: F (3,60) =.714, p=.586 η2 =.049 Computer Science: F (3,40) =1.242, p =.309, η2 =.094
Synchronously in an online environment (Zoom/Microsoft Teams) through breakout rooms	5.87(±1.01)	5.67(±.53)	5.91(±0.83)	
Online discussions through social media (WhatsApp, Facebook)	5.60(±.85)	5.48(±.99)	5.45(±0.57)	
Engagement due to lecturer-student dialogue:				
Synchronously in a physical environment (classroom)	5.06(±1.11)	5.33(±.77)	5.52(±.61)	F (2, 180) =4.511, p =.004, η2 =.071
Synchronously in a one-to-one meeting through an online, environment (Zoom/Microsoft Teams)	5.85(±.99)	5.86(±1.04)	5.81(±.76)	English: F (4, 80) = 2.897, p =.041, η2 =.103 Architecture: F (4,60) =1.144, p=.339, η2 =.058 Computer Science: F (3,40) =.355, p =.786, η2 =.029
Synchronously in an online environment (Zoom/Microsoft Teams) through the chat function	5.62(±1.05)	5.74(±.73)	5.58(±.78)	
Asynchronously through the exchange of emails	5.51(±.40)	5.24(±.44)	5.46(±.75)	

α: the limit of the significant level, M: Mean, SD: Standard Deviation, F(a,b) is the variance value, and p: significant value. , η2: effect size

Table 6.4 and Table 6.5 summarise the statistical findings relating to student engagement in a synchronous lecture integrating Kahoot and Padlet per school. Student-student dialogue, lecturer-student dialogue, student-student collaboration, and physical or online class attendance were included in this set of analyses to identify what the students preferred as evidenced by school engagement. The only significant difference found was in the responses of the students at the English school about the lecturer-student dialogue.

Table 6.5
Students’ engagement is due to the student-student collaboration setting when they follow a synchronous lecture supported by Kahoot and Padlet.

Behavioural variable	English (M, SD)	Architecture (M, SD)	Computer (M, SD)	ANOVA among schools and within each School (α =.05)
Engagement due to student-student collaboration:				
Synchronously in a physical environment (lecture theatre, classroom).	5.15(±1.12)	5.55(±0.79)	5.33(±.69)	F (2, 180) =1.426, p =.217, η2 =.039 English: F (5, 80) = 1.148, p =.343, η2 =.072
Synchronously in an online environment (Zoom/Microsoft Teams) through the chat function.	5.53(±1.14)	5.80(±1.01)	5.93(±.68)	Architecture: F (5,60) =1.812, p=.126, η2 =.144 Computer Science: F (5,40) =1.148, p =.343, η2 =.072
Synchronously in an online environment (Zoom/Microsoft Teams) through breakout rooms.	5.20(±1.31)	5.31(±.63)	5.92(±1.70)	
Online collaboration through social media (Google docs, WhatsApp, Facebook group).	5.85(±0.72)	5.48(±.97)	5.47(±1.75)	

α: the limit of the significant level, M: Mean, SD: Standard Deviation, F(a,b) is the variance value, and p: significant value. , η2: effect size

The second question revealed no significant difference regarding the students’ views on what participation meant to them when Kahoot and/or Padlet were used by their lecturers to support the lecture. However, a significant difference was observed in their involvement in online learning activities, with English and Computer Science students indicating that they were more engaged than Architecture students. Additionally, the students from the different schools highlighted different aspects of their involvement; the Architecture students mentioned a range of activities that they participated in online, while the Computer Science and English students focused specifically on the ability to ask their lecturers questions directly.

Table 6.6
Students' responses to questions related to the lecture settings they preferred for dialogue and collaboration, whether among students or with lecturers.

Behavioural variable	English	Architecture	Computer	Chi-square results (α =.05)
For learning purposes, students mostly prefer to attend lectures.				
Synchronously in a physical environment	55.0%	60.0%	25.0%	
Synchronously in an online environment	45.0%	40.0%	75.0%	χ2 (2, 180) = 13.333, p =.000
Which setting do you most prefer for student-student dialogue?				
Synchronously in a physical environment (classroom).	40.0%	30.0%	17.5%	χ2(2,180) =6.354, p =.042
Synchronously in an online environment (Zoom/Microsoft Teams) through the chat	17.5%	28.3%	25.0%	χ2(2,180) =2.432, p =.296
function.	8.8%	6.7%	20.0%	χ2(2,180) =5.016, p =.081
Synchronously in an online environment (Zoom/Microsoft Teams) through breakout	32.5%	30.0%	37.5%	χ2(2,180) =0.618, p =.734
rooms, Online discussions through social media (WhatsApp, Facebook).	0.0%	3.4%	0.0%	χ2(2,180) =4.080, p =.130
Other				
Which setting do you most prefer for lecturer-student dialogue?				
Synchronously in a physical environment (classroom).	48.8%	53.3%	22.5%	χ2(2,180) =10.322, p =.006
Synchronously in a one-to-one meeting through an online, environment (Zoom/Microsoft Teams).	23.8%	28.3%	25.0%	χ2(2,180) =0.387, p =.824
Synchronously in an online environment (Zoom/Microsoft Teams) through the chat function.	17.5%	11.7%	42.5%	χ2(2,180) =14.828, p =.001
Asynchronously through the exchange of emails.	8.8%	5.0%	10.0%	χ2(2,180) =1.026, p =.599
Which setting do you prefer for student-student collaboration?				
Synchronously in a physical environment (lecture theatre, classroom)	43.6%	46.6%	17.9%	χ2 (2, 180) = 9.357, p =.009
Synchronously in an online environment (Zoom/Microsoft Teams) through chat function.	19.2%	20.7%	15.4%	χ2 (2, 180) =.442, p =.802
Synchronously in an online environment (Zoom/Microsoft Teams) through breakout rooms.	11.5%	10.3%	23.1%	χ2 (2, 180) = 3.785, p =.153
Online collaboration through social media (Google docs, WhatsApp, Facebook group)	21.8%	19.0%	38.5%	χ2 (2, 180) = 5.368, p =.068
Asynchronously through the exchange of emails.	3.8%	3.4%	5.1%	χ2 (2, 180) =.180, p =.914

α is the limit of the significance level, χ 2 (a, b) is the variance between groups, and p is the significance level.

The next set of questions aimed to explore whether these web-based platforms were considered useful in terms of supporting the blended synchronous learning approach in both a physical and online learning environment (Table 6.6) in terms of student interaction with peers and lecturers and collaboration with peers.

A significant difference was revealed in students' preferences in terms of learning environments. Computer Science students mostly preferred a blended learning approach which integrated web-based platforms (Kahoot and/or Padlet) and took place online, while English and Architecture students preferred to follow this approach in a physical environment. These preferences were identified in their responses on the way that they preferred to interact with their peers and lecturers and in a collaborative environment.

In all cases, the Computer Science students preferred the learning process to take place "synchronously in an online environment (Zoom/Microsoft Teams via chat function)" rather than "synchronously in a physical classroom environment", which was mostly the preference of the students of the other two schools.

This study also explored whether there was a significant difference between the students from the three schools (English, Architecture and Computer Science) in student engagement when web-based learning platforms (Kahoot and/or Padlet) were used in a synchronous learning environment (Research Question 2). The six variables (behavioural engagement, engagement with academics, online engagement, engagement with peers, cognitive engagement, and synchronous engagement) relating to learning engagement were not statistically significant using the univariate ANOVA test except for student engagement with their peers (Table 6.7). The size effect revealed a significant difference between the three schools, with the main difference between the English and Computer Science students' responses.

Table 6.7
Students' engagement factors when Kahoot and/or Padlet were used with blended synchronous teaching and learning approach.

Engagement Factor	School (M, SD)	ANOVA among schools (α =.05)
Behavioural engagement (7-items, a = 0. 857)	English:5.54(±1.17) Architecture:5.67(±0.99) Computer Science: 5.69 (±0.87)	*F* (2,180) =.376, P=.687, η2 =.004 Multiple Comparisons analysis using Tukey HSD: there is no significant difference among schools.
Engagement with academics (7-items, a = 0. 857)	English: 5.52(±1.29) Architecture: 5.67 (±0.94) Computer Science: 5.59 (±0.92)	*F* (2,180) =.336, P =.715, η2 =.004 Multiple Comparisons analysis using Tukey HSD: there is no significant difference among schools.
Online engagement activates (6-items, a = 0. 874)	English: 5.49(± 1.31) Architecture: 5.44 (±1.18) Computer Science: 5.89 (±0.82)	*F* (2,180) = 1.963, P= .143, η2 =.022 Multiple Comparisons analysis using Tukey HSD: there is no significant difference among schools.
Engagement with peers (4-items, a = 0. 884)	English: 4.80 (± 1.71) Architecture: 5.53 (±1.14) Computer Science: 5.63 (±1.11)	*F* (2, 180) = 6.427, P = .002, η2 =.068 Multiple Comparisons analysis using Tukey HSD: there is a significant difference between English and Computer Science schools (p =002).
Synchronous engagement (5-items, a = 0. 862)	English: 5.77(± 1.13) Architecture: 5.66 (±1.02) Computer Science: 5.80 (±0.77)	*F* (2, 180) =.264, P =.768, η2 =.003 Multiple Comparisons analysis using Tukey HSD: no significant differences among schools.
Cognitive engagement (3-items, a = 0. 871)	English: 5.32(± 1.19) Architecture: 5.25 (±1.13) Computer: 5.11 (±1.20)	*F* (2, 180) =.418, P =.659, η2 =.005 Multiple Comparisons analysis using Tukey HSD: there is no significant difference among schools.

a = Cronbach's Alpha, M: Mean, SD: Standard Deviation, F(a,b) is the variance value, p: significant value, η2: effect size.

No significant difference was found among the three schools in terms of individual characteristics. The characteristics were divided into two categories, positive and negative based on their impact on student learning. The positive impact characteristics (self-efficacy, course utility, and self-regulation) obtained high values except for self-regulation; also, negative impact characteristics (surface learning, test anxiety, and negative habits) obtained high values.

To explore the effect of blended synchronous teaching and learning using web-based learning platforms (Kahoot and/or Padlet) on student behavioural self-regulation (negative habit), self-efficacy, course utility, surface learning, variety of sources, and test anxiety, an ANOVA statistical analysis was used (Table 6.8).

Table 6.8
Comparisons of students' individual characteristics between the three schools (English, architecture and computer science) when they followed blended synchronous teaching via web-based learning platforms (Kahoot and/or Padlet).

Behavioural and individual variables	Academic School (M, SD)	ANOVA among schools (α =.05)
Self-efficacy (4 items, a =0.862)	English: 5.65 (± 0.98) Architecture: 5.61 (± 0.98) Computer: 5.58 (± 0.89)	(F (2, 180) =.077, P =.926, η2 =. 001 Multiple Comparisons analyses using Tukey HSD: show no significant difference between all schools.
Course Utility (3 items, a =0.852)	English: 5.91 (± 1.13) Architecture: 6.07 (± 0.96) Computer: 5.91 (± 0.91)	F (2, 180) = 1.627, p =.199, η2 = .018, Multiple Comparisons analysis using Tukey HSD: show no significant difference between all schools (p=.199).
Surface Learning (3 items, a =0.854)	English: 5.72 (± 1.22) Architecture: 5.64 (± 1.07) Computer: 5.95 (± 0.65)	F (2, 180) = 1.058, P =.349, η2 =.012, Multiple Comparisons analysis using Tukey HSD: show no significant difference between all schools (p=.349).
Variety of Sources (4 items, a =0.847)	English: 5.80 (± 1.03) Architecture: 5.65 (± 0.94) Computer: 5.91 (± 0.87)	F (2, 180) =.975, p =.379, η2 = .011, Multiple Comparisons analysis using Tukey HSD: show no significant difference between all the schools (p almost equals 1).
Test Anxiety (4 items, a =0.874)	English: 5.28 (± 1.48) Architecture: 5.05 (± 1.30) Computer: 4.92 (± 1.23)	F (2, 180) = 1.054, p =0.351, η2 = .012, Multiple Comparisons analysis using Tukey HSD: show no significant difference among schools.
Negative Habits (Self-regulation) (3 items, a =0.879)	English: 4.63 (±1.39) Architecture: 5.09 (±1.06) Computer Science: 4.67 (±1.15)	*F* (2, 180) =2.613, P =.076, η2 =.029 Multiple Comparisons analysis using Tukey HSD: there is no significant difference between all the schools (p almost equals 1).

a = Cronbach’s Alpha, M: Mean, SD: Standard Deviation, F(a,b) is the variance value, p: significant value, η2: effect size.

Students' self-regulation was examined using a range of devices; their experience and whether they attended the synchronous lecture online or physically (Table 6.9). However, except for students' experience of the lecture and whether they attended the lecture physically or online, there were no significant differences in the students' self-regulation in any of the examples analysed. There was, however, a significant difference in the students' lecture experience as the Computer Science students had prior experience with technology.

Table 6.9
Students' self-regulation is based on devices used, experience, and lecture attendance with blended synchronous teaching and learning via web-based learning platforms (Kahoot/Padlet).

Behavioural variable	English (M, SD)	Architecture (M, SD)	Computer (M, SD)	ANOVA among schools and within each School (α =.05)
The device students have used over the Kahoot/Padlet lecture				
Smartphone	2.57 (±1.44)	2.24(±0.96)	2.36(±1.04)	F (2,180) =1.057, η2 =.012, p=.350
Laptop	2.47 (±1.47)	2.11 (±.98)	2.62 (±1.18)	English: F (2, 80) =.932, η2 =.024 p =.398
Tablet	2.90(±1.21)	1.54(±1.23)	3.14(±.95)	Architecture: F (2,60) =.437, η2 =.015, p=.648,
PC	2.51(±.68)	2.73(±1.01)	3.71(±0.0)	Computer Science: F (2,40) =.461, η2 =.012, p =.501
The students' lectures' experience of using the Kahoot platform per lecture:				
None	2.49(±1.22)	2.24(±1.04)	2.76(±1.11)	F (3, 180) =2.291, η2 =.038, p =.080
1-2 lectures	2.68(±1.48)	1.98(±.93)	2.33(±1.07)	English: F (3, 80) = 2.280, η2 =.083 p =.086 Architecture: F (2,60) =0.461, η2 =.016, p=.633, Computer Science: F (2,40) = 1.521, η2 =.038, p =.225
The students' lectures' experience of using the Padlet platform per lecture:				
None	2.47(±1.29)	2.10(±0.98)	2.40(±1.09)	F (2, 180) =3.576, η2 =.039, p =.030
1-2 lectures	2.84(±1.75)	2.34(±1.04)	3.75(±0.47)	English: F (3, 80) = 1.754, η2 =.044 p =.180 Architecture: F (2,60) =0.470, η2 =.008, p=.496 Computer Science: F (2,40) =6.268, η2 =.142, p =.017
Students attend the Kahoot/Padlet lecture in a physical or online class				
Synchronously in a physical environment	1.78(±1.17)	2.16(±0.85)	2.84(±1.08)	F (2, 180) =7.004, p =<.001 English: F (1, 80) = 37.699, η2 =.326, p =<.001
Synchronously in an online environment	3.37(±1.12)	2.11(±1.19)	2.50(±1.11)	Architecture: F (1,60) =0.041, η2 =.001, p =.840, Computer Science: F (1,40) =.675, η2 =.017, p =.416

α: the limit of the significant level, M: Mean, SD: Standard Deviation, F(a,b) is the variance value, and p: significant value.

Additionally, a significant difference in students' physical or online lectures within the English school; students preferred synchronous online classes over those who preferred physical classes. These quantitative findings indicate that the type of platform used (be it Kahoot and/or Padlet) during the lecture did not affect students' self-regulation. The student's self-regulation improved because of their experience with Kahoot/Padlet. The Architecture and the Computer

Science students had almost identical scores for self-regulation regardless of whether they preferred physical or online lecture sessions.

Qualitative Analysis

As previously noted, the purpose of interviewing lecturers, was to elicit lecturers' thoughts on implementing a blended synchronous teaching and learning approach using web-based learning platforms from the perspectives of control, experience, feedback, and student interaction (Research Question 4). The interview transcriptions were analysed using the thematic coding analysis approach that identified the following themes: web-based learning platforms, Kahoot/Padlet, teaching role, teaching delivery process, challenges and opportunities, training/technical support, infrastructure and Internet connection, students' learning process, lecturer interaction with students, communication and feedback, student peer collaboration, and students' enjoyment of learning and teaching. More details about each theme are presented below. The main points gleaned from the lecturers' qualitative responses regarding the challenges and opportunities presented by integrating web-based learning platforms (Kahoot and Padlet) into teaching and learning are presented below. More detailed analyses are presented in Appendix 6. F.

Web-based learning platforms (Kahoot and Padlet). The interviews with lecturers from the three schools (English, Architecture and Computer Science) yielded information on which of the web-based platforms (Kahoot and/or Padlet) they preferred to use to support their synchronous lectures and how. Some lecturers have used both platforms for different purposes, for example, lecturers have used Padlet to allow students to "freely express their opinions about the material and content, as well as present any negatives or positives for developing the material in the following chapters" (Architecture lecturer), and Kahoot "was used in conjunction with the lecture's theoretical content to stimulate students through scientific competition, allowing distinguished students to be discovered and encouraging the remaining students to participate" (Computer Science lecturer). Kahoot was deemed to be "more relevant to check student understanding through quick multiple-choice questions" (English lecturer).

Importance in teaching and learning processes. All the lecturers agree that the web-based tools help support teaching and learning purposes, as “they assist students in reviewing the information and concepts presented during the lecture, consolidating their knowledge, and achieving targeted learning objectives" (Computer Science lecturer), making lectures "more enjoyable" (English lecturer). As an Architecture lecturer stated, "these learning tools motivate students to pay attention to the lecture topic". As this research project was conducted over the first lockdown period of the COVID-19 pandemic, lecturers also referred to the usefulness of the web-based platforms "particularly in light of such unexpected circumstances of the COVID19 pandemic".

The lecturers also highlighted the importance of teaching alternation compared to the traditional way of teaching, leading them "to think outside the box” to integrate the web-based platforms into their teaching (English lecturer) and allow them to significantly improve it (Computer Science lecturer).

They also spoke about how these web-based platforms could improve student engagement. One of the English lecturers stated that “students were now more engaged in concentrating on what they have heard to correctly answer questions and climb to the top of the Leader Board" when Kahoot was used in the lecture, thus keeping students "engaged due to the competition process, making the lecture more enjoyable". Padlet helped increase interaction between students and lecturers and among students as it enabled them to exchange pictures and files during the lecture (Architecture lecturer) and comment (Computer Science lecturer).

The lecturers who integrated Kahoot and/or Padlet into their synchronous lecture sessions perceived these web-based platforms as an opportunity “to be focused on the key lecture points through the development of an interactive game for students when Kahoot was used” or “to facilitate communication and discussion with and among students including online learning activities, when Padlet was used” (Architecture lecturer). The lecturers felt that their students were better able to learn when these techniques were used compared to the traditional way of teaching as they "felt more actively involved in the lecture" (English lecturer).

They also believed that, by integrating the Kahoot and the Padlet platforms into their teaching approach, “the learning process has become easier than the traditional way of teaching and students can easily use their smartphones, tablets and/or laptops either from their home or their university lecture theatre". This was important especially during the COVID 19 pandemic as it meant that the teaching and learning process was not disrupted. However, they also mentioned the importance of providing "lecture materials … to students in an organized manner" (English lecturer).

Teaching and learning. The lecturers also pointed out that these web applications could not be used to support all lecture topics. For example, an Architecture lecturer stated that " these platforms may be ideal for some courses, while they can be used as a supplementary material for other courses" depending on "the nature of the material taught" (English lecturer) and "the lecturer’s style" (Computer Science lecturer).

However, as an Architecture lecturer mentioned these were ideal web-based tools to use during the COVID-19 pandemic teaching and learning restrictions as "there is no room for another option, given that students are being taught at home (online)".

Students’ participation in learning activities. The lecturers viewed interaction as a fundamental issue related to their teaching and their student learning experience noticing that "student willingness to participate in learning activities based on Kahoot and/or Padlet was higher than the traditional way of teaching including a high level of interaction between students" (Architecture lecturer) keeping students "active participants during the lecture " (Computer Science lecturer). The lecturers also mentioned that the platforms provided equal opportunity for participation in learning activities, even for “students who were almost embarrassed to participate via voice or who were hesitant to write comments in the traditional mode, when their names were presented" (Computer Science lecturer). The lecturers agreed that their students “have the relevant capabilities to participate in online learning activities and interact with their peers online”; however, they also mentioned that "several students reported difficulty in downloading and running the Kahoot application from their smartphones and tablets”.

Communication and feedback opportunities. When asked to what extent the use of the web-based learning platforms during lectures aided or enabled them to communicate with and provide feedback to their students, the lecturers' responses were almost unanimously positive. For example, an Architecture lecturer stated, "this approach allowed lecturers to communicate and provide feedback in real time and after the lecture with their students" mainly "because the lecturers can monitor the teaching and learning process in real-time" (Architecture lecturer). Students could also use web-based applications alongside the University Virtual Learning Environment platform (i.e., Blackboard) allowing the lecturers to "communicate with them throughout the whole teaching process" (English lecturer). "After the students participated in learning activities through the web-based applications, a direct online discussion via the Blackboard platform further clarified misconceptions after the lecture" (Architecture lecturer). Lecturers used this process to give feedback, as "the free version of Kahoot that we used provides no space for student communication or feedback and Blackboard further supported the communication between lecturers and students during/after the lecture" (Computer Science lecturer). Considering students' interaction with their peers, most lecturers believed that "the students assisted one another by identifying errors in one another's work, discussing them, and correcting them" (Architecture lecturer). "Additionally, " the students who participated less in the traditional way of teaching were more active in online settings increasing the competition level between the students or supported a more active online debate " (Architecture lecturer), as "they loved the challenge of collecting points by trying to answer the questions fast" (Computer Science lecturer) and "they had more ways to interact with others and chat in the online discussions with several students on how they had achieved it, sharing their feeling" (English lecturer).

Feedback was provided to students and online discussion was possible through Blackboard discussion forums "connecting the topic points" (Computer Science lecturer) and/or "using the WhatsApp application" (Architecture lecturer).

Opportunities and challenges for enjoyment and fun. The lecturers agreed that learning through web-based platforms (Kahoot and Padlet) was fun for students. "I believe they enjoyed the lecture as when I was not using these web-based platforms, students frequently asked why I have not used them" (English lecturer). Students have "been pleased with their lecturers and "thanked" them "for providing the lecture using this approach" (Computer Science lecturer). Students enjoyed the process of being "able to enter the platform via mobile or through other digital devices increasing their interactivity with others". Although most of the lecturers believed that the students felt that the platforms allowed them to "remove the fear of testing and increase their enthusiasm for learning", some lecturers "worried because the use of applications might distract them" from their learning process (Computer Science lecturer).

Referring to the COVID-19 pandemic, the lecturers stated that, by integrating these web-based applications into their teaching process, they "offered students a unique experience that they could not obtain in other courses at a time when they were bored and tired of lectures as a result of the COVID -19 pandemic" (Architecture lecturer).

Discussion

The purpose of this research project was to explore students' and lecturers' perspectives on synchronous lecture sessions using the web-based learning platforms, Kahoot and/or Padlet. This section discusses the impact of the integration of web-based learning in lectures during the first lockdown of the COVID-19 pandemic with particular emphasis on student engagement, the role of student self-regulation and individual student characteristics in the learning process from the lecturers' viewpoint. This research project also explored the students' perceptions of their engagement with the lectures when their lecturers used Kahoot/Padlet to support the teaching and learning process and the extent to which their needs were met using this learning technology.

Students' view

This section details students' responses to the questionnaire following their attendance at the lecture that used blended synchronous teaching and learning via web-based learning platforms (Kahoot/Padlet). The findings regarding topics including learning behaviours, engagement, self-regulation, and other individual characteristics are discussed below.

Lecture settings and participation behaviours. The findings revealed that all types of devices, i.e., smartphones, laptops, tablets, and PCs, were used during the synchronous lecture. There were no notable distinctions in the device used during the lecture across the three schools and no statistically significant difference between the use of one or two devices. Therefore, it could be inferred that Kahoot/Padlet could be used with a range of the available devices and that the devices that are generally available to students have sufficient capabilities and functionalities to be used with such applications which are free of charge and easy to use. The findings of this research project are in alignment with the findings of Adhikari et al. (2016) which revealed that students valued web-based teaching when they were able to use their own devices, describing the teaching as being more relevant and valuable in today's innovative culture.

Most of the students reported a positive learning experience when Kahoot and/or Padlet were used in a synchronous lecture session. They deemed both web applications easy to use and beneficial in terms of assisting them to learn by interacting with others. Kahoot's competitive function was specifically highlighted as being beneficial by most students, in line with Doung-in (2019) findings.

Regarding students' engagement behaviours and their participation in learning activities during the synchronous lecture, the findings revealed no significant differences across the three schools. Based on their responses, the students appear to perceive Padlet to be effective for both independent and collaborative learning (Dianati et al., 2020) while Kahoot was found to be effective to use for revision.

For this research project, the researcher looked at what participation means for students and sought to identify any differences in the definition of participation among the students in the three schools. The results indicate that the English and Computer Science students were more actively involved in the online learning activities than students at the Architecture school. The number of learning activities in which students engaged varied per school. For example, the Architecture students identified five activities. In contrast, Computer Science students identified with only three activities and English students with just two. These findings demonstrate how different academic school programs influence the type and number of learning activities students are motivated to participate in during a lecture using Kahoot/Padlet.

An earlier study by Fiester and Green (2016) found that students' creativity was motivated by Padlet, which is a virtual notebook for creating, collecting, and sharing ideas, images, quotations, and video clips; the students widely regarded it as an excellent tool for gathering, sharing, and modifying views. Furthermore, Rashid et al. (2019) demonstrated that Padlet could be used to create an online dashboard displaying and presenting information about each lecture topic. Hence, it is classified as an online interactive learning tool. Kahoot, on the other hand, is described by Ismail and Mohammad (2017) as a promising and practically feasible formative assessment tool designed to offer students the opportunity to learn in a stimulating and entertaining environment. Finally, Holbrey (2020) reported no technical issues when using Kahoot's competitive games, finding that they encouraged active engagement and dynamic learning. Moreover, students of this research project appreciated Kahoot competitions and the access to instant feedback, which enhanced their commitment and concentration.

In terms of the settings in which students prefer to learn (i.e., through dialogue, interaction, or collaboration, with peers or lecturers, whether in an online or physical synchronous environment) significant differences emerged among the schools. The Computer Science students favoured a synchronous online environment, while the English and Architecture students preferred synchronous lectures in a physical environment.

This finding can be interpreted in a variety of ways. One explanation may be that Computer Science school students are used to working online with their peers and English and Architecture students may prefer a synchronous physical classroom environment because they rely on non-verbal cues, such as body language, eye contact, gestures, and facial expressions for effective communication (Eve, 2013). Research has established that eye contact is a critical non-verbal teaching technique that both raise the learners' attention in the classroom and assists lecturers in effectively achieving targeted student outcomes (Butt et al., 2011).

The two most popular forms of communication with lecturers preferred by the students of all three schools were, "synchronously in a physical classroom environment" and "online discussions via social media (WhatsApp, Facebook)". Their popularity may be a consequence of the novelty of using these forms of technologies in an educational context. Students are accustomed to the physical classroom environment, which explains the first response; they are also confident using social media applications (WhatsApp, Facebook) in their daily lives.

Regarding lecturer-student dialogue, the results revealed a significant difference among the schools relating to preferences between the two settings "synchronously in a physical environment (classroom)" and "synchronously in an online environment (Zoom/Microsoft Teams) through the chat function". Notably, of all the students, the Computer Science students were the ones who most preferred the online environment and least preferred the physical environment.

The preference expressed by English and Architecture students for the setting "synchronously in a physical environment" might be due to school-specific teaching approaches that require academics' face-to-face involvement in the learning processes (for instance, in the speaking and listening elements of English or the design modules in Architecture). For their part, most Computer Science students may have preferred "synchronously in an online environment (Zoom/Microsoft Teams) using the chat function because they may have been taught courses this way routinely and are, thus, accustomed to navigating the learning processes without non-verbal cues.

A significant difference was apparent concerning the preferred settings for student-student collaboration. Students in the English and Architecture schools were more likely to collaborate synchronously in a physical environment (lecture theatre, classroom) than the Computer Science students. This could be due to the importance of working together in a face-to-face environment. Previous literature supports these findings, as Fisher (2017) reported, Padlet provides a more responsive alternative to oral input in the classroom, particularly for students who may otherwise be hesitant about contributing verbally. Additionally, Alabbad and Huwamel (2020) demonstrated that teaching English vocabulary to Saudi women via the Padlet platform boosted learners' English vocabulary. Therefore, it is recommended that academics are trained in the requisite pedagogical knowledge to facilitate collaborative learning within a gamified learning context, and to develop an environment that is conducive to effective learning experiences (Korkealehto & Siklander, 2018).

Students' engagement. No significant differences were discovered among schools regarding students' engagement components, except for engagement with peers, favoured by Architecture and Computer Science students over English students. Students of Architecture and Computer Science may place a high value on engagement with peers because these two schools' programs are chiefly designed to include collaborative assignments and group projects. Korkealehto and Siklander (2018) confirmed the role of collaboration as an initial driver motivating engagement with online learning. Previously, Baker (2015) defined collaboration as making a concerted effort toward developing a "joint problem space" of shared representations of a problem to be solved, as a result of which students collaborate to solve problems and co-create learning outcomes. Using Padlet in the classroom fosters creativity and collaborative learning, while also optimizing classroom performance (Ramachandiran & Mahmud, 2018). Additionally, using Kahoot, particularly in Team mode, enables learners to readily share knowledge (Atherton, 2018).

Additionally, there was no difference in engagement values among schools due to students' synchronous class attendance, whether physical or online. Additionally, there no difference was noted in engagement among schools due to the varied settings for student-student dialogue. In contrast, there was a significant difference in engagement for English students, due to the different settings for lecturer-student dialogue, as they perceived "Synchronously in a physical environment (classroom)" to be the least effective.

A similar result was found by Aleksic-Maslac et al. (2017), demonstrating the gamification tool Kahoot as an effective method to enhance student engagement in class. The higher level of engagement, in that case, resulted from the integration of synchronous online learning into lecture theatres. As Holbrey (2020) suggested, gaming appears to be an effective tool for promoting active participation and interactive learning. Students valued Kahoot's competitive game over a synchronous lecture due to the immediate feedback that they received and the opportunities for discussion on specific questions. This process also reduced their test anxiety. The integration of Kahoot and Padlet in teaching and learning allowed lecturers to follow a more active teaching process compared to the traditional way of teaching. According to Cureton and Gravestock (2018), the integration of the web-based applications into teaching and learning included activities that stimulated good learning relationships, facilitated interactions between students and between students with their lecturer, acknowledge the student as an individual, encourage good communication, and provide opportunities to discuss work.

Self-Regulation and individual characteristics. Individual characteristics were also examined, including self-efficacy, course utility, surface learning, variety of sources, test anxiety, and negative habits (Self-Regulation) (Table 6.8). There were no significant differences between the three schools in terms of their characteristics, apart from self-regulation. Specifically, it seems that the students from all schools demonstrated a high level of confidence in their ability (self-efficacy) to be involved in a teaching approach which integrated web-based applications, such as Kahoot and Padlet, and to interact with various learning resources. However, they believed that the synchronous learning approach has not improved their self-regulation skills, and their learning strategies (surface learning) and they have not reduced their test anxiety. Teng et al. (2020) have mentioned that collaborative learning technologies could assist students' acquisition and development of self-regulation, proposing lecturers promote students' social and cognitive interactions over the lecture. Although lecturers might have concerns about the integration of competitive games, such as Kahoot, into their teaching, as they might increase student anxiety (Wang & Tahir, 2020), it was found student self-regulation has been highly linked to their learning engagement, when they used their own digital devices to participate in online collaborative learning activities (Saltos Tarira, 2019).

The findings of this research project are in alignment with Owen and Licorish (2020), who expressed their concerns regarding Kahoot's limited and shallow content coverage, and the time-consuming and distracting nature of the platform. Additionally, Arkorful and Abaidoo (2015) discussed that student communication skills and knowledge acquisition might not be positively affected by the use of various web-based applications due to students may lack the skills necessary to deliver their acquired knowledge to others.

The findings of this research project showed that students' self-regulation was low during the Kahoot/Padlet lecture but influenced by a number of the digital devices that students used during their lecture, the number of modules that integrated these web-based applications, and student preferences on learning environment (synchronous physical or online environment). There were no significant differences in student self-regulation among schools, except within the Computer Science school's experiences when using Padlet. However, those students who had experienced (1-2) lectures using Padlet had improved self-regulation relative to those who had not previously attended this type of lecture. This was mainly because Computer Science students were familiar with the use of technology. Additionally, there is a significant difference in student self-regulation among schools, particularly in the learning environment (synchronous attendance physical or online environment). This difference was most evident within the English school, where students' self-regulation was greater in the synchronous online environment than in the synchronous physical environment. A potential explanation of this finding might be related to the number of students who were in a lecture theatre (small lecture theatres for a such large number of students). The learning environment settings could influence student self-regulation skills (Xu & Qiu, 2021), with the physical environment distracting student learning. This finding has been confirmed in the first research project, which has been investigated the influence of the use of digital devices in a lecture theatre.

Regarding student engagement when web-based applications were used to support teaching, previous research has indicated that students' self-regulation was affected by their engagement. For instance, Nadeem and Al Falig (2020) presented evidence that Kahoot quizzes positively affect the three critical elements of self-regulated learning, effective feedback, a supportive classroom environment, and students' metacognitive skills, which supported student engagement. In addition, Sun and Rueda (2012), recommended academics assist students taking their first online courses to increase their emotional engagement and self-regulation in distance education environments. The findings further indicated that even when students exhibit high levels of engagement during a lecture, they do not always exhibit high levels of self-regulation. The previous findings were in alignment with the statistical results of this research project.

Lecturer View

An interview process was followed to explore the lecturers' views on the use of web-based platforms, Kahoot and/or Padlet, in their teaching approach. The areas that have been identified by the lecturers were related to their attitudes, experiences, and satisfaction with the use of Kahoot and/or Padlet for teaching purposes, the potential challenges, and opportunities regarding communication and feedback, and student participation and interaction.

Web-based Platforms (Kahoot and/or Padlet). Regarding the type of web-based application(s) (Kahoot and/or Padlet) that was/were used by lecturers to support their teaching, the selection was up to them. Although there were several lecturers from each School who used both platforms for teaching purposes, it seems that the majority preferred to use Kahoot to review their student's knowledge, to provide formative assessment, or to have a break from traditional learning activities. They have selected to use this web-based application because it was easy for them to create their online quiz, and assess their student knowledge, while their students could join online without being registered, take part in the learning activity anonymously, have fun in a competitive environment which might increase their engagement (Wang, 2015; Wang & Tahir, 2020). It was also found that Kahoot enabled students to optimize their skills regarding a particular aspect of the competitive challenge. The term "challenge" refers to an objective with uncertain outcomes, which was varied by the degree of difficulty, and the multiple levels of learning goals (Pontes e Silva et al., 2021). Finally, all lecturers who used Kahoot as part of their teaching process have mentioned the importance of this web application regarding the enhancement of student motivation and engagement alongside the facilitation of student discussion (Sharples, 2000).

However, when lecturers designed learning tasks which supported a debate between their students, they preferred to use Padlet in their teaching. They have created a virtual discussion wall to allow their students to share their views on various topics/questions, uploading documents, questions, images, audio, and video files Padlet was also used with various ways to support the learning process following the relevant literature: pre-lecture preparation, in-lecture activities, post-lecture consolidation, and group project work (Fisher, 2017), and it was used to support remote online synchronous collaboration over the COVID-19 pandemic first lockdown period

The lecturers who used both web-based platforms over their lectures highlighted the importance of Padlet to allow students to express their opinions about the lecture material and content over the online discussion settings, whereas Kahoot was used to stimulate student motivation through the game competition.

The lecturers also believed that the use of Padlet was highly dependent on the user's ability to explore and optimize its functionality which has been extremely beneficial for their learning process as it was used as a medium for collaborative learning, allowing students to attain a common goal (Saepuloh & Salsabila, 2020; Sætra, 2021). Additionally, they believed that the use of Kahoot could enhance their teaching and learning process through the use of the challenge for students' multiple-choice questions and the game settings which could increase enjoyment, motivation, and concentration (Chaiyo & Nokham, 2017; Cutri et al., 2016; De Melo et al., 2018; Ismail & Mohammad, 2017; Owen & Licorish, 2020; Wang & Tahir, 2020).

Overall, the lecturers utilised the unique platforms' functionalities emphasizing the importance of the fun atmosphere, competition, and interaction between students and lecturers. In alignment with the previous literature (Wang & Tahir, 2020), lecturers believed that Kahoot could improve student performance, enhance communication, and reduce students' anxiety. They also believed that Kahoot was an interactive way to provide formative feedback to students in a joyful and interesting atmosphere (Ismail & Mohammad, 2017), while Padlet inspired students to participate actively in learning activities through a debate process, reducing test anxiety, promoting the interaction between peers and the lecturers, and improving language accuracy (Rashid et al., 2019).

Teaching and Learning Processes. The lecturer's experience with the use of Kahoot and/or Padlet was limited to the free version functionalities. This might affect their experience and the potential evaluation process. However, the lecturers indicated that the learning platforms assisted them in a variety of ways regarding the teaching delivery process by:

1. increasing the effectiveness of student attention, assisting students in reviewing and consolidating information and concepts during the lecture due to the interactive learning environment.
2. overcoming the student boredom that they might experience during their lecture sessions through active engagement- and interaction-promoting learning activities.
3. utilising a variety of online activities to break down the lecture session into several teaching segments facilitating student learning.
4. enabling them to monitor students' understanding (Nkhoma et al., 2018).
5. allowing reliance on online education, as occurred during the COVID-19 pandemic, when all campuses were forced to close.

The lecturers who participated in this research project confirmed the findings of Sætra (2021), who discovered that the number of students who used Padlet gradually increased, asking simple but fundamental questions that assist them to clarify their misconceptions. These questions might not be asked by students, as they might be afraid to ask questions during the lecture session, as they thought that they would appear ignorant and be mocked. Parra-Santos et al. (2018) pointed out that the gamification approach can increase student participation in learning activities.

It has been also mentioned by the lecturers that through the integration of web-based applications into their teaching process, they could follow an approach alternative to the traditional way of teaching. Additionally, the integration of web-based applications into the teaching delivery process allowed lecturers to monitor the student learning process.

Challenges and Opportunities. The lecturers also identified certain challenges and opportunities associated with incorporating web-based learning platforms (Kahoot/Padlet) into their teaching schedule, based on their experience during the synchronous lecture. The challenges include weakness of internet service and connectivity for some students, provision of robust Wi-Fi service in the lecture theatres, student lack a suitable device, academic lack the technical knowledge, the course preparation process's requirements, integration with the university's LMS (Blackboard), adoption of appropriate learning theories and pedagogical approaches.

A previous study reported that the pedagogical approaches employed affected students' use of Padlet, with some of them creating barriers to learning (Deni & Zainal, 2018). Zainuddin et al. (2020) stated that several perceived barriers to participation in classroom activities include difficulty speaking, shyness, fear of interaction, and reluctance to provide comments. Furthermore, lecturers suggested that when applied uniformly to all lectures, some students were initially fascinated by the new interactive approach, but their enthusiasm and attraction have diminished over time. This has been also mentioned by Wang (2015), who noted that Kahoot had a less positive influence on student and lecturer interactions after several months in use. Based on a literature review by Wang and Tahir (2020), Kahoot had less influence on student learning after the first five months of its initial use. In addition, regarding the use of Kahoot, there were several challenges in getting the difficulty level of questions, network connectivity, speed-based scoring reducing students' reflection time and causing some to guess without thinking and some adverse reactions when a student fails a quiz. The potential opportunities that have been pointed out by the lecturers were related to the interaction of students, student, and lecturer enthusiasm to use the web-based applications for educational purposes, student learning engagement and motivation for learning the facilitation of student learning process, student active participation in learning processes and activities, and the enhanced interactivity and communication process between students and/lecturers.

Finally, there was a belief among lecturers that the use of these web-based applications was essential during the COVID-19 pandemic, as teaching has been moved online and these platforms kept student engaged with their learning process. Many other lecturers have used Kahoot and Padlet in their teaching over the COVID-19 pandemic period, highlighting similar points regarding the findings of this project. For example, Nkhoma et al. (2018) mentioned that Kahoot allows lecturers to engage with a large number of students, increasing their engagement (Martín-Sómer et al., 2021), while Mehta et al. (2021) mentioned that using Padlet as a digital tool could boost and retain student engagement during the COVID-19 pandemic by promoting remote collaborative learning.

Another challenge that the lecturers pointed out was related to the training requirement and technical support that might need to use web-based learning platforms from technical experts. Although the relevant video instructions were provided to them, they thought that they spent time to preparing the relevant material and they expected someone to prepare the online learning activities for them. According to Beltrán-Martín (2019), Padlet could support simple activities and no need for any particular expertise is required. Several of the lecturers who participated in the current research project mentioned that Kahoot and Padlet were not such difficult to use and they compared them with the Blackboard learning platforms which have found them not easy to use. However, many other lecturers who have been involved in this research project considered that they spent excessive time overloading their workload to familiarize themselves with these web-based applications. Wang and Tahir (2020) mentioned that one of the most prominent issues for lecturers is to the challenging use of technology in their teaching. Additionally, the lecturers who used these web-based applications (Kahoot and/or Padlet) to support their teaching believed that the full subscription licenses (not the free version) of these platforms could allow them to gain more benefits for the additional functionalities. Such functionalities for Kahoot include adding puzzles for players to test deeper understanding, adding polls to gather player feedback, and adding multi-select questions in answer options while for Padlet the paid plans will give unlimited Padlet walls in a lecturer account. Generally, these findings align with the results presented in chapter two of this thesis, where the lecturers from Saudi Arabia faced technical challenges when integrating technologies into their teaching, a point that was also mentioned in previous studies (Al Meajel & Sharadgah, 2017; Almannie, 2018; Bajabaa, 2017).

Students' participation and interaction. The lecturers who have integrated Kahoot and/or Padlet into a synchronous teaching approach have viewed student interactions with the learning activities through the web-based applications as critical for student engagement.

The interaction with the learning activities was mainly affected by the dialogue opportunities between students and lecturers when Padlet was used and the gaming settings (play and win process) of the Kahoot application. Being active learners through the high level of interactivity with the web-based applications gave all students the opportunities to be engaged with their learning process even those students who in the past had been embarrassed to participate orally or hesitant to write traditional comments. A previous study using Kahoot indicated that this platform stimulated student voice, motivating disengaged and lethargic participants (Susanti, 2018). Special merit has the use of these web-based applications over the COVID-19 pandemic, where the lecturers noticed their students preferred to use Kahoot and/or Padlet and other digital tools (i.e., Blackboard and Cisco WebEx) as a supplementary environment to support their learning process. However, the lecturers who used Kahoot and/or Padlet in their teaching have considered students training on the use of digital tools essential to ensure that all students had the same ability to use these applications (Deni & Zainal, 2018).

Communication and Feedback. The lecturers who used Kahoot and/or Padlet to support a synchronous blended learning approach have considered that they could communicate and provide feedback to their students over the lecture more effective than the traditional way of teaching. These opportunities allowed them to monitor and facilitate their student learning process over the lecture. Lecturers have also believed that as students could anonymously participate in the learning activities, they could freely express themselves the others’ opinions (Sari, 2019) which enhanced the communication process between students and/or lecturers. According to Jellicoe and Forsythe (2019), the evaluation of student behaviours regarding feedback and the communication process can be an effective way to determine whether students were prepared to make the incremental gains in learning required for the development. In this research project, lecturers have mentioned that their students have been in the process of discussing the points posted online by other students and this process stimulated discussions between students and lecturers during the lecture.

This communication and feedback process has been applied even when Kahoot applications were used, as to gain points in a competitive environment they exchanged views on the lecture topic and in several cases used additional platforms, such as WhatsApp.

Academics believed that these online lecture activities which promoted the communication process between students and/or lecturers could assist students with their assessment preparation, reducing their test anxiety (Smith & Kaya, 2021). This was a point that has been also found in the student quantitative analysis. It has been also mentioned by the lecturers that these active teaching and learning process fostered peer collaboration (Deslauriers et al., 2019), where students shared and provided feedback among their peers, a process which kept them engaged with their learning processes and based on Yeh et al. (2019) it allowed them to further develop their critical thinking and feedback skills.

Conclusion

This project investigated students' and lecturers' views from three Schools (English, Architecture and Computer Science) regarding their experiences with digital synchronous teaching and learning via the web-based learning platforms (Kahoot and/or Padlet). Overall, there were no significant differences among schools in terms of students' use of their own devices (whether smartphones, laptops, tablets, or PCs) during the blended synchronous lecture on Kahoot/Padlet platforms, with the students having the relevant digital capabilities to be actively involved in the Kahoot and/or Padlet learning activities.

A significant difference among schools was found regarding prior experience with the use of Kahoot/Padlet platforms. Thus, it is revealed that most, except for English students, were experiencing their first exposure to these platforms. Therefore, it is possible to deduce that most students in this survey were unfamiliar with these platforms. As a result, it may be concluded that these platforms are infrequently used in teaching and learning at UQU.

Student engagement was statistically evaluated via six learning variables: behavioural engagement, engagement with lecturers, online engagement, engagement with peers, cognitive engagement, and synchronous engagement. No significant differences were discovered among schools, except for engagement with peers, which was favoured in Architecture and Computer Science over English, mainly due to their academic programs, which include more collaborative assignments and group projects, making it easier for lecturers to create collaborative activities using Kahoot and/or Padlet.

Additionally, high student engagement values were statistically significant when Kahoot and Padlet were used in various lecture settings: student-student dialogue, lecturer-student dialogue, and student-student collaboration. There were no differences in engagement values among schools due to students' synchronous class attendance, whether physical or online. In contrast, there was a significant difference in engagement for English students due to the different settings for lecturer-student dialogue, as these students preferred the teaching delivery process to take place in a lecture theatre rather than online.

Individual characteristics demonstrated both positive and negative effects. For instance, the favourable indicators of self-efficacy, course utility, and source variety were all rated highly. This finding could indicate that students have a high level of confidence in their abilities to use these platforms and the diverse resources available through them. On the other hand, students mentioned that negative habits, surface learning, and test anxiety have not been influenced by using web-based applications during the lecture. This finding might indicate that students were inexperienced with the use of Kahoot and/or Padlet for the learning process, although these applications kept them engaged with their learning process. This is an issue that needs to further investigate to explore ways to make students aware of how these applications could further support their learning.

Self-regulation (negative habit) was found to be lacking in students at all schools. Students' self-regulation scores were poor throughout the Kahoot/Padlet lecture, which included a variety of conditions, including the use of different devices, lecturers' experiences, and whether students attended synchronously in a physical or online environment. There were significant differences among schools regarding student self-regulation, notably in students' synchronous attendance in a physical or online environment. This difference is apparent within the English school, where students' self-regulation is higher in the synchronous online environment than in the synchronous physical environment, meaning that these students had less experience than others regarding online learning. Additionally, they might become distracted by others and their own personal learning environment, which influenced their learning process. This finding is in alignment with the first research project regarding the use of digital devices during the lecture session, when students brought their digital devices.

In general, the findings suggest that even when students exhibit high levels of engagement during the lecture, they did not necessarily demonstrate high levels of self-regulation, although based on the lecturers Kahoot and Padlet had a significant impact on their teaching and student learning during a synchronous blended lecture session rather than traditional teaching approach. The lecturers highlighted the advantages and disadvantages of the integration of web-based learning tools (Kahoot and Padlet) into their teachings, such as Internet access and Wi-Fi connectivity into lecture theatres, and the integration of these platforms with the university's learning management system (Blackboard). In alignment with a previous study (Korkealehto & Siklander, 2018), Padlet was viewed as a less enjoyable process compare the Kahoot use, but it stimulated more in-depth discussions on various material (i.e., text, videos, images, external links). On the other hand, Kahoot fostered a sense of community through the gaming process, supporting a relaxing and friendly environment. However, both web-based applications increased student engagement, motivation, and attendance through the communication interactions between students and/or lecturers. The lecturers found that students' interactions with their peers were reflected in their behaviour, as they assisted one another in finding a solution to problems and/or discussing one another's work.

This teaching delivery process took place over the COVID-19 pandemic, and the lecturers reported that their students had become fatigued by remote online teaching, although they overall characterised this teaching approach as valuable and authentic. For example, they believed it was vital to use these platforms because allowed them to remotely monitor students' performance and learning process.

CHAPTER 7 - Conclusion

The findings reported in this research study have made an important contribution to knowledge regarding the integration of personal devices and (social media) applications (SMAs) in lectures to enhance teaching and learning in the KSA Higher Education sector. Specifically, this was a pilot study conducted at Umm Al-Qura University in three Schools (English, Architecture and Computer Science), to investigate the prevailing education landscape and explore how blended learning interventions may be perceived by students and academics. This chapter will synthesise the main findings of each research project and will present their main contribution to the KSA Higher Education setting.

Main Findings and Contribution

The findings of this literature review concern the challenges/barriers that universities, students, and academics in KSA have provided details about regarding the current use of technology in KSA alongside the KSA government's strategic approach to digital education.

Overall, three main categories of challenges were identified regarding the integration of technology for learning and teaching purposes from student and university lecturer perspectives. These were lack of training and technical support, lack of technology and Internet infrastructure, and increased workload. It also emerged that academics had not received relevant training on how to use technology for educational purposes, and so they demonstrated limited positivity and motivation towards using technology and expressed many concerns regarding the distractions that the use of technology could cause students in lecture theatres. Additionally, academics reported having many concerns about privacy issues related to the use of SMAs in lecture theatres.

Considering the above barriers/challenges faced by KSA universities, academics, and students, three projects were designed to explore them in depth. The first research project investigated student behaviour, specifically the individual characteristics of the academic learning environment which integrates digital devices and SMAs to identify students' challenges and needs. The findings of this investigation revealed that KSA students encountered certain challenges when using personal devices and SMAs in academic contexts and that these were highly related to their limited use during lectures. Most of the students from all three schools indicated an eagerness to use their own digital devices in lectures. However, the students frequently reported that lack of the Internet connectivity on university campuses prevented them from becoming actively engaged in learning activities. Thus, although KSA Higher Education institutions and the government set as a priority ensuring a reliable infrastructure, this remains an ongoing problem. Based on the findings of this first research project, it is apparent that the student's behaviours and attitudes toward the use of learning technology in lecture theatres were unrelated to their characteristics, such as self-efficacy, course utility, test anxiety, surface learning, and negative study habits (behavioural self-regulation). However, student learning was affected by the requirement for multitasking and distraction, when they used their digital devices in a lecture theatre to participate in (non-)learning activities. This finding requires lecturers to adapt their approach to the teaching process by employing more interactive methods. Students mentioned that they were distracted by their digital devices, noting that they and/or their peers sometimes used their devices to escape a "boring" and uninteresting lecture session. Regarding the multitasking process, this research project also proposed that this could be highly related to the variety of resources made available to students, which prevented them to be involved in non-learning activities. Thus, Saudi academics could provide different types of resources to their students to avoid them needing to search for information on the Internet, while following the lecture sessions.

Finally, all the students claimed that their lecturer's attitudes towards the use of technology were the main barrier to them using their digital devices during lectures, which led the researcher to explore lecturers' behaviours and attitudes towards the use of digital devices and SMAs for teaching and learning in lecture theatres. Overall, the second research project found no significant differences between the academics from the three schools regarding their responses concerning perceived usefulness, ease of use, and behavioural intentions following the Technology Acceptance Model (TAM) framework, expressing a positive view toward the use of technology for teaching and learning purposes. The overall findings were also consistent with those reported in the literature, demonstrating that perceived usefulness and ease of use had a significant, direct effect on intention, and were crucial drivers of social media adoption in higher education contexts. Almost all the academics involved in the study relied significantly on their smartphones, a finding that is consistent with the high rate of smartphone ownership in the KSA. This might have been influenced by their intention to include the use of smartphones in the classroom. However, they felt uncomfortable about using this technology, mainly because they had received enough information and support on how they could integrate digital learning tools into their teaching to enhance student learning, keeping them engaged with the teaching process. Their lack of familiarity with the use of learning technology led them to feel reluctant about using it for non-learning activities.

This finding, therefore, supported the suggestion to issue guidelines and directions for the use of personal devices for educational purposes to avoid distractions in the lecture context. Additionally, regulations should be established to guarantee students adhere to guidelines, thereby highlighting that university academics should be willing to permit students' use of smart devices.

The lecturers mentioned their intentions to use learning technology in a lecture were also influenced by Internet infrastructure and the usefulness of university-promoted platforms (i.e., Blackboard) as compared to social media. This could be explained by the lack of essential training and technical support from the University to assist them with using specific platforms and gaining familiarity with the social media platforms.

The findings of the second research project, which focused on the academics' behaviours and attitudes towards the use of technology for educational purposes in the lecture theatre also mentioned other potential challenges, including the lack of time to familiarize themselves with learning digital tools, fear of vulnerability regarding privacy and security issues, and lack of confidence when monitoring student learning engagement with digital devices during the lecture session. Thus, training courses on the use of learning technology designed by the Universities to support members of staff should not only include instruction on how to use technology for educational purposes but also enhance academics' confidence about using technology to overcome privacy and security fears. However, the participant lecturers acknowledged that the new generation of students was heavily engaged with technology, with SMAs having become an integral part of their daily lives. Thus, lecturers proposed the use of web applications, which could be made accessible via (social media) platforms and then used in lecture theatres in such a way as to ensure student engagement, while remaining focused on the lecture topic. Therefore, their intention to use these types of web applications led the current research study to introduce two different platforms (Kahoot and Padlet) to support synchronous lecture sessions in a blended learning environment. The selection of these web applications was based on student interaction and engagement and monitoring of the teaching process over the lecture session.

It is significant to reiterate here that this research project was conducted at the beginning of the COVID-19 pandemic and the first lockdown. Thus, the majority of the lecture sessions were delivered online then, although according to Li et al. (2020) web-based Kahoot and Padlet platforms could be used to support the synchronous lecture sessions in both virtual and physical learning environments. The collaborative learning theory, Malone's theory for the GSRS, and the interactionist approach have been applied to support the integration of Kahoot and Padlet web-based learning platforms into the synchronous teaching delivery process (Wang, 2015). The students were enthusiastic about digital tool functionalities and their integration into the teaching process, while they expected other future courses to integrate web applications. However, their participation in online learning activities during the lecture varied depending on the learning activity designed by their lecturers. For example, a learning activity which required students to ask questions of lecturers directly had a high participation rate among the students, while when lecturers asked them to watch module-related videos fewer students participated. However, no difference was found between the six engagement variables (behavioural engagement, engagement with academics, online engagement, engagement with peers, cognitive engagement, and synchronous engagement) in the third research project; the peer collaboration element was highly evaluated when the schools' academic programs emphasized collaborative assignments and group projects, supporting student-student dialogue, lecturer-student dialogue, and student-student collaboration.

Finally, there was no difference in engagement values between the schools, whether a physical or online session would take place. In both cases, the lecturers used Kahoot to enhance their students' understanding of lecture topics in competitive and enjoyable environments, whilst they used Padlet to engage students in collaborative activities via virtual wallboards. Although the students found the teaching delivery process interesting, motivating and engaging, their lecturers highlighted some challenges when employing these web-based learning platforms, including difficulties with Internet access and connectivity in lecture theatres, and integrating web-based platforms with the university's learning management system, Blackboard, was another critical concern for them. In particular, the academics mentioned that by using this technology, they allowed students who were previously reluctant to participate in traditional settings to be more active online. These platforms facilitated communication and feedback between students and/or academics, while at the same time allowing lecturers to monitor student processes in real-time. Finally, there were significant differences between the schools regarding students' negative habits/self-regulation regarding the usage of different digital devices, teaching experience and the learning environment (lecture sessions delivered on campus or online). Even when students exhibited high levels of engagement in lectures, they did not necessarily demonstrate high levels of self-regulation. The distinctions between schools might relate to the students having less experience with online learning.

Implications

This study's implications will be discussed based on both theoretical and practical perspectives in the following sections.

Implications for Theory

This study found that when students brought their own digital devices into lecture theatres, their attention and self-regulation were impacted, due to the requirement for multitasking and distractions arising from the devices. This relates to SCT, which was then applied to develop a theoretical model that considered the lecture theatre environment and the use of personal devices and SMAs for teaching and learning purposes. This theory addresses how knowledge is constructed through interactions between personal cognition, such as self-efficacy, and offline and/or online behaviour, such as engagement with online learning materials (Limniou et al., 2020; Wang, 2010).

It is recommended that to explore students' learning behaviour when they bring their own digital devices into lecture theatres the following elements should be considered: 1) focus on the expectations of environmental cues, 2) focus on the perceived consequences of performing a behaviour, 3) address normative influences using outcome predictions based on the perceived social consequences of behaviour, and 4) the model of behaviour incorporating self-efficacy (Schwarzer & Luszczynska, 2005). Thus, SCT factors with the potential to influence students' learning process should be related to their characteristics (i.e., diverse backgrounds, perceived course utility, self-efficacy, test anxiety, surface strategy, self-regulation), behavioural variables (i.e., bringing and using different devices into lectures, using multiple applications during lectures, and engaging in (non)learning activities related to the lecture topic), and environmental variables (i.e., multitasking activities and distractions from others and their actions and variety of sources). This research study allows future educational researchers to reconsider how SCT could be further applied in a lecture theatre environment using this study as a reference.

Numerous previous studies have adopted the TAM to explore the university students' and academics' intention to adopt digital learning technologies, and SMAs into their learning and teaching respectively (Acarli & Sağlam, 2015; Al-Qaysi et al., 2021; Dumpit & Fernandez, 2017; Leong et al., 2018). There are various versions of this model and this study adapted TAM3, using the approach employed by Jeffrey (2015), considering all of determinants Venkatesh and Bala (2008) to include critical elements, such as perceived usefulness, and perceived ease of use to provide useful information about the intention of university academics to use of SMAs for teaching purposes. Additionally, the TAM3 version was distinguished by its effectiveness in identifying and defining all the variables that uniquely describe user behaviour, and it has been used by many researchers over the years to explore users' intention to use digital technology in various countries (Li et al., 2021). As Scherer et al. (2019) demonstrated in their meta-analysis, academics’ acceptance of digital technologies in the lecture theatre is determined by core TAM variables (i.e., perceived usefulness, perceived ease of use, and attitudes towards SMA). This study also verified the elements of this framework through the qualitative lecturers’ responses, from which additional elements such as the fear of using technology for educational purposes and monitoring students’ learning process should be further considered in future studies.

Finally, to explore whether Kahoot and Padlet web-based platforms can keep students engaged with their learning process, stimulate the discussions between the students and/or academics and allow students to work in a collaborative environment in a synchronous lecture session supported by a blended approach, learning activities were designed following Collaborative Learning Theory principles to assist students to develop collaborative skills, sharing their thoughts, ideas, and feelings (Korkealehto & Siklander, 2018). Additionally, it emerged that this approach engenders a remarkable shift in the lecturer’s role, from module leader to moderator, a conclusion also reached by Rutherford (2014). Additionally, the integration of Kahoot into a synchronous lecture session could apply Malone's theory, as each Kahoot quiz item could prove challenging (goals with uncertain results) increasing student and academic fantasy (captivated by intrinsic or extrinsic fantasy), and curiosity (sensory curiosity through graphics and sound, and cognitive curiosity in which the player must solve something unsolved). These conclusions have also been confirmed previously (Wang, 2015; Wang & Tahir, 2020; Wang, 2010). Finally, the Interactionist Approach is based on the belief that students can learn by interacting with others. In terms of the use of Padlet, this approach allows students and their lecturers to communicate whenever they wish before, during and after lecture sessions, and for students, comments to be discussed over the synchronous sessions. Therefore, they have time to reflect and correct their mistakes, and comment equally, thereby enhancing their learning (Algraini, 2014). Additionally, this study observed that student engagement was at the same level for on-campus and online sessions as a result of qualitative responses resulting in further exploration from future studies.

Implications for Practice

This section discusses the implications of the research study based on the findings described following the three research projects conducted to explore Saudi students’ and academics’ views when learning technology was used to support lecture sessions. Specifically, the implications of the first two projects related to the barriers students and university academics encountered in a KSA university. This study confirmed the findings of previous studies regarding lack of training and unreliable infrastructures, but fear of lecturers monitoring the student learning process also emerged as did fears about invasion of privacy. Therefore, although the students were willing to use their digital devices and SMAs during lectures, it was mainly their lecturers who prevented the integration process. Both students and academics believed that due to the use of digital devices and SMAs students might become distracted when learning. Students expected their lecturers to deliver an interesting and interactive lecture, to keep their attention so they would not be tempted to use their digital devices for non-learning purposes during the lecture sessions. Meanwhile, the academics expected the university to offer relevant support to design and deliver teaching, and integration of learning technology. This study further explores how a blended learning approach integrating the Kahoot and Padlet web-based learning platforms could assist academics and students’ development in synchronous lecture sessions. The academics not only expected relevant training and support from the University, but also expected lecturers to use very simple and reliable web-based applications that would not require them to make a big effort (i.e., spend hours) to deliver their lectures.

The findings of this study were applied to three groups of stakeholders: students, lecturers, and universities, each of whom plays a unique role in advancing the requirements associated with the technology employed. First, Saudi Arabian universities/academic schools are responsible for establishing regulations and policies regarding technology use in lectures; for providing a sophisticated internet network on their university campuses and in their lecture theatres; and acquiring licenses for web-based platforms, such as Kahoot and Padlet. Additionally, university/academic schools should provide training support to members of staff for adopting a blended synchronous approach, and technical support for the use of web-based platforms, such as Kahoot and Padlet. Additionally, through blended synchronous lecture sessions, students would be encouraged to bring their own devices to class to participate in various learning activities, which permit interactions and collaborations with their peers and/or their lecturers.

As the integration process of the web-based applications into lecture sessions took place during the COVID-19 pandemic, it was possible to collect information about different learning settings (face-to-face and online). It seems that neither learning nor teaching was influenced by the sudden shift in the process from face-to-face to online, which is a good indicator that the integration of Kahoot and Padlet web-based applications could be effectively used to support on-campus and online courses in KSA universities.

Research Limitations

This study focused-on students' and academics' views of the use of personal devices and SMAs in lecture theatres from three different academic schools at a single university in the KSA. Therefore, it is not generalizable to all KSA universities; nevertheless, it provides a good indication of the directions that should be further explored to gain a better understanding of the integration of learning technology into KSA Higher Education. The three schools selected were chosen from among many at UMM university; however, they offered diverse and representative curricula. The students who participated in this study might not be wholly representative of the possible sample, as they might dislike their courses, lecture subject topics, and/or their lecturers, and so bias may inform their views. Additionally, the data collection phase focused on students' and academics' perceptions of the use of technology as being associated with personal devices and SMAs to support teaching and learning, not course content, design, and/or the teaching and learning approach followed. However, to overcome this limitation, interviews and qualitative data were collected from both students and academics. During the focus groups, peer pressure may have resulted in similar responses being given to the moderator. In addition, male students and lecturers were contacted via Skype (due to the cultural restrictions considering physical meetings with the researcher as a female), and physical meetings took place with female lecturers and students at the female university campus.

It is important to note that free versions of Kahoot and Padlet were used, allowing users (students and lecturers) access to only limited functionality. Although their usage level was sufficient to achieve the objectives of this study, this may have influenced their views on the web-based applications, and consequently the evaluation process. Additionally, in most of the discussions and analyses, the participants' responses did not differentiate between Kahoot and Padlet regarding functionality. They perceived the two platforms as one system, which might have altered the evaluation of the BSTL approach, although there were relevant questions for each platform on the relevant questionnaire.

Finally, the study sample for the first two studies was only first-year undergraduates, while the third research project took place in lecture sessions regardless of the student's year of study, despite being focused on the lecturer's choice. This approach was followed, as it seems that the academics had the greatest concerns regarding the use of technology for educational purposes. Thus, this research study allowed lecturers to select the module they would integrate into the web-based applications, as they might have felt more comfortable designing learning activities for specific topics. A further significant limitation was the COVID-19 pandemic, which occurred during the data collection phase of this research, forcing everyone to suddenly adopt technology for educational purposes, learn new systems, and develop new skills, resulting in a potentially overwhelming workload. This situation also prevented the researcher from collecting more participants, with the result that the data gathered related to just 11 lecturers/courses and 180 students.

Recommendations for Umm Al-Qura University

This study was conducted at Umm Al-Qura university, and it is recommended based on the findings that the institution establishes regulations and policies (i.e., how to use various learning tools, how to monitor the learning process) for lecturers and students when digital devices and SMAs are being integrated for synchronous lecture teaching delivery.

As academics expressed an interest in using simple and user-friendly web-based learning applications, the university could obtain advanced licenses for Kahoot and Padlet to offer full access to students and academics, so they can utilize all possible functions during blended synchronous lectures. Training courses, providing good practice examples, would also ensure academics and students could not only learn how to use digital tools but also how to enhance their teaching and learning process when using technology. The university could also provide technical support to lecturers, not only to assist them to use them in various learning environments (face-to-face and online) but also to assist them to design appropriate learning activities tailored to individual lecturers' needs. Finally, the university should provide a reliable Internet infrastructure within its lecture theatres, allowing academics and students to use their own devices and ensure successful synchronous lectures.

Recommended Future Research

Future studies in this area may explore how various learning theories could be implemented to enhance teaching and learning processes using various digital applications, focusing specifically on students at Saudi universities. These theories may include collaborative learning theory, and Malone's theory (the game-based student response system [GSRS]). In the KSA, various technology-facilitated educational delivery processes are now being utilized, due to the requirements imposed by the COVID-19 pandemic.

This research found that students generally lack self-regulation, although these skills are influenced by specific learning behaviours (such as engagement, participation, feedback, and competition). Thus, further research is required to determine the most effective methods for developing and enhancing such behaviours in blended synchronous lectures.

Additional research is also required to determine the effects of multitasking behaviours on students' learning when students are using their own personal digital devices in lecture theatres in the context of Saudi higher education. Students' multitasking behaviours during lecture time using digital devices can be a significant source of distraction from their learning. Such distractions can arise due to students using their own devices, or as a result of others using their devices during lectures for educational or non-educational purposes. However, further research is required to understand the influence of distractions on cognitive ability and student performance of the students.

Although lecturers reported the use of Kahoot and Padlet applications effectively supported blended synchronous lecture sessions, further research could be conducted to explore how the specific functionalities (i.e., adding multi-select questions in answer options, puzzles for players to test deeper understanding) of these applications could influence student engagement, interaction, self-regulation, and collaboration at various KSA universities.

Finally, since the findings of this study can be generalized specifically to Saudi universities, and because the survey was conducted with first-year students only from three academic schools at a single university, it is recommended that further research replicates the study with a wider population by expanding its boundaries. For example, it might include other academic schools within the same university but in different academic years and/or other KSA higher education institutions.

CHAPTER 8 Appendix 1 - Abbreviations

KSA	Kingdom of Saudi Arabia
UQU	Umm Al-Qura University
BYOD	Bring Your Own Device
SM	Social Media
SMAs	Social Media (Applications) that include social media platforms and other related tools (e.g., PowerPoint, Google).
LMS	Learning Management System
ICT	Information communication Technology
MoHE	Ministry of Higher Education
MOE	Ministry of Education
SCT	Social Cognitive Theory
TAM	Technology Acceptance Model
BSTL	Blended Synchronous Teaching and Learning
FA	Factor Analysis
EFA	Exploratory Factor Analysis
CFA	Confirmatory Factor Analysis
NCeDL	National Centre for E-learning and Distance Learning
SEU	The Saudi Electronic University

KAU	King Abdul-Aziz University
SDL	Saudi Digital Library
UTAUT	The Unified Theory of Acceptance and Use of Technology
TRA	The Theory of Reasoned Action
TPB	The Theory of Planned Behaviour
BL	Blended Learning

CHAPTER 9 Appendix 2. A - The Participant Information Sheet for 1st Research Project

Student Focus Groups

Focus groups – bring your own device
Participant information sheet.

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Focus groups – bring your own device

You have been invited to participate in a research study. Before you decide whether to participate, it is important that you understand why the research is being done and what it will involve.

What is the purpose of the study?
The purpose of this study is to gain a wider picture of student experience that cannot be captured through questionnaires alone. We are aiming to deepen our understanding of your experiences as a student, and build up a more detailed picture of how students are using the devices during lectures and other classes.

Why have I been invited to take part?
You have been invited to take part because you are a student from Umm Alqura University (especially, student from the Departments of English, Architecture or Computer Science). The researchers are interested in why you bring (or do not bring) technological devices into class and what effect these have on your learning.

Do I have to take part?
You are under no obligation to take part in this study; it is completely your choice. If you do decide to take part, you are free to withdraw at any time and without giving a reason for wishing to withdraw.

What will happen if I take part?
In a small group of 4-6 students, we will ask you about your experiences with technology in the classrooms, and some of your study habits. The consent form will ask you to state your student ID number. The reason for this is that the researchers want to allow you to withdraw from this study by providing your student ID to the Principle Investigator and to connect your responses with your questionnaire responses. There is no risk, if you do provide your student ID number, of being re-identified at any time within the duration of the research or after it has been completed. Focus group will last approximately 90 minutes. Your responses are **anonymous** and the data will be used for research purposes only.

The researchers will **not** share your responses with anyone (including the Umm Al- alqura University staff members) outside the research team. In addition, the researchers will **not** provide your responses to the academic staff from your department who teach on your courses.

Focus groups will be recorded using a solid-state recorder, and transcribed. Once the recordings have been transcribed, they will be deleted. Very short sections from the transcript may be published but these will never be personally identifiable, or contain details, which would enable identification of an individual or school. For example "I found the tests really helpful as they made me revise more often" (2018 focus group)

Expenses and/or payment
There is no payment for the participation in the focus group for this study.

Are there any risks in taking part?
There are no anticipated risks to you if you take part, nor are there likely to be any adverse effects.

What are the benefits of taking part?
There are no direct benefits of taking part; however, you will be helping us to increase our understanding of your experiences, and enabling us to improve our teaching practices, which may help future students.

Focus groups – bring your own device
Participant information sheet.

UNIVERSITY OF LIVERPOOL

What if I am unhappy, or there is a problem?
If you are unhappy at any point in the study, or if there is a problem, please contact the researcher at the address below. If you remain unhappy or have a complaint which you feel you cannot come to us with then you should contact the Research Governance Officer on 0151 794 8290 (ethics@liv.ac.uk). When contacting the Research Governance Officer, please provide details of the name or description of the study (so that it can be identified), the researcher(s) involved, and the details of the complaint you wish to make.

Will my participation be kept confidential, and what will happen to the results?
All data collected will remain anonymous. We ask you to provide your student ID number in order to link the questionnaire responses taken over the year. As we are only taking the student ID number and no other personal details, there is no risk of you being identified at any time during the research or on its completion. The researchers do not have access to the Umm Al-alqura university student records and they will not cross the student ID with student names. In addition, the recordings from the focus groups will not be shared with any member of the Umm-alqura University, including the academic staff who teach in the Departments of English, Architecture and Computer Science. Therefore, there is no risk for the participants to provide their own student ID number.

Student IDs will be collected and a pseudo-anonymization process will be followed in order to allow students to withdraw from this study by providing their student ID to the Principle Investigator. Following this process, before the researchers start the analysis, they will generate a new participant account for each student and they will store the student ID number on a separate file.

All collected data will also be transcribed and stored electronically completely separately to your consent form. The overall results of the study will be published in academic journals and other scholarship activities such as conference presentations and research project dissertation.

What will happen if I want to stop taking part?

You can withdraw at any time without having to explain your reason for doing so. To withdraw your data from this study, please send an email to Maria.Limniou@liverpool.ac.uk, providing your student ID.

Who can I contact if I have further questions?

If you require more information about this study, or would like an overview of the results once completed, please contact Dr Maria Limniou - Maria.Limniou@liverpool.ac.uk or the Researcher: Moudi Alsharif – M.Al-sharif@liverpool.ac.uk

This project has been approved by the School of Psychology Research Ethics Committee
Approval reference: Liverpool: IPHS-201718- 3376

CHAPTER 10 Appendix 2. B- Themes and Sub-themes for the Focus Groups and Interviews

Themes and Sub-themes for the Focus Groups Analysis (Project 1)

	Main Theme	Sub-themes
1	BYOD (Bring your own device)	Device – Smartphone – Laptop - Tablet
2	Technology Applications	Social media – PowerPoint - WhatsApp
3	Learning environment	university campus - Academic School - Lecture theatre - multitasking – distraction - WIFI internet communication
4	Student Behaviour	Handwriting – engagement – participation – texting – browsing slides - chatting - browsing the internet - taking notes - playing electronic games - watching movies -video clips - soccer games - snap a photograph of chalkboard
5	Learning Activities	Student productivity - educational lessons - download electronic files - access educational resources
6	Non-Learning Activities	Smartphone notifications - boredom – exhaustion - entertainment
7	Self-regulation	self-control - obvious gestures – noise - screen exposure

Themes and Sub-themes for the Interview Analysis (Project 2)

	Main Theme	Sub-themes
1	Lecturers' behaviours and devices	Device – Smartphone – Laptop – Tablet - PC
2	Technology applications	Social media – PowerPoint - WhatsApp – Twitter – Instagram – YouTube - Snapchat – Google - Google Docs - Google Drive – Dropbox - Facebook - LinkedIn - Blackboard - LMS - COVID-19 - Zoom - Microsoft Teams - SM integration – infrastructure - email service - file sharing - feedback, - submission of assignments – internet - electronic dictionaries – educational videos - lecturers' experiences
3	The teaching purposes	Communicate with students in the lecture class - Send information about the course - Share learning material with students - Receive Assignments - Create Tests - Respond to Student Contributions - Distribute Videos and Web Links Relevant to Course Topic

4	Learning opportunities that SMAs can offer	additional course materials - more useful information - connect with study groups - educational channels - demonstrations of student projects - SM platforms for teaching
5	Barriers of using SMAs	lecture theatre - internet connection - pressure on the network - controlling audience - violation of privacy - legal and formal rules - program crash - control the lecture - control the content - control the time - language barrier – academics experience and skills - academics training
6	Training and Infrastructure	practical applications in the classroom - method, process, and technique - course content creation - organised workshops – internet network – equipped classes
7	SMAs Usefulness	Subjective Norms – Image - Output Quality - Job Relevance - Result Demonstrability
8	Ease of Use	self-efficacy - external control - SM anxiety- enjoyment
9	Academics Needs	lecturer manageable SM - control the learning environment - university-specific interfaces - regulations to integrate SM for teaching (booklet) - ethical regulations for SM use - monitoring system

Themes and Sub-themes for the Interview Analysis (Project 3)

	Main Theme	**Sub-themes**
1	The Platforms	Kahoot -Padlet- functionality- scientific competition- motivation- participation- quizzes
2	Teaching and Learning Processes	Teacher role- students role - learning objectives - enjoyable atmosphere - satisfaction – confidence - interaction - technology integration - pay attention - thinking - lecture atmosphere - teaching methods- learning environment- productivity- students engagement - interactive Wallboard - teaching functions - lectures' materials.
3	Challenges and Opportunities	Internet service – course preparation - course content – integration with LMS - technical knowledge - lecturers' training - technical tools - university's infrastructure - teaching methods - student interaction - student participation – interactive atmosphere - students’ learning development - learning behaviours
4	Teaching and Learning purposes	Kahoot/Padlet – course supplement - educational process - motivation - competitions - the COVID-19 - experience
5	Students’ Participation and Interaction	interaction - experience - eagerness to participate - interesting experience - inactive students.

6	Communication and Feedback	Web-based learning - platforms- communication – monitoring - teaching process - learning process- interaction with peers- contribution - questions - LMS combination - social media.
7	Enjoyment and Fun	Gamification - stress - comments– enthusiasm - unique experience- interaction.

CHAPTER 11 Appendix 2. C- Question Matrix of Focus Group Questions Based on SCT Components (Project 1).

Questions for Focus Groups	Background	Behaviour	Environment	Cognition
What is your usual approach during lectures?	x	x	x	
Follow-up questions: • Do you take notes? If so, do you prefer to hand-write them or type them? What format do your notes take (longhand, mind-map etc) • If you don't take notes, what do you do in a lecture? Sit and listen. Write questions. Something else? • What has led to the approach you take? Do you feel it is working well?				
What do you do with PowerPoints (e.g., annotate them, print them)?		x	x	
Follow-up questions: • What do you like about them/dislike about them?				
Do you use your device in lectures for learning purposes?	x	x	x	x
Follow-up questions: • Note taking/engaging in lecture etc. • Do you ever do work for a different part of the course while in a lecture? • How do you interact with learning activities by using your device (e.g., answer questions in your head, text etc.)? How useful are these? Do you find them helpful or distracting?				
Do you use your device in lectures for any other purpose?	x	x	x	x
Follow-up questions: • What are your study habits when it comes to sending and receiving text messages or chat messages during a lecture? How frequently do you engage in this type of activity? What do you usually chat about? How often are the chats and text messages related to the work in the class? Are they ever to other students in the class (students who attend the lecture or not)? • Any other activities e.g., browsing online, shopping, Facebook, etc? • What kinds of things do you look at/use during lectures (e.g., what about the people you know/around you)? • Do you think you miss important content by doing this?				
What differences, if any, did you notice in your ability to focus, take notes, or recall information whether you use or not your device in lectures?	x	x	x	x
What differences, if any, did you notice related to your participation in learning activities, such as the use of WhatsApp/Twitter, in your ability to pay attention to a lecture?	x	x	x	x
Do you ever do work for a different part of the course in lecture?	x	x	x	x
How good are you at doing several things at once (multitasking)?		x	x	

Follow-up questions: • Do you switch between activities at different points in the lecture/class, why do you do this, and what effects do you think it has on your learning?				
What about the people around you, do you get distracted by their activities, for example, if someone is watching a video do you find your attention is drawn to that instead of the lecturer?	x	x	x	x
If you realise you have lost focus in class, what do you do to bring attention back?		x	x	x
Follow-up questions: • Once distracted how you do regain focus? • Are some things more/less distracting than others?				
If you could not bring your device to lectures, what would you do differently (e.g., not attend, bring one anyway etc.)?	x	x	x	
What about if you could bring your device but not access the internet?		x	x	
What about a device provided for you?	x		x	
Anything else you would like to say about your device use in class?	x	x	x	x

CHAPTER 12 Appendix 2. D- Question Matrix of Interview Based on TAM Components (Project 2).

Questions for Interviews	Background	Ease of Use	Usefulness	Intention
For which purposes do you use social media in your teaching?	x			
Follow-up questions: • Please provide us with an example				
What are the main social media platforms and applications that you (may) use to support your teaching?	x	x	x	x
Follow-up questions: • Please provide us with an example of how you (may) use it for educational purposes.				
What are the social media functionalities that could support your teaching?			x	
Follow-up questions: • Please provide us with an example of Higher Education and its use in a lecture theatre.				
From the academic point of view, what are the challenges and opportunities regarding the use of social media in lecture theatres?		x		x
How can/could you integrate social media applications into current higher education teaching practices?		x	x	
Follow-up questions: • Please provide us with an example regarding the necessary technical skills and/or the role of pedagogy.				
To what extent do you think social media is important for your teaching delivery process in Higher Education?	x			x
What type of support do you need to integrate social media applications into your teaching process?			x	x
Do you think that social media use in a lecture theatre could be beneficial for your teaching and your student learning?			x	
Follow-up questions: • Why?				
Do you think your academic performance is influenced by your capability to use social media for educational purposes?			x	x
Follow-up questions: • Please explain to us why?				
If students are allowed to use personal devices to implement social media in the lecture theatre. Do you think they will use it for learning, or non-learning purposes?	x		x	x
Follow-up questions:				x

• Do you/will you allow them to use it during lecture time?				
Do you recommend social media to your students to support their learning?		x	x	
Do you think that the University of UQU should play a more active role in the integration of social media applications for educational purposes?	x		x	x
Do you think the university infrastructure is capable to support social media integration into lecture theatres for educational purposes?	x		x	

CHAPTER 13 Appendix 2. E - Question Matrix of Interviews Based on BSTL Approach (Project 3).

Interview Questions	Background	Student Behaviour	Student engagement	Individual characteristics	Academics expectations
To what extent do you think that types of learning tools support your teaching role?	x				x
Follow-up questions: • Why?					
What is the web-based learning platform that you used during the experiment lecture? Kahoot, Padlet or both,	x				
Follow-up questions: • why?					
Has your teaching delivery process been enhanced with the use of these types of learning applications (i.e., Kahoot and/or Padelt)?					x
Follow-up questions: • Why?					
Can you provide us with an example of how this integration changed your teaching?					
What are the challenges and opportunities that you could identify regarding the use of web-based learning platforms in lecture theatres?	x				
Do you think teachers should be supported (e.g., training/technical support) by the Government/Uni/School to use web-based learning platforms, such as Kahoot and Padelt, in the lecture theatre?					x
Follow-up questions: • How? • why?					
Are the University infrastructure and Internet connection enough to support your effort to support your teaching and student learning by using the web-based applications during lecture time?	x				
To what extent do you think that these types of web-based learning platforms MUST use for teaching and learning purposes in the lecture theatre?					x
Follow-up questions: • Why?					

Do you find students learning process could be improved by using web-based learning platforms during lecture time?		x	x		
Follow-up questions: • Why?					
Do you think web-based learning platforms Kahoot/Padlet would help students in learning?		x	x		x
To what extent were you able to interact with your students during the experiment lecture?			x		
Follow-up questions: • Why?					
Has the use of web-based learning platforms during lecture time supported and allowed you to communicate and provide feedback to your students?			x		
Follow-up questions: • Why?					
To what extent do you think students interacted among their peers during lecture time by using a web-based application, such as Kahoot or Padlet?			x		
To what extent do you think students enjoyed your teaching using the web-based applications (Kahoot and/or Padelt)		x			

CHAPTER 14 Appendix 4. A - Ethical approval for Research Project 1.

Ethical approval was obtained from the Institute of Life and Human Sciences Research Ethics Committee (School of Psychology) of the University of Liverpool (code 3376 and date of approval 28/11/2018).

UNIVERSITY OF LIVERPOOL

Health and Life Sciences Research Ethics Committee (Psychology, Health and Society)

30 November 2018

Dear Dr Limniou

I am pleased to inform you that your application for research ethics approval has been approved. Application details and conditions of approval can be found below. Appendix A contains a list of documents approved by the Committee.

Application Details

Reference:	3376
Project Title:	BYOD-DSML-Social Media
Principal Investigator/Supervisor:	Dr Maria Limniou
Co-Investigator(s):	Mrs Moudi Alsharif, Dr Alex Forsythe
Lead Student Investigator:	-
Department:	School of Psychology
Approval Date:	30/11/2018
Approval Expiry Date:	Five years from the approval date listed above

The application was **APPROVED** subject to the following conditions:

Conditions of approval

- All serious adverse events must be reported to the Committee (ethics@liverpool.ac.uk) in accordance with the procedure for reporting adverse events.
- If you wish to extend the duration of the study beyond the research ethics approval expiry date listed above, a new application should be submitted.
- If you wish to make an amendment to the study, please create and submit an amendment form using the research ethics system.
- If the named Principal Investigator or Supervisor leaves the employment of the University during the course of this approval, the approval will lapse. Therefore it will be necessary to create and submit an amendment form within the research ethics system.
- It is the responsibility of the Principal Investigator/Supervisor to inform all the investigators of the terms of the approval.

Kind regards,

Health and Life Sciences Research Ethics Committee (Psychology, Health and Society)

iphsrec@liverpool.ac.uk

0151 795 5420

Appendix - Approved Documents

(Relevant only to amendments involving changes to the study documentation)

The final document set reviewed and approved by the committee is listed below:

Document Type	File Name	Date	Version
Research Tools	Debrief(1)	26/09/2018	2
Interview Schedule	Questions for focus group	02/11/2018	3
Participant Information Sheet	BYOD partcipant info focus group	02/11/2018	3
Participant Consent Form	consent focus group	02/11/2018	3
Questionnaire	BYOD Final_questionnaire	02/11/2018	3
Participant Information Sheet	BYOD partcipant info questionnaire	02/11/2018	3
Participant Consent Form	consent questionnaire	02/11/2018	3
Advertisement	BYOD email_for Questionnaire	02/11/2018	3
Study Proposal/Protocol	Validation protocol for students Projet v01 (2)	05/11/2018	2
Research Tools	English_permission	05/11/2018	1
Research Tools	Computer_Science_permission	05/11/2018	1
Fieldwork Risk Assessment	English_permission	05/11/2018	1
Fieldwork Risk Assessment	Computer_Science_permission	05/11/2018	1
Research Tools	Architecture_permission	22/11/2018	1
Fieldwork Risk Assessment	Architecture_permission	22/11/2018	1
Advertisement	BOYD focus group advert (3)	22/11/2018	2

CHAPTER 15 Appendix 4. B - Official approval from the Three Schools (English, Architecture, and Computer Science), Umm Al-Qura University.

First: English School

Kingdom of Saudi Arabia
Ministry of Education
Umm Al-Qura University
Faculty of Social Sciences
Department of English

المملكة العربية السعودية
وزارة التعليم
جامعة أم القرى
كلية العلوم الاجتماعية
قسم اللغة الإنجليزية

November 3, 2018

Dr. Maria Limniou,

In reference to your email dated Fri 11/2/2018 concerning my permission for data collection, as Head of English Department, Umm-Al-Qura University (UQU), for the research conducted by Moudi Alsharif, the PhD student in the University of Liverpool at the School of Psychology.

It gives me great pleasure to inform you that Department of English at UQU encourages and welcomes all academic projects that will help future researchers and contribute to any filed of knowledge.

Sincerely,

Aliabureesh

Department Chair
Ali H. Abureesh, Ph.D.
Associate. Prof. of English
E-Learning Expert
ahabureesh@uqu.edu.sa

Second: Architecture

VISION 2030

المملكة العربية السعودية
وزارة التعليم
جامعة أم القرى

031

UQU

Dear Mrs. AlSharif, Moudi

In reference to your email dated on Sunday December 02, 2019, regarding the permission for data collection of the research that is being conducted by the PhD student, Moudi Alsharif, at the University of Liverpool on the School of Psychology.

This letter is to inform you that Department of Islamic Architecture encourages and welcomes all academic projects that help future researchers and contribute to any field of knowledge.

Sincerely

Dec 8th, 2019

Ibraheem N. Al-Bukhari, PhD

Chairman of Islamic Architecture

Third: Computer Science

Kingdom of Saudi Arabia
Ministry of Education
Umm Al-Qura University
(031)

المملكة العربية السعودية
وزارة التعليم
جامعة أم القرى
(٠٣١)

November 5, 2018

Re: Letter of Support for Moudi Alsharif's Request to Conduct Educational Experiment

The department of Computer Science at UQU supports Moudi Alsharif (PhD Candidate in the University of Liverpool, UK) to conduct an educational experiment as part of her PhD thesis. In particular, the department supports Moudi in recruiting students to fill questionnaire and forming focus groups to discuss further ideas related to her thesis.

Sincerely,

Eisa Alanazi, PhD
Head of Computer Science Department
College of Computer and Information Systems
Umm Al-Qura University
Makkah, Saudi Arabia

Fourth: An example of the Email sent to Each School

From: Alsharif, Moudi [psmalsh2]

Sent: Sunday, December 1, 2019 2:53:42 PM

To: Ibraheem N. Al Bukhari

Cc: Limniou, Maria Subject: Your Permission for Data Collection

Dear Dr Ibrahim Bokhari,

Head of Architecture Department

Salam and Greetings

Thank you for your support to investigate students' behaviour regarding their device usage in a lecture theatre last academic year. In the second part of her PhD research, Moudi Alsharif will investigate academics' behaviour and how they use social media/technology in the lecture theatre to support their teaching approach.

As part of conducting educational research at the University of Liverpool, the researchers must submit an ethics application form along with additional documentation to take approval from the ethics committee. If the research includes sites outside the UK, local research ethics approval from the other country is required.

The current study includes a questionnaire circulation and interviews with the Department of Architecture members of staff. It will be conducted by Moudi Alsharif (current PhD student at the University of Liverpool at the School of Psychology) under the supervision of Dr Maria Limniou (principal supervisor) and Dr Alex Forsythe (secondary supervisor).

This PhD research project aims to explore academics' behavioural intentions regarding the use of social media/technology in teaching contexts, and the current way in which social media tools have been integrated into the teaching delivery process. The objectives of this investigation are to examine the three research questions listed in the following:

1. What are the behavioural intentions of academics regarding the use of social media for teaching?
2. Why is social media important for the academic teaching process?
3. How are social media currently integrated into a teaching approach to support inside and outside class activities?

To address the three research questions listed above, a questionnaire for academic members of staff was developed. The questionnaire has 41 items that take approximately 10- 15 minutes to complete online. Academics' responses are anonymous, and the data will be used for research purposes only. Academics are under no obligation to take part in this study; it is completely their choice. If they do decide to take part, they are free to withdraw at any time and without giving a reason for wishing to withdraw. The questionnaire will be distributed online to the academics of your department.

Following the completion of this questionnaire, the academic members of staff will be invited to take part in an interview process for the researchers to explore in more depth the responses to the initial quantitative study. During the interview, the PhD researcher will discuss with the academics their behavioural intention to use social media in a lecture theatre, their beliefs on the importance of social media for their teaching delivery process, and the current social media/technology integration process that they follow. The total number of interviews will be between 5 to 10. The interview will be taken place online via skype or WhatsApp applications. Each interview will last approximately 45 minutes.

Please find attached the questionnaire, and participant information sheets (members of staff participation in questionnaire and interview process) alongside the consent forms that we would like to circulate to the academics of your department. If you have any questions, please do not hesitate to contact Dr Maria Limniou who is her principal supervisor for Moudi's research project at the following address: Maria.Limniou@liverpool.ac.uk. Also, please find attached the email that the researchers would like to circulate to the participants from Umm Al-Qura University.

For recruitment purpose, this research study requires participants from your department. At Umm Al-Qura University (UQU), there is no ethics committee in which the researcher could search for ethical approval on an educational project. To take our permission for data collection, please could you send us a letter of agreement that you as the Head of Architecture Department, are aware of this research and you allow us to continue with the recruitment process?

Best Regards
Mrs Moudi Alsharif

Appendix 4. C –The questionnaire For Students (Research Project 1)

Please type your student ID number below:

……………………………………………………………………………

I am currently a student in:
☐ Computer Science ☐ English ☐ Architecture

Which of the following devices do you mostly bring into lectures (choose the most appropriate)
☐ Laptop ☐ Tablet ☐ Smartphone ☐ other, please specify……………………………

Which of the following applications you use **during your lectures** (tick all that apply)
☐ Microsoft Word ☐ Microsoft PowerPoint ☐ Microsoft Outlook express ☐ Virtual Learning Environment
☐ Facebook ☐ Twitter ☐ WhatsApp ☐ WeChat/Weibo
☐ Google ☐ YouTube ☐ Other chat applications
☐ Other social media/web applications, please specify…………………….

Usually, how many applications do you have open during your lectures?
☐ 0-2 ☐ 3-6 ☐ 7 and more

What are doing during lectures?
☐ Just pay attention to the lecture ☐ keep notes by hand ☐ read PowerPoint slides on your device ☐ type notes on your device
☐ Receive and send messages ☐ browse the Internet ☐ check social media ☐ play games on your device ☐ other, please specify ………………..

Generally, I am good at multi-tasking, doing several things at once
☐ Strongly Disagree ☐ Disagree ☐ More or less disagree ☐ Undecided ☐ More or less agree ☐ Agree ☐ Strongly agree

I use my device to multitask between learning and non-learning activities in lectures
☐ Strongly Disagree ☐ Disagree ☐ More or less disagree ☐ Undecided ☐ More or less agree ☐ Agree ☐ Strongly agree

I use my device in lectures to multitask but only between different learning activities
☐ Strongly Disagree ☐ Disagree ☐ More or less disagree ☐ Undecided ☐ More or less agree ☐ Agree ☐ Strongly agree

To what extent do you use your own device when attending lectures:	Not at all	Very Small Extent	Small Extent	Moderate Extent	Fairly Great Extent	Great Extent	Very Great Extent
1. For activities not directly related to your learning (e.g. chat with a friend, shopping, playing games)?	☐	☐	☐	☐	☐	☐	☐
2. Solely for learning purposes?	☐	☐	☐	☐	☐	☐	☐
3. If you are interested in subject topic?	☐	☐	☐	☐	☐	☐	☐
4. To access course/module information (e.g., announcements, office hours, room information, assessment criteria, etc.)?	☐	☐	☐	☐	☐	☐	☐
5. To supplement lecture notes.	☐	☐	☐	☐	☐	☐	☐
6. For this option, select the box for "small extent".	☐	☐	☐	☐	☐	☐	☐
7. To get in contact with your lecturers? (e.g., email, discussion board)?	☐	☐	☐	☐	☐	☐	☐
8. To communicate with your peers on study/learning related matters.	☐	☐	☐	☐	☐	☐	☐
9. To access learning resources (e.g., PowerPoint slides, pdfs)?	☐	☐	☐	☐	☐	☐	☐
10. To complete assignment(s)?	☐	☐	☐	☐	☐	☐	☐
11. To watch module-related videos?	☐	☐	☐	☐	☐	☐	☐
12. To be involved in online learning activities (e.g. Poll Everywhere, discussion boards)?	☐	☐	☐	☐	☐	☐	☐

To what extent do you use your own device when attending lectures:	Not at all	Very Small Extent	Small Extent	Moderate Extent	Fairly Great Extent	Great Extent	Very Great Extent
13. To share learning resources with your peers and/or your lecturer?	☐	☐	☐	☐	☐	☐	☐
14. To read journal article(s).	☐	☐	☐	☐	☐	☐	☐
15. To browse webpages related to lecture topic.	☐	☐	☐	☐	☐	☐	☐
16. To browse webpages unrelated to lecture topic (e.g. shopping, travelling).	☐	☐	☐	☐	☐	☐	☐
17. To use social media networks (e.g. Facebook, Twitter, and WhatsApp).	☐	☐	☐	☐	☐	☐	☐
18. To complete online tests/tasks (e.g., multiple-choice tests)?	☐	☐	☐	☐	☐	☐	☐
19. To type note on your own device and/or to take photos from lecturers' presentation?	☐	☐	☐	☐	☐	☐	☐
To what extent do you find the following to be true:							
20. Having your own device in lectures is distracting.	☐	☐	☐	☐	☐	☐	☐
21. Others using their own device in lectures for learning is distracting.	☐	☐	☐	☐	☐	☐	☐
22. Others using their own device in lectures for non-learning activities (e.g. chat in social media, shopping) distracting?	☐	☐	☐	☐	☐	☐	☐
23. The current functions of your own device are enough for your learning activities.	☐	☐	☐	☐	☐	☐	☐
24. The functions of your own device completely meet your study needs.	☐	☐	☐	☐	☐	☐	☐

Answer these questions regarding your study habits.	Strongly Disagree	Disagree	More or less disagree	Undecided	More or less agree	Agree	Strongly Agree
25. I make good use of various information sources (lectures, readings, videos, websites etc.) to help me understand the topic.	☐	☐	☐	☐	☐	☐	☐
26. During lectures, I often miss important points because I am thinking of other things.	☐	☐	☐	☐	☐	☐	☐
27. I am confident that I can understand the basic concepts in this course.	☐	☐	☐	☐	☐	☐	☐
28. When I take a test, I worry about my performance.	☐	☐	☐	☐	☐	☐	☐
29. I am personally interested in the content of this course.	☐	☐	☐	☐	☐	☐	☐
30. When studying for this course, I often repeatedly go over the same course material to memorize it.	☐	☐	☐	☐	☐	☐	☐
31. I think I will be able to use what I learn in this course elsewhere in life.	☐	☐	☐	☐	☐	☐	☐
32. I rarely find time to review my notes or readings.	☐	☐	☐	☐	☐	☐	☐
33. I believe I will achieve a high grade this year.	☐	☐	☐	☐	☐	☐	☐
34. When I take tests, I think about the consequences of failing.	☐	☐	☐	☐	☐	☐	☐

Answer these questions regarding your study habits.	Strongly Disagree	Disagree	More or less disagree	Undecided	More or less agree	Agree	Strongly Agree
45. I should begin my coursework earlier than I do.	❐	❐	❐	❐	❐	❐	❐
46. When I take a test, I worry about being unable to answer the questions.	❐	❐	❐	❐	❐	❐	❐
47. I believe I am capable of getting a high mark in this subject.	❐	❐	❐	❐	❐	❐	❐
48. Sometimes I cannot motivate myself to study, even if I know I should.	❐	❐	❐	❐	❐	❐	❐
49. I make use of a variety of sources in my studies (websites, videos, textbooks, journals etc.).	❐	❐	❐	❐	❐	❐	❐

Comments: Please write below any comments you have regarding your behaviour/attitudes towards bringing your own device to lectures and how you feel this affects/impacts your learning process (e.g., how they affect your motivation, ability to multitask and if you find them distracting issues).

CHAPTER 16 Appendix 4. D - Development of the personal Devices and Social Media Questionnaire (Research Project 1)

	Items	Factor	References
		Self-efficacy (4Q) (4 items) (scale value = 28)	(Chen et al., 2004),
1.	I am confident that I can understand the basic concepts in this course.		
2.	I believe I will achieve a high grade this year.		
3.	I am confident that I can understand the most complex/difficult concepts in this course.		(Kenny et al., 2012)
4.	I believe I am capable of getting a high mark in this subject.		
1.	When I take a test, I worry about my performance.	Test anxiety (4Q) (scale value = 28)	(Taylor & Todd, 1995)
2.	When I take tests, I think about the consequences of failing.		
3.	I have an uneasy, upset feeling when I take a test.		(Devine et al., 2012) (Zhang & Henderson, 2019)
4.			
5.	When I take a test, I worry about being unable to answer the questions.		
1.	During lectures, I often miss important points because I am thinking of other things.	Negative Habits = (self-regulation) (7Q) (7 items) (scale value = 49)	(Nonis & Hudson, 2010), (Aquino, 2011) (Botty et al., 2015)
2.	I rarely find time to review my notes or readings.		
3.	I sometimes procrastinate to the extent that it negatively impacts my work.		
4.	Other things in my life tend to take priory over this course.		
5.	I find it hard to stick to a study schedule.		
6.	I should begin my coursework earlier than I do.		
7.	Sometimes I cannot motivate myself to study, even if I know I should.		
1.	I make good use of various information sources (lectures, readings, videos, websites etc.) to help me memorise information.	Surface Learning(3Q) (3 items) (scale value = 21)	(Floyd et al., 2009),
2.	When studying for this course, I often repeatedly go over the same course material to memorize it.		
3.	When studying for this course, I often repeatedly go over the same course material to make sure I understand it.		

1.	I make good use of various information sources (lectures, readings, videos, websites etc.) to help me understand the topic.	Variety of sources (3Q) (scale value = 21)	(Lee & Salman, 2012)
2.	I go back to previously made notes and readings to refresh my understanding of them. When I study for this course, I examine a range of information from different sources (websites, videos, textbooks, journals etc.).		
3.	I make use of a variety of sources in my studies (websites, videos, textbooks, journals etc.).		
1.	I am personally interested in the content of this course.	Utility of Course (3Q) (3 items) (scale value = 21)	(Lee & Salman, 2012)
2.	I think I will be able to use what I learn in this course elsewhere in life.		(Taylor & Todd, 1995)
3.	I think the material in this course will be useful in my studies.		
1.	For activities not directly related to your learning (e.g. chatting with a friend, shopping, playing games)?	Unproductive (3 items) (scale value = 21)	(Johnson et al., 2017),
2.	To browse webpages unrelated to the lecture topics (e.g., shopping, travelling).		
3.	To use social media networks (e.g., Facebook, Twitter, and WhatsApp).		
1.	Solely for learning purposes?	productive to learning (14 items) (scale value = 98)	(Alanazi & Thompson, 2019)
2.	To access course/module information (e.g., announcements, office hours, room information, assessment criteria, etc.)?		(Alanazi & Thompson, 2019)
3.	To supplement lecture notes.		
4.	To get in contact with your lecturers. (e.g., email, discussion board)?		
5.	To communicate with your peers on study/learning-related matters?		
6.	To access learning resources (e.g., PowerPoint slides, pdf)?		
7.	To complete assignment(s)?		
8.	To watch module-related videos?		
9.	To be involved in online learning activities (e.g., Poll Everywhere, discussion boards)?		
10.	To share learning resources with your peers and/or your lecturer?		
11.	To read journal article(s)?		

12.	To complete online tests/tasks (e.g., multiple-choice tests)?		
13.	To type notes on your own device and/or to take photos from lecturers' presentations?		
1.	The current functions of your own digital device are enough for your learning activities.	Social Media (3 items) (scale value = 7)	(Lee & Salman, 2012)
2.	The functions of your own device completely meet your study needs.		(Alanazi & Thompson, 2019)
3.	To use social media networks (e.g., Facebook, Twitter, and WhatsApp).		
1.	Having your own device in lectures is distracting.	Distracting (3 items) ((scale value = 21)	(Winter et al., 2010)
2.	Others using their own device in lectures for learning is distracting.		
3.	Others using their own device in lectures for non-learning activities (e.g., chatting on social media, shopping) distracting?		
1.	Generally, I am good at multi-tasking, doing several things at once.	Multitasking (3 items) ((scale value = 21)	(Winter et al., 2010) (Burak, 2012)
2.	I use my device to multitask between learning and non-learning activities in lectures.		
3.	I use my device in lectures to multitask but only between different learning activities.		

CHAPTER 17 Appendix 4. E – Questionnaire items modification by item deletion or adding the covariance between the error terms of the individual characteristics based on CFA

Surface Learning, 4 items

Item	Items Text	Unobserved	Modify.
Surf01	I go back to previously made notes and readings to refresh my understanding of them.	e18	-
Surf02	When studying for this course I often repeatedly go over the same course material to memorize it.	e17	(e17=e16)
Surf03	When studying for this course I often repeatedly go over the same course material to make sure I understand it.	e16	(e17=e16)

Self-efficacy, 4 items

Items	Items Text	Unobserved	Modify.
Self01	I believe I am capable of getting a high mark in this subject.	e1	(e1=e3)
Self02	I believe I will achieve a high grade this year.	e2	-
Self03	I am confident that I can understand the basic concepts in this course.	e3	(e3=e1)
Self04	I am confident that I can understand the most complex/difficult concepts in this course.	e4	-

Utility, of Course, 3 items

Items	Items Text	Unobserved	Modify.
Util01	I am personally interested in the content of this course.	e25	-
Util02	I think I will be able to use what I learn in this course elsewhere in life.	e24	-
Util03	I think the material in this course will be useful in my studies.	e23	-

Negative Habits, 7 items

Items	Items Text	Unobserved	Modify.
Negt01	I should begin my coursework earlier than I do.	e15	
Negt02	During lectures, I often miss important points because I am thinking of other things.	e14	
Negt03	I find it hard to stick to a study schedule.	e13	**deleted**
Negt04	I sometimes procrastinate to the extent that it negatively impacts my work.	e12	
Negt05	I rarely find time to review my notes or readings.	e11	
Negt06	Other things in my life tend to take priority over this course.	e10	**deleted**
Negt07	Sometimes I cannot motivate myself to study, even if I know I should.	e9	

Test anxiety，4 items

	Items Text	Unobserved	Modify.
Test01	When I take a test, I worry about my performance.	e8	-
Test02	When I take a test, I worry about being unable to answer the questions.	e7	-
Test03	I have an uneasy upset feeling when I take a test.	e6	-
Test04	When I take tests, I think about the consequences of failing.	e5	-

CHAPTER 18 Appendix 4. F – Questionnaire items modification by item deletion or adding the covariance between the error terms of the learning environment component based on CFA

Multitasking, 3 items

Items	Items Text	Unobserved	Modify.
Mult1	I use my device to multitask between learning and non-learning activities in lectures	e3	-
Mult2	I use my device in lectures to multitask but only between different learning activities	e2	-
Mult3	Generally, I am good at multi-tasking, doing several things at once	e1	-

Distraction, 3 items

Items	Items Text	Unobserved	Modify.
Dist1	Others using their own device in lectures for learning is distracting.	E7	(e57- e5)
Dist2	Having your own device in lectures is distracting.	E6	-
Dist3	Others using their own device in lectures for non-learning activities (e.g., chatting in social media, shopping) distracting?	E5	(e5- e7)

Variety of Sources, 4 items

Item	Items Text	Unobserved.	Modify.
Var01	When I study for this course, I examine a range of information from different sources (Websites, videos, textbooks, journals etc.).	E15	-
Var02	I make good use of various information sources (lectures, readings, videos, websites etc.) to help me understand the topic.	E14	(e14-e12)
Var03	I make use of a variety of sources in my studies (websites, videos, textbooks, journals etc.).	E13	(e12-e13)
Var04	I make good use of various information sources (lectures readings, Videos, websites etc.) to help me memorise information.	E12	(e12-e14) (e12-e13)

CHAPTER 19 Appendix 4. G – Questionnaire items modification by item deletion or adding the covariance between the error terms of the learning behaviour component based on CFA

Learning Behaviour activities, 14 items

Item	Items Text	Unobserved	Modify.
UnPr1	For activities not directly related to your learning (e.g., chatting with a friend, shopping, playing games)?	E3	-
UnPr2	To browse webpages unrelated to the lecture topic (e.g., shopping, travelling).	E2	-
UnPr3	To use social media networks (e.g., Facebook, Twitter, and WhatsApp).	E1	-
Prod01	To watch module-related videos?	(e17)	-
Prod02	To access learning resources (e.g., PowerPoint slides, pdf)?	(e16)	(e15=e16)
Prod03	To complete assignment(s)?	(e15)	(e15=e16) (e15=e10)
Prod04	To share learning resources with your peers and/or your lecturer?	(e14)	(e13=e14)
Prod05	To communicate with your peers on study/learning-related matters?	(e13)	(e13=e14)
Prod06	To be involved in online learning activities (e.g., Poll Everywhere, discussion boards)?	(e12)	(e12=e9)
Prod07	To access course/module information (e.g., announcements, office hours, room information, assessment criteria, etc.)?	(e11)	(e11=e8)
Prod08	To get in contact with your lecturers. (e.g., email, discussion board)?	(e10)	(e9=e10) (e15=e10)
Prod09	To type notes on your own device and/or to take photos from lecturers’ presentations?	(e9)	(e9+e12) (e9=e10)
Prod10	To supplement lecture notes.	(e8)	(e11=e8)
Prod11	To complete online tests/tasks (e.g., multiple-choice tests)?	(e7)	(e7=e4) (e9=e7)
Prod12	Solely for learning purposes?	(e6)	-
Prod13	To read journal article(s)?	(e5)	-
Prod14	To browse webpages related to the lecture topics.	(e4)	-

CHAPTER 20 Appendix 5. A - Ethical approval (Research Project 2)

Ethical approval was obtained from the Institute of Life and Human Sciences Research Ethics Committee (School of Psychology) of the University of Liverpool (code 5727 and date of approval 06/02/2020).

UNIVERSITY OF LIVERPOOL

Health and Life Sciences Research Ethics Committee (Psychology, Health and Society)

6 February 2020

Dear Dr Limniou

I am pleased to inform you that your application for research ethics approval has been approved. Application details and conditions of approval can be found below. Appendix A contains a list of documents approved by the Committee.

Application Details

Reference:	5727
Project Title:	Social Media use in Teaching
Principal Investigator/Supervisor:	Dr Maria Limniou
Co-Investigator(s):	Mrs Moudi Alsharif, Dr Alex Forsythe
Lead Student Investigator:	-
Department:	School of Psychology
Approval Date:	06/02/2020
Approval Expiry Date:	Five years from the approval date listed above

The application was **APPROVED** subject to the following conditions:

Conditions of approval

- All serious adverse events must be reported to the Committee (ethics@liverpool.ac.uk) in accordance with the procedure for reporting adverse events.
- If you wish to extend the duration of the study beyond the research ethics approval expiry date listed above, a new application should be submitted.
- If you wish to make an amendment to the study, please create and submit an amendment form using the research ethics system.
- If the named Principal Investigator or Supervisor changes, or leaves the employment of the University during the course of this approval, the approval will lapse. Therefore it will be necessary to create and submit an amendment form within the research ethics system.
- It is the responsibility of the Principal Investigator/Supervisor to inform all the investigators of the terms of the approval.

Kind regards,

Health and Life Sciences Research Ethics Committee (Psychology, Health and Society)
iphsrec@liverpool.ac.uk
0151 795 5420

Appendix - Approved Documents

(Relevant only to amendments involving changes to the study documentation)

The final document set reviewed and approved by the committee is listed below:

Document Type	File Name	Date	Version
Interview Schedule	Questions for interviewes final (2)		1
Study Proposal/Protocol	08-Validation protocol		1
Fieldwork Risk Assessment	Computer School Permission with Email		1
Fieldwork Risk Assessment	English Language Permission		1
Fieldwork Risk Assessment	Architecture School Admission with Email		1
Fieldwork Risk Assessment	Debrief(1)		1
Advertisement	014-Social media interview advert (2)		2
Participant Information Sheet	012-Participant,information,sheet,interview (2)		2
Participant Consent Form	09-Cosent form interview 2020		2
Participant Information Sheet	011-Participant,information,sheet, 2020		2
Participant Consent Form	010-Cosent form questionnaire 2020		2
Advertisement	015-social media email advert Questionnaire (1)		2
Questionnaire	016-Social media questionnaire for teachers		2

CHAPTER 21 Appendix 5. B – Development of the Questionnaire for Social media use in teaching (Perceived usefulness and ease of use)

	Questions	Factor	References
	To what extent do you agree with the following statements:		
1.	Using social media will improve my performance in teaching as an academic Profession.	**Perceived usefulness**	(Acarli & Sağlam, 2015), (Venkatesh & Bala, 2008),
2.	Using social media increases my productivity in my academic profession.		
3.	Using the social media enhances my effectiveness in my academic profession.		
4.	Using social media for teaching makes me happy.		
5.	Using social media does stimulate my interest in teaching.		
6.	Overall, social media use in teaching is very useful to me.		
	To what extent do you agree with the following statements:	**Perceived ease of use**	(Acarli & Sağlam, 2015),
7.	It is easy for me to carry out teaching activities on social media.		
8.	For me, social media is suitable to carry out teaching activities.		
9.	I can do the things I want, in terms of teaching activities, on social media during lecture time.		
10.	My interaction with social media is clear and understandable.		(Alarcón del-Amo et al., 2012)
11.	Overall, social media is easy to use in teaching.		(Venkatesh & Bala, 2008),
1.	**To what extent do you agree with the following statements:**		
2.	The use of social media improves the quality of my teaching.	Social media Self-efficacy	(Al-Aufi & Fulton, 2014),
3.	Social media help me access new tools for my teaching		
4.	I have been increasingly dependent on social media for purposes of academic teaching		
5.	I feel confident finding information by using a search engine (e.g., Google).		(Isaac et al., 2017)
6.	I have control over using social media in my teaching.	Perceptions of External Control	(Venkatesh & Bala, 2008)
7.	I have the resources necessary to use social media for teaching.		

8.	Given the resources, opportunities, and knowledge it takes to use social media, it would be easy for me to use the social media for teaching.		
9.	Social media is not compatible with other online systems I use.		
10.	I find using social media in teaching to be enjoyable.	Perceived Enjoyment	Venkatesh, V., & Bala, H. (2008).
11.	The actual process of using social media in teaching is pleasant.		
12.	I have fun using the social media in teaching.		

Part 3. Social media use in teaching items (Perceived usefulness)

	To what extent do you agree with the following statements:	Factors	References
	People who influence my behaviour think that I should use social media for teaching.	Subjective Norm	(Venkatesh & Bala, 2008)
2.	People who are important to me think that I should use social media in teaching.		
3.	In general, the UQU supports the use of social media in teaching.		
4.	My use of social media for teaching is voluntary.	Voluntariness	
5.	My managers do not require me to use social media for teaching.		
6.	Although it might be helpful, using the social media is certainly not compulsory in my academic profession.		
7.	To what extent do you agree with the following statements:		
8.	I believe that the teachers who use social media in their teaching activities will be more prestigious than those who do not.	Image Of using social media	(Acarli & Sağlam, 2015)
9.	I believe that teachers who use social media in their teaching activities are more popular.		
10.	I believe that the UQU is supporting a teacher who is using social media during the lecture.		
11.	I look forward to those aspects of my teaching that require me to use social media.		(Venkatesh & Bala, 2008)
12.	To what extent do you agree with the following statements:		
13.	Using social media for teaching is important for my academic profession		

14.	Using social media for teaching is relevant to my academic profession.		
15.	Using social media for teaching serves the purpose of my academic profession.		
16.	The quality of the output I get from social media is high in teaching.	Output Quality	(Venkatesh & Bala, 2008)
17.	I have no problem with the quality of social media's output.		
18.	I rate the results from social media for teaching to be excellent.		
19.	I don't think that I will have any difficulty explaining the advantages/ disadvantages of using social media.	Result demonstrability	(Acarli & Sağlam, 2015) (Venkatesh & Bala, 2008)
20.	I believe that I can get in touch with my colleagues about the results of using social media.		
21.	I think that I will be able to see the results of using social media.		

	Items	Factors	Reference
22.	To what extent do you agree with the following statements:		
23.	I am planning to use social media in my teaching activities in the lecture every day.	Intention to use social media	(Acarli & Sağlam, 2015)
24.	During my professional life as an academic member, I am thinking of using social media for teaching activities.		
25.	I am using my smartphone "or other portable devices" with my students for teaching activities in and out of class.		
26.	I will recommend the use of social media for teaching others.		(Alarcón del-Amo et al., 2012)
27.	Assuming I had access to social media, I intend to use social media.		(Venkatesh & Bala, 2008)
28.	I intend to let students use social media during lecture time.		(Wong et al., 2012),

Definitions of Determinants of Perceived Usefulness (Venkatesh & Bala, 2008)

Determinants	Definitions
Perceived Ease of Use	The degree to which a person believes that using an IT will be free of effort (Davis et al., 1989).

Subjective Norm:	The degree to which an individual perceives that most people who are important to him think he should or should not use the system (Fishbein & Ajzen, 1975; Venkatesh & Davis, 2000).
Image:	The degree to which an individual perceives that the use of innovation will enhance his or her status in his or her social system (Moore & Benbasat, 1991).
Job Relevance:	The degree to which an individual believes that the target system applies to his or her job (Venkatesh & Davis, 2000).
Output Quality	The degree to which an individual believes that the system performs his or her job tasks well (Venkatesh & Davis, 2000).
Result Demonstrability	The degree to which an individual believes that the results of using a system are tangible, observable, and communicable (Moore & Benbasat, 1991).

Definitions of Determinants of Perceived Ease of Use (Venkatesh & Bala, 2008)

Determinants	Definitions
Computer Self-Efficacy	The degree to which an individual believes that he or she can perform a specific task/job using the computer (Compeau & Higgins, 1995a, 1995b).
Perception of External Control	The degree to which an individual believes that organizational and technical resources exist to support the use of the system (Venkatesh et al., 2003).
Computer Anxiety	The degree of “an individual’s apprehension, or even fear, when she/he is faced with the possibility of using computers” (Venkatesh, 2000, p. 349).
Computer Playfulness	the degree of cognitive spontaneity in microcomputer interactions” (Webster & Martocchio,1992, p. 204).
Perceived Enjoyment	The extent to which “the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use” (Venkatesh, 2000, p. 351).
Objective Usability	A “comparison of systems based on the actual level (rather than perceptions) of effort required to complete specific tasks” (Venkatesh, 2000, pp. 350–351).

CHAPTER 22 Appendix 5. C - Questionnaire for Academics (Social Media Use for Teaching)

General information

1. **Please type your university ID below:**
   ……………………………………………………………………

2. **Are you?**
   ☐ Male ☐ Female ☐ Prefer not to say

3. **What is your teaching role in the University?**
   ☐ Graduate Teaching Assistant (GTA) ☐ Lecturer ☐ Assistant Professor ☐ Associate professor ☐ Professor

4. **How much teaching experience in higher education do you have?**
   ☐ None ☐ 0-4 years ☐ 5-10 years ☐ 11 or more

5. **Of which School are you a member?**
   ☐ Computer Science ☐ English ☐ Architecture/Design
6. **How often do you use social media (e.g., Twitter, Facebook, YouTube, WhatsApp) in your teaching in the lecture theatre?**
   ☐ Never ☐ 1-2 hours per week ☐ 3-5 hours per week ☐ 6-8 hours per week ☐ More than 8 hours per week
7. **For which purposes do you use social media in your teaching? (tick all that apply)**
   ☐ Send information about your course ☐ Receive assignments ☐ Communicate with your students ☐ Share learning material with your students ☐ Provide feedback ☐ Design quizzes ☐ Reply to your students' posts ☐ Distribute videos and web links relevant to your course topic
   Other (please specify) ……………………

8. **How many courses do you teach per week/per semester using social media in a lecture theatre?**
   ☐ 1 course ☐ 2 courses ☐ 3 or more

9. **For which purposes do you use social media in your daily life? (tick all that apply)**
   ☐ Post personal resources (e.g., images, thoughts) ☐ Chat with friends and relaives ☐ Reply comments on others' posts ☐ Online shopping ☐ Play games ☐ Be informed about your future travel plans ☐ Keep informed about your personal interest (e.g., sports, art, music)
   Other (please specify) ……………………

10. **Which of the following devices do you use to connect with social media? (tick all that apply)**

    ☐ Desktop ☐ Smartphone ☐ Tablet ☐ Laptop

11. **Which of the following social media platforms and applications do you use in your teaching delivery process? (tick all that apply)**
    ☐ Microsoft PowerPoint ☐ Microsoft Outlook express ☐ Facebook ☐ Snapchat
    ☐ Twitter ☐ WhatsApp
    ☐ Instagram
    ☐ Google ☐ YouTube
    Other applications (please specify) ……………………

12. **How many social media platforms do you usually open during your lecture to support your own teaching delivery process?**
    ☐ 0-2 ☐ 3-4 ☐ 5-6 ☐ 7 or more

13. **Which of the following barriers do you think prevent you from using social media in teaching? (tick all that apply)**

    ☐ Fear of losing my privacy and security ☐ Anxiety about using social media
    ☐ University infrastructure ☐ No interest in using social media
    ☐ Lack of time ☐ No opportunity to integrate social media into teaching ☐ Unaware of how social media could support my teaching
    ☐ Lack of training ☐ Loss of the control of teaching
    ☐ Lack of monitoring of students' engagements with lecture
    Other (please specify) ……………………

To what extent do you agree with the following statements:	Strongly Disagree	Disagree	More or less disagree	Undecided	More or less agree	Agree	Strongly agree
14. I am planning to use social media in my teaching activities in the lecture each day.							
15. Social media improves the quality of my teaching.	☐	☐	☐	☐	☐	☐	☐
16. Social media helps me access new websites for the purpose of my teaching.	☐	☐	☐	☐	☐	☐	☐

To what extent do you agree with the following statements:	Strongly Disagree	Disagree	More or less disagree	Undecided	More or less agree	Agree	Strongly agree
17. I have become increasingly dependent on social media for purposes of my teaching.	❒	❒	❒	❒	❒	❒	❒
18. I feel confident when sharing information via social media.	❒	❒	❒	❒	❒	❒	❒
19. I have the control of teaching by using the social media.	❒	❒	❒	❒	❒	❒	❒
20. I have the learning resources necessary to use social media for my teaching delivery process.	❒	❒	❒	❒	❒	❒	❒
21. I have fun when using social media in teaching.							
22. Given the resources, opportunities and knowledge to use social media, it would be easy for me to use social media for teaching.	❒	❒	❒	❒	❒	❒	❒
23. The actual process of using social media in teaching is enjoyable.	❒	❒	❒	❒	❒	❒	❒
24. Using social media for teaching does not scare me at all.	❒	❒	❒	❒	❒	❒	❒
25. Using social media for the teaching delivery process makes me feel uneasy.	❒	❒	❒	❒	❒	❒	❒
26. People who have an influence on my professional behaviour think that I should use social media for my teaching delivery process.	❒	❒	❒	❒	❒	❒	❒
27. In general, the university supports the use of social media for teaching purposes.	❒	❒	❒	❒	❒	❒	❒
28. Using social media for teaching is not compulsory.	❒	❒	❒	❒	❒	❒	❒

To what extent do you agree with the following statements:	Strongly Disagree	Disagree	More or less disagree	Undecided	More or less agree	Agree	Strongly agree
29. Using social media for teaching makes me feel uncomfortable.							
30. My line managers do not require me to use social media for teaching.	❒	❒	❒	❒	❒	❒	❒
31. I believe that the academic staff who use social media in their teaching are more popular between students.	❒	❒	❒	❒	❒	❒	❒
32. I look forward to those aspects of my teaching that require me to use social media.	❒	❒	❒	❒	❒	❒	❒
33. Using social media for teaching is important for my academic performance	❒	❒	❒	❒	❒	❒	❒
34. Using social media for my teaching gives higher quality output than not using.	❒	❒	❒	❒	❒	❒	❒
35. Using social media for teaching is relevant to my academic performance.	❒	❒	❒	❒	❒	❒	❒
36. People who are significant in my professional life think I should use social media in my teaching.	❒	❒	❒	❒	❒	❒	❒
37. For this option please tick "agree"	❒	❒	❒	❒	❒	❒	❒
38. Using social media for teaching serves the purpose of my academic profession.							

To what extent do you agree with the following statements:	Strongly Disagree	Disagree	More or less disagree	Undecided	More or less agree	Agree	Strongly agree
39. Although it might be helpful, using the social media is certainly not compulsory in my academic profession.							
40. I intend to let students using social media in the lecture time.							
41. I rate my teaching outcomes when using social media tools to be good.	❐	❐	❐	❐	❐	❐	❐
42. Social media is not consistent with other online systems I use for teaching.							
43. I don't think that I will have any difficulty in explaining advantages/ disadvantages of using social media for teaching purposes.	❐	❐	❐	❐	❐	❐	❐
44. I believe that I can discuss with my colleagues my teaching outcomes when using social media as a tool for classroom delivery.	❐	❐	❐	❐	❐	❐	❐
45. I think that I will be able to see the results of using social media for teaching clearly.	❐	❐	❐	❐	❐	❐	❐
46. I will recommend the use of social media for teaching to others.							

Please write below any comments that you have regarding your behaviour/attitudes towards the use of social media for teaching in the lecture theatre and how you feel this affects/impacts on the teaching process (e.g., how they affect your role, your ability to teach, students' views and your colleagues' views).

....

....

....

CHAPTER 23 Appendix 5. D – Questionnaire items modification by item deletion or adding the covariance between the error terms of the perceived ease of use component for Project 2, based on CFA

Perceived Enjoyment, 2 items

Items	Items Text	Unobserved	Modify.
PersEnj1	The actual process of using social media in teaching is enjoyable.	e1	-
PersEnj2	I have fun when using social media in teaching.	e2	-

Self-Efficacy, 6 items

Items	Items Text	Unobserved	Modify.
SMSelf1	Social media improves the quality of my teaching.	e6	-
SMSelf2	Social media helps me access new websites for my teaching.	e7	-
SMSelf3	I have become increasingly dependent on social media for the purposes of my teaching.	e8	-
SMSelf4	I feel confident when sharing information via social media.	e9	-

perceived external control, 3 items

Items	Items Text	Unobserved	Modify.
PersContr1	I have control of teaching by using social media.	e10	-
PersContr2	I have the learning resources necessary to use social media for my teaching delivery process.	e11	-
PersContr3	Given the resources, opportunities, and knowledge to use social media, it would be easy for me to use social media for teaching.	e12	-

The anxiety of SM Use in Teaching, 3 items

Items	Items Text	Unobserved	Modify.
SMAnx1	Using social media for teaching does not scare me at all.	e13	-
SMAnx2	Using social media for the teaching delivery process makes me feel uneasy.	e14	(e14=e15)
SMAnx3	Using social media for teaching makes me feel uncomfortable.	e15	(e14=e15)

SMAnx4	The actual process of using social media in teaching is enjoyable.	e16	-

CHAPTER 24 Appendix 5. E – Questionnaire items modification by item deletion or adding the covariance between the error terms of the perceived usefullness component for Project 2, based on CFA

Job-Relevance, 3 items

Items	Items Text	Unobserved	Modify.
JobRelev1	Using social media for teaching is important for my academic performance.	e1	-
JobRelev2	Using social media for teaching is relevant to my academic performance.	e2	-
JobRelev3	Using social media for teaching serves the purpose of my academic profession.	e3	-

Output quality, 2 items

Items	Items Text	Unobserved	Modify.
OutpQ1	Using social media for my teaching gives higher quality output than not using it.	e4	-
OutpQ2	I rate my teaching outcomes when using social media tools to be good.	e5	-

Subjective Norms, 3 items

Items	Items Text	Unobserved	Modify.
SubjN1	People who influence on my professional behaviour think that I should use social media for my teaching delivery process.	e6	-
SubjN2	People who are significant in my professional life think I should use social media in my teaching.	e7	-
SubjN3	~~In general, the university supports the use of social media for teaching purposes~~		Deleted

Results demonstrated that 3 items

Items	Items Text	Unobserved	Modify.
ResultD1	I don’t think that I will have any difficulty in explaining advantages/disadvantages of using social media for teaching purposes.	E8	-
ResultD2	I believe that I can discuss with my colleagues my teaching outcomes when using social media as a tool for classroom delivery.	E9	-

ResultD3	~~I think that I will be able to see the results of using social media for teaching.~~	e10	Deleted

Image, 2 items

Items	Items Text	Unobserved	Modify.
Image1	I believe that the academic staff who use social media in their teaching are more popular among students.	e11	-
Image2	I look forward to those aspects of my teaching that require me to use social media.	e12	-

CHAPTER 25 Appendix 6. A - Ethical approval (Research Project 3)

Ethical approval was obtained from the Institute of Life and Human Sciences Research Ethics Committee (School of Psychology) of the University of Liverpool (code 8551 and date of approval 04/02/2021).

UNIVERSITY OF LIVERPOOL

Health and Life Sciences Research Ethics Committee (Psychology, Health and Society)

4 February 2021

Dear Dr Limniou

I am pleased to inform you that your application for research ethics approval has been approved. Application details and conditions of approval can be found below. Appendix A contains a list of documents approved by the Committee.

Application Details

Reference:	8551
Project Title:	Student and teacher engagement over synchronous time
Principal Investigator/Supervisor:	Dr Maria Limniou
Co-Investigator(s):	Mrs Moudi Alsharif, Dr Alex Forsythe
Lead Student Investigator:	-
Department:	School of Psychology
Approval Date:	04/02/2021
Approval Expiry Date:	Five years from the approval date listed above

The application was **APPROVED** subject to the following conditions:

Conditions of approval

Please note: this approval is subject to the University's research restrictions during the pandemic, as laid out on the research ethics webpages. Therefore, wherever possible, research should be conducted via remote means which avoid the need for face-to-face contact with human participants during the pandemic. The process for requesting an exemption to these restrictions is described on the research ethics webpages.

- All serious adverse events must be reported to the Committee (ethics@liverpool.ac.uk) in accordance with the procedure for reporting adverse events.
- If you wish to extend the duration of the study beyond the research ethics approval expiry date listed above, a new application should be submitted.
- If you wish to make an amendment to the study, please create and submit an amendment form using the research ethics system.
- If the named Principal Investigator or Supervisor changes, or leaves the employment of the University during the course of this approval, the approval will lapse. Therefore it will be necessary to create and submit an amendment form within the research ethics system.
- It is the responsibility of the Principal Investigator/Supervisor to inform all the investigators of the terms of the approval.

Kind regards,

Health and Life Sciences Research Ethics Committee (Psychology, Health and Society)

iphsrec@liverpool.ac.uk

0151 795 5420

Appendix - Approved Documents

(Relevant only to amendments involving changes to the study documentation)

The final document set reviewed and approved by the committee is listed below:

Document Type	File Name	Date	Version
Fieldwork Risk Assessment	Debrief(1)	10/01/2021	1
Interview Schedule	Questions for interviewes Teachers	10/01/2021	3
Advertisement	Kahoot-Padlet interview advert	10/01/2021	3
Questionnaire	Kahoot and Padlet questionnaire 2021	10/01/2021	3
Fieldwork Risk Assessment	letter -permission from the haed of the English School	11/01/2021	3
Fieldwork Risk Assessment	Letter- permission from the Head of the Computre School 2021	11/01/2021	3
Fieldwork Risk Assessment	Letter-permission from head of Architecture	11/01/2021	3
Participant Consent Form	Cosent form interview 2021	14/01/2021	3
Participant Consent Form	Cosent form questionnaire	14/01/2021	3
Participant Information Sheet	Participant,information,sheet,interview	16/01/2021	3
Participant Information Sheet	Participant,information,sheet, Qu	16/01/2021	3

CHAPTER 26 Appendix 6. B – Project 3 Questionnaire

Part one: General information

1. **Please type your university ID below:**
   ……………………………………………………………………………
2. **Gender:**
   ☐ Male ☐ Female
3. **Which School are you in:**
   ☐ Computer Science ☐ English ☐ Architecture
4. **Which of the following devices have you used over your lecture time (tick all that apply)?**
   ☐ Smartphone ☐ Tablet ☐ Laptop ☐ Other devices/please specify……………………
5. **Have you ever used Kahoot platform during your lecture time?**
   ☐ None ☐ 1-2 lectures ☐ 3-5 lectures ☐ More than 6 lectures
6. **Have you ever used Padlet platform during your lecture time?**
   ☐ None ☐ 1-2 lectures ☐ 3-5 lectures ☐ More than 6 lectures
7. **When you used Kahoot and/Padlet over your lecture, you (tick all that apply)?**

   ☐ became distracting from your learning.
   ☐ felt enthusiastic about the use
   ☐ were interested in participating in learning activities
   ☐ better communicated with your peers
   ☐ better communicated with your teachers
   ☐ received valuable for your learning feedback
   ☐ enjoyed the learning activities
   ☐ expected other courses to include these tools during lecture time
   ☐ Other, please specify ……………………

What is it like participating in a lecture?
☐ Just attend lecture ☐ keep notes ☐ access learning resources (e.g., PowerPoint slides, pdfs) prior and/after lecture time ☐ Watch module-related videos ☐ ask questions to teachers directly ☐ be involved in online learning activities (e.g. padlet, Kahoot, discussion boards) ☐ discuss with my peers predetermined questions by teachers ☐ collaborate with my peers to accomplish tasks ☐ complete assignments and tests ☐ other, please specify ………………

Which setting do you mostly prefer for student-student dialogue?
☐ synchronously in a physical environment (i.e., lecture theatre, classroom)
☐ synchronously in an online environment (i.e., Zoom/Microsoft Teams) through chat function
☐ synchronously in an online environment (i.e., Zoom/Microsoft Teams) through breakout rooms
☐ online discussions through social media (i.e, whatsup, Facebook)
☐ other, please specify ………………

Which setting do you mostly prefer for teacher-student dialogue?
☐ synchronously in a physical environment (i.e., lecture theatre, classroom)
☐ synchronously in one-to-one meeting through online environment (i.e., Zoom/Microsoft Teams)
☐ synchronously in an online environment (i.e., Zoom/Microsoft Teams) through the chat function
☐ exchange of emails
☐ other, please specify …………………

Which setting do you prefer for student-student collaboration?
☐ synchronously in a physical environment (i.e., lecture theatre, classroom)
☐ synchronously in an online environment (i.e., Zoom/Microsoft Teams) through chat function
☐ synchronously in an online environment (i.e., Zoom/Microsoft Teams) through breakout rooms
☐ online collaboration through social media (i.e, Google docs, whats up, Facebook group)
☐ exchange of emails
☐ other, please specify …………………

Section B: Students' engagement with their own learning process

Please tell us to what extent you agree with the following statements thinking your current learning experience with the use of Kahoot and/or Padlet	Not at all	Very Small Extent	Small Extent	Moderate Extent	Fairly much Extent	Great Extent	Very much
1. I have usually had a clear idea of where I am going and what is expected of me in this course	❐	❐	❐	❐	❐	❐	❐
2. It is always easy to know the standard of work expected	❐	❐	❐	❐	❐	❐	❐
3. Teachers make it clear right from the start what they expected from me	❐	❐	❐	❐	❐	❐	❐
4. Teachers provide tasks and conditions that help make my thinking explicit	❐	❐	❐	❐	❐	❐	❐
5. Teachers provide me a simplification of the tasks when necessary	❐	❐	❐	❐	❐	❐	❐
6. Teachers provide me tasks and assignments appropriate to my capacity and my own prior experience	❐	❐	❐	❐	❐	❐	❐
7. Teachers provide me opportunities to apply knowledge from the course into practice	❐	❐	❐	❐	❐	❐	❐
8. Teachers provide me opportunities to reflect on the course content and discussion	❐	❐	❐	❐	❐	❐	❐
9. Teachers provide me opportunities to brainstorm and find relevant information to resolve content-related questions	❐	❐	❐	❐	❐	❐	❐
10. Teachers are responsive to my study concerns	❐	❐	❐	❐	❐	❐	❐
11. Teachers provide timely feedback on assignments, exams, or projects	❐	❐	❐	❐	❐	❐	❐
12. Teachers provide helpful timely feedback on assignments, exams, or projects	❐	❐	❐	❐	❐	❐	❐

Please tell us to what extent you agree with the following statements thinking your current learning experience with the use of Kahoot and/or Padlet	Not at all	Very Small Extent	Small Extent	Moderate Extent	Fairly much Extent	Great Extent	Very much
13. I feel as if teachers care about my individual learning in this course	❐	❐	❐	❐	❐	❐	❐
14. Teachers are helpful in identifying areas of agreement and disagreement on course topics that helped me to learn	❐	❐	❐	❐	❐	❐	❐
15. Teachers are helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking	❐	❐	❐	❐	❐	❐	❐
16. Teachers help to keep course participants engaged and participating in productive dialogue	❐	❐	❐	❐	❐	❐	❐
17. Teachers help keep the course participants on task in a way that helped me to learn	❐	❐	❐	❐	❐	❐	❐
18. Teachers encourage me to explore new concepts in this course	❐	❐	❐	❐	❐	❐	❐
19. Teachers' actions reinforce the development of a sense of community among students	❐	❐	❐	❐	❐	❐	❐
20. The online activities help me to understand the learning content in this course	❐	❐	❐	❐	❐	❐	❐
21. The online activities are designed to get the best out of students	❐	❐	❐	❐	❐	❐	❐
22. The online activities help me to learn about lecture topic in details	❐	❐	❐	❐	❐	❐	❐
23. The online activities are well-integrated into psychology undergraduate course	❐	❐	❐	❐	❐	❐	❐
24. The online activities help me engage actively in my learning	❐	❐	❐	❐	❐	❐	❐
25. Sharing and discussion environment in synchronous sessions are good	❐	❐	❐	❐	❐	❐	❐

Please tell us to what extent you agree with the following statements thinking your current learning experience with the use of Kahoot and/or Padlet	Not at all	Very Small Extent	Small Extent	Moderate Extent	Fairly much Extent	Great Extent	Very much
26. Synchronous interactions are useful for subject understanding	❒	❒	❒	❒	❒	❒	❒
27. Synchronous interactions assist me in the retention of information about the lecture topic	❒	❒	❒	❒	❒	❒	❒
28. I can find the answers to my questions during the synchronous sessions	❒	❒	❒	❒	❒	❒	❒
29. Teachers explain the lecture topic well during the synchronous sessions	❒	❒	❒	❒	❒	❒	❒
30. I can work collaboratively with peers in a project/task	❒	❒	❒	❒	❒	❒	❒
31. I share information and resources with others	❒	❒	❒	❒	❒	❒	❒
32. I discuss my ideas with other students	❒	❒	❒	❒	❒	❒	❒
33. I receive feedback from other students to improve my work	❒	❒	❒	❒	❒	❒	❒
34. I discuss learning strategies with other students	❒	❒	❒	❒	❒	❒	❒
35. I have access to other students' output, e.g., essays in blogs or wikis, submitted assignments, oral presentation	❒	❒	❒	❒	❒	❒	❒
36. I feel that I learn as much from this course as I might have from a face-to-face version of the course	❒	❒	❒	❒	❒	❒	❒
37. I feel that I learn more in online courses than in face-to-face courses	❒	❒	❒	❒	❒	❒	❒
38. The quality of the learning experience in online courses is better than in face-to-face courses	❒	❒	❒	❒	❒	❒	❒

Section C: Individuals' learning characteristics

Answer these questions regarding your study habits.	Strongly Disagree	Disagree	More or less disagree	Undecided	More or less agree	Agree	Strongly Agree
1. I make good use of various information sources (lectures, readings, videos, websites etc.) to help me understand the topic.	❒	❒	❒	❒	❒	❒	❒
2. During lectures, I often miss important points because I am thinking of other things.	❒	❒	❒	❒	❒	❒	❒
3. I am confident that I can understand the basic concepts in this course.	❒	❒	❒	❒	❒	❒	❒
4. When I take a test, I worry about my performance.	❒	❒	❒	❒	❒	❒	❒
5. I am personally interested in the content of this course.	❒	❒	❒	❒	❒	❒	❒
6. When studying for this course, I often repeatedly go over the same course material to memorize it.	❒	❒	❒	❒	❒	❒	❒
7. I think I will be able to use what I learn in this course elsewhere in life.	❒	❒	❒	❒	❒	❒	❒
8. I rarely find time to review my notes or readings.	❒	❒	❒	❒	❒	❒	❒
9. I believe I will achieve a high grade this year.	❒	❒	❒	❒	❒	❒	❒
10. When I take tests, I think about the consequences of failing.	❒	❒	❒	❒	❒	❒	❒

Answer these questions regarding your study habits.	Strongly Disagree	Disagree	More or less disagree	Undecided	More or less agree	Agree	Strongly Agree
11. I go back to previously made notes and readings to refresh my understanding of them.	☐	☐	☐	☐	☐	☐	☐
12. I have an uneasy, upset feeling when I take a test.	☐	☐	☐	☐	☐	☐	☐
13. I make good use of various information sources (lectures, readings, videos, websites etc.) to help me memorise information.	☐	☐	☐	☐	☐	☐	☐
14. When studying for this course, I often repeatedly go over the same course material to make sure I understand it.	☐	☐	☐	☐	☐	☐	☐
15. I sometimes procrastinate to the extent that it negatively impacts my work.	☐	☐	☐	☐	☐	☐	☐
16. I am confident that I can understand the most complex /difficult concepts in this course.	☐	☐	☐	☐	☐	☐	☐
17. I think the material in this course will be useful in my studies.	☐	☐	☐	☐	☐	☐	☐
18. Other things in my life tend to take priory over this course.	☐	☐	☐	☐	☐	☐	☐
19. I find it hard to stick to a study schedule.	☐	☐	☐	☐	☐	☐	☐
20. When I study for this course, I examine a range of information from different sources (websites, videos, textbooks, journals etc.).	☐	☐	☐	☐	☐	☐	☐
21. I should begin my coursework earlier than I do.	☐	☐	☐	☐	☐	☐	☐

Answer these questions regarding your study habits.	Strongly Disagree	Disagree	More or less disagree	Undecided	More or less agree	Agree	Strongly Agree
22. When I take a test, I worry about being unable to answer the questions.	☐	☐	☐	☐	☐	☐	☐
23. I believe I am capable of getting a high mark in this subject.	☐	☐	☐	☐	☐	☐	☐
24. Sometimes I cannot motivate myself to study, even if I know I should.	☐	☐	☐	☐	☐	☐	☐
25. I make use of a variety of sources in my studies (websites, videos, textbooks, journals etc.).	☐	☐	☐	☐	☐	☐	☐

To what extent do you feel that you have developed new learning habits in order to cope with the University's move to online learning after the COVID-19 lockdown?

☐ A great deal ☐ A lot ☐ A moderate amount ☐ A little ☐ None at all

Comments:

1. Please write below any comments you have regarding your behaviour/attitudes towards your current learning experience and how you feel this affects/impacts your learning process (e.g., how they affect your motivation, ability to work from home and how your learning is influenced by COVID-19 restrictions).

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2. Please write below any comments that you have regarding your experiences/view towards the use of Kahoot/Padlet for learning in the lecture theatre and how do you feel this affects/impacts on your own learning process (e.g., motivation and engagement for learning).

CHAPTER 27 Appendix 6. C – Student Engagement Scale Development (in Synchronous Lectures)

S	Factor	Items	
1.	Behaviour	Teachers help guide the class towards understanding course topics in a way that helped me clarify my thinking	(Appleton et al., 2006) (Luo et al., 2021)
2.	Behaviour	Teachers provide tasks and conditions that help make my thinking explicit	
3.	Behaviour	Teachers encourage me to explore new concepts in this course	(Appleton et al., 2006) (Reeve & Tseng, 2011)
4.	Behaviour	Teachers help identify areas of agreement and disagreement on course topics that helped me to learn	(Appleton et al., 2006)
5.	Behaviour	Teachers help to keep course participants engaged and participating in productive dialogue	(Luo et al., 2021)
6.	Behaviour	Teachers help keep the course participants on the task in a way that helped me to learn	(Appleton et al., 2006) (Luo et al., 2021)
7.	Behaviour	Teachers' actions reinforce the development of a sense of community among students	(Appleton et al., 2006)
8.	Teacher Support	Teachers provide me opportunities to apply knowledge from the course to practice	(Appleton et al., 2006) (Luo et al., 2021)
9.	Teacher Support	Teachers provide me opportunities to reflect on the course content and discussion	(Lee et al., 2019)
10.	Teacher Support	Teachers provide me opportunities to brainstorm and find relevant information to resolve content-related	(Appleton et al., 2006) (Luo et al., 2021)
11.	Teacher Support	Teachers are responsive to my study concerns	(Appleton et al., 2006)
12.	Teacher Support	Teachers provide timely feedback on assignments, exams, or projects	(Zhoc et al., 2019) (Luo et al., 2021)
13.	Teacher Support	Teachers provide helpful timely feedback on assignments, exams, or projects	
14.	Teacher Support	Teachers provide me with tasks and assignments appropriate to my capacity and my own prior experience	(Reeve & Tseng, 2011)
15.	Teacher Support	Teachers make it clear right from the start what they expected from me	(Appleton et al., 2006) (Luo et al., 2021)
16.	Teacher Support	I feel as if teachers care about my learning in this course	(Lee et al., 2019)
17.	Online	The online activities help me to understand the learning content in this course	(Luo et al., 2021) (Luo et al., 2019)

18.	Online	The online activities are designed to get the best out of students	(Tsay et al., 2018) (Zhoc et al., 2019)
19.	Online	The online activities are well-integrated into the course	
20.	Online	The online activities help me to learn about lecture topics in detail	
21.	Online	The online activities help me engage actively in my learning	
22.	Online	I feel that I learn more in online courses than in face-to-face courses	
23.	Online	The quality of the learning experience in online courses is better than in face-to-face courses	
24.	Online	I feel that I learn as much from this course as I might have from a face-to-face version of the course	
25.	synchronous	Sharing and discussion environment in synchronous sessions are good	(Wdowik, 2014)
26.	synchronous	Synchronous interactions are useful for subject understanding	
27.	synchronous	Synchronous interactions assist me in the retention of information about the lecture topic	
28.	synchronous	Teachers explain the lecture topic well during the synchronous sessions	
29.	synchronous	I can find the answers to my questions during the synchronous sessions	
30.	Peers	I have access to other students' output, e.g., essays on google or WhatsApp, submitted assignments, and oral presentations.	(Lee et al., 2019) (Appleton et al., 2006)
31.	peers	I can work collaboratively with peers on a project/task	
32.	peers	I share information and resources with others.	
33.	peers	I discuss my ideas with other students.	
34.	peers	I receive feedback from other students to improve my work.	
35.	peers	I discuss learning strategies with other students.	
36.	Cognitive	Teachers provide me with a simplification of the tasks when necessary	(Reeve & Tseng, 2011)
37.	Cognitive	I have usually had a clear idea of where I am going and what is expected of me in this course	
38.	Cognitive	It is always easy to know the standard of work expected	

CHAPTER 28 Appendix 6. D – Questionnaire items modification by item deletion or adding the covariance between the error terms of the engagement scale for Project 3, based on CFA

Students Learning behaviour, 7 items

Items	Items Text	Unobserved	Modify.
Beh01	Teachers are helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking	e1	-
Beh02	Teachers provide tasks and conditions that help make my thinking explicit. e2	e2	-
Beh03	Teachers encourage me to explore new concepts in this course	e3	-
Beh04	Teachers help identify areas of agreement and disagreement on course topics that helped me to learn	e4	-
Beh05	Teachers help to keep course participants engaged and participating in productive dialogue	e5	-
Beh06	Teachers help keep the course participants on task in a way that helped me to learn.	e6	-
Beh07	Teachers’ actions reinforce the development of a sense of community among students	e7	-

Teacher engagement, Items 9

Items	Items Text	Unobserved	Modify.
TeachSu01	~~Teachers provide me opportunities to apply knowledge from the course to practice~~		removed
TeachSu02	Teachers provide me opportunities to reflect on the course content and discussion	E29	-
TeachSu03	Teachers provide me opportunities to brainstorm and find relevant information to resolve content-related.	E7	-
TeachSu04	Teachers are responsive to my study concerns	E8	-
TeachSu05	Teachers provide timely feedback on assignments, exams, or projects.	E9	
TeachSu06	Teachers provide helpful timely feedback on assignments, exams, or projects.	E10	
TeachSu07	Teachers provide me with tasks and assignments appropriate to my capacity and my own prior experience	E30	(e7-e10),

TeachSu08	~~Teachers make it clear right from the start what they expected from me.~~		Removed
TeachSu09	I feel as if teachers care about my individual learning in this course	E32	(e9-e10)

collaboration with Peers, 4 Items

Items	Items Text	Unobserved	Modify.
Peer01	~~I can work collaboratively with peers in a project/task~~		Deleted
Peer02	~~I share information and resources with others~~.		Deleted
Peer03	I discuss my ideas with other students	e12	-
Peer04	I receive feedback from other students to improve my work.	E13	(e20=e18)
Peer05	I discuss learning strategies with other students	E14	-
Peer06	I have access to other students' output, e.g., essays in google or WhatsApp, submitted assignments, oral	E15	-

Synchronous Activities, Items 5

Items	Items Text	Unobserved	Modify.
Sync01	Sharing and discussion environment in synchronous sessions are good	E17	-
Sync02	Synchronous interactions are useful for subject understanding	E18	(E18, e19)
Sync03	Synchronous interactions assist me in the retention of information about the lecture topic	E19	(E19, e18)
Sync04	Teachers explain the lecture topic well during the synchronous sessions	e20	-
Sync05	I can find the answers to my questions during the synchronous sessions	e21	-

Online Activities, Items 6

Items	Items Text	Unobserved	Modify.
Onlinl01	The online activities help me to understand the learning content in this course	e22	-

Onlinl02	The online activities are designed to get the best out of students	e23	-
Onlinl03	The online activities are well-integrated into the course	E24	-
Onlinl04	The online activities help me to learn about lecture topics in detail	E25	-
Onlinl05	The online activities help me engage actively in my learning	E26	-
Onlinl06	~~I feel that I learn more in online courses than in face-to-face courses.~~	-	Deleted
Onlinl07	~~The quality of the learning experience in online courses is better than in face-to-face courses~~	-	Deleted
Onlinl08	I feel that I learn as much from this course as I might have from a face-to-face version of the course. E35	e37	

Cognitive learning (Items 3)

Items	**Items Text**	**Unobserved**	**Modify.**
Cogn01	I have usually had a clear idea of where I am going and what is expected of me in this course	e38	-
Cogn02	It is always easy to know the standard of work expected	E41	(e41= e40)
Cogn03	Sharing and discussion environment in synchronous sessions are good	E40	(e40= e41)

CHAPTER 29 Appendix 6. E – Questionnaire items modification by item deletion or adding the covariance between the error terms of the student charaterisitics for Project 3, based on CFA

Test Anxiety, 4 Items

Items	Items Text	Unobserved	Modify.
ACanx1	When I take a test, I worry about being unable to answer the questions.	e1	-
ACanx2	When I take tests, I think about the consequences of failing.	e2	-
ACanx3	I have an uneasy, upset feeling when I take a test.	e3	-
ACanx4	When I take a test, I worry about my performance.	e4	-

Utility, of course, 3 Items

Items	Items Text	Unobserved	Modify.
ACutil1	I am personally interested in the content of this course.	e8	-
ACutil2	I think I will be able to use what I learn in this course elsewhere in life.	e9	-
ACutil3	I think the material in this course will be useful in my studies.	e10	-

Surface learning, 3 Items

Items	Items Text	Unobserved	Modify.
ACsurf1	I go back to previously made notes and readings to refresh my understanding of them.	e5	-
ACsurf2	When studying for this course, I often repeatedly go over the same course material to memorize it.	e6	-
ACsurf3	When studying for this course, I often repeatedly go over the same course material to make sure I understand it.	e7	-

Self-efficacy, 4 Items

Items	Items Text	Unobserved	Modify.
ACself1	I believe I will achieve a high grade this year. er1-er4	E24	(e24=e27)
ACself2	I am confident that I can understand the most complex /difficult concepts in this course.	e25	-
ACself3	I am confident that I can understand the basic concepts in this course	E26	-
ACself4	I believe I am capable of getting a high mark in this subject. er1-er4	E27	(e27=e24)

Negative habits, 4 Items

Items	Items Text	Unobserved	Modify.
Aceng1	I sometimes procrastinate to the extent that it negatively impacts my work.	e28	-
Aceng2	Other things in my life tend to take priory over this course.	e29	-
Aceng3	~~I find it hard to stick to a study schedule.~~		Deleted
Aceng4	I should begin my coursework earlier than I do.	E31	
Aceng5	~~I rarely find time to review my notes or readings~~.		Deleted
Aceng6	~~Sometimes I cannot motivate myself to study, even if I know I should.~~		Deleted
Aceng7	~~During lectures, I often miss important points because I am thinking of other things.~~		deleted

CHAPTER 30 Appendix 6. F – Part of Data Analysis and Discussion: Challenges and Opportunities (Project 3)

Challenges and Opportunities. Concerning the challenges and opportunities identified by academics in the examined lecture regarding the use of web-based learning platforms, several teachers argued that Internet service is a significant challenge. For instance, an English School lecturer stated that "the internet presents additional challenges in terms of bandwidth and connectivity." Another English lecturer) stated, "It necessitated a stable internet connection, which some students may lack." "The challenges guiding the application of this technology necessitate the support of lecture halls with strong Internet and Wi-Fi," a Computer Science lecturer stated. "The greatest obstacle they may face in this endeavour is the absence of a robust internet service and the availability of appropriate devices," he added. Another lecturer from the Computer Science School mentioned the "Internet's weakness for some students." Additionally, a lecturer from the Architecture School stated that "the difficulties are represented by the internet's limitations and the lack of a suitable device that enables the student to follow along and participate in the lecture's interaction." Another Architecture lecturer stated that "some students and teachers have difficulty utilising technology and the Internet."

Two teachers at the Computer Science School identified the time required to prepare the lesson to be presented via the platform as a challenge; for example, the Computer Science School lecturer stated that "spending time preparing the questions and adjusting them to be time-appropriate." "For Padlet, the content problem is too great due to the nature of the course and the limited time," commented the other Computer Science lecturer. Additionally, an English lecturer commented on that point, stating that "in terms of challenges, perhaps the teacher needs to spend some time familiarising himself or herself with the interface and the ins and outs of the website before incorporating it into classroom discussions". Also, an Architecture School lecturer commented on this point from the perspective of the course preparation process and time, stating that "the challenges associated with the use of these platforms are limited to the early preparation of the material, which means that the faculty member must know in advance that he will teach the course before the semester's start to complete the preparation process through these platforms."

Several additional challenges were mentioned by interviewees, including the integration of these platforms with the university's learning management system (Blackboard), as mentioned by the Architecture School lecturer. How adapt the appropriate learning theories to reflect students' enhanced learning? as an English School lecturer stated. A lecturer at an English school mentioned that students lacked the technical knowledge necessary to use such tools. Two distinct points were made by an Architecture School lecturer: the loss of eye contact with students to assess their comprehension of lecture content and the absence of certain tools required for practical and design courses. Finally, an English lecturer stated, "I believe that using unrestricted computers and mobile phones to work on web-based learning platforms will distract students during face-to-face instruction."

Concerning the opportunities that Web-based learning provides educators, one lecturer from the English School stated, "Web-based learning provides educators with the opportunity to create learning materials that engage students and enhance their learning". Therefore, a Computer Science lecturer stated, "I believe that the interaction of students, their passion, and the rate at which they learn is the greatest opportunity that can be exploited, as well as a strong motivator to change teaching methods and use learning platforms". According to a lecturer at the Architecture School, "there is an excellent opportunity to use learning platforms to increase student interaction during lectures and participation in the educational process." enables the student to pay close attention and participate actively in the lecture's interaction". Another Architecture School lecturer added, "As for the opportunities, I believe the most significant opportunity is the students' interest in these platforms because they make them more interactive, which changes the monotonous atmosphere of the Blackboard a little bit."

Two teachers mentioned two additional distinct facets. To begin, an English lecturer discusses the impact of these platforms on distant learning, stating that "in distant learning, such web-based learning platforms are invaluable because they can engage students and enable teachers to monitor student’s learning development and behaviours". Second, an Architecture lecturer discussed the opportunities in terms of transportation and other issues such as cost, automation, and increased enrolment, stating that "opportunities can be represented in terms of reducing the time and cost of transportation to the university and providing housing expenses for those who live outside of cities. In addition, the lecture can be recorded, as can the integration of larger groups of students, particularly in theoretical lectures, as well as the automatic correction of electronic tests, among other things."

Concerning teachers' perspectives on whether they require training and technical support to teach using web-based learning platforms, most interviewees from all schools agreed on the importance of having these services provided to academics either by the university or individually by each academic school.

Teachers are required to integrate these platforms into their lecture programmes, which requires additional technical expertise, time, and effort in preparing materials for this teaching approach. Thus, a Computer Science School lecturer proposed, "Academics be supported by assistant technicians who assist them in developing technological applications for the lecture material provided."

Another Computer Science lecturer stated that because using these platforms requires a significant amount of effort and time to convey the lecture, "teachers should be supported and trained to use innovative educational platforms." "The responsible authority must provide training and technical support," an Architecture lecturer stated, indicating that some teachers are unfamiliar with the use of technology and computers. A lecturer from the English School emphasised the importance of teachers being familiar with learning theories and effectively using technology to deliver constructive teaching and learning, and thus stated, "Yes, teachers should be supported at various levels."

Other concerns were expressed in the responses, including the following: "Support with appropriate devices, if possible," commented an Architecture lecturer; "The university should conduct some staff training and also provide them with a free subscription," added a Computer Science School lecturer. Another Computer Science lecturer proposed "incentives" and "training courses and workshops." One of the English School lecturers concurred with the Computer

Science teacher's assessment, stating that "universities can organize workshops or at the very least online training for lecturers on a periodical basis." Additionally, "universities can invite professionals in the field of web-based learning to give short seminars about the benefits and drawbacks of web-based teaching." Finally, according to an English School lecturer, "it would be extremely beneficial for the institution to support usage of these platforms, as these web-based platforms have additional features if purchased."

A lecturer at the Architecture School emphasised the importance of providing technical tools and support to both the student and the teacher. He advocated for the use of ad hoc classes for learning, "where students can participate in lectures from any location without being assigned to a specific class." Additionally, he stated, "Courses should be developed around problem-solving method, which may be beyond the capabilities of professors without specialised technical and educational support."

On the other hand, English lecturers indicated that learning how to use such tools is quite simple, stating, "I believe that the majority of teachers will have no difficulty deploying them within a short time and with minimal experimentation." Another Architecture School lecturer argued for the provision of training and technical support but added that "learning on these platforms is straightforward in comparison to the Blackboard system." Finally, a Computer Science lecturer took a completely different tack, stating, "I believe that students will initially be enthralled by the new interactive method." However, if it is applied uniformly to all lectures, there will be little enthusiasm or fascination for it".

Regarding the capacity and efficiency of the university's infrastructure in terms of internet connection and Wi-Fi service on campus and lecture halls, as well as the academics' perspective as users and the extent to which it impacts their use of web-based platforms for teaching, the majority of teachers responded positively. Meanwhile, others provided comments based on their own experiences during the application process. For instance, a lecturer at the Architecture School stated, "Yes, the university's infrastructure is excellent and sufficient." However, we need to make these platforms available publicly and for free". According to an

English School lecturer, "I believe the University's infrastructure and internet connection are sufficient."

As a result of the COVID-19 Pandemic's circumstances, a lecturer from the Computer Science School stated that "due to the COVID-19 pandemic, the lecture was conducted remotely, making it impossible to assess the university's infrastructure." Another Computer Science lecturer stated, "I am unable to respond to this question because I have never used the university's internet on these platforms due to the COVID-19 pandemic."

In that context, a lecturer from the Architecture School stated, "There is no doubt that the university has updated and supported its infrastructure in the last period to enable it to carry out the burden of online teaching under quarantine conditions as a result of Covid 19." He added, however, that "many students suffer from inadequate Internet connections at home, in addition to inadequate devices for some of them."

Discussion

Challenges and Opportunities. The academics also identified certain challenges and opportunities associated with incorporating web-based learning platforms (Kahoot/Padlet) into their teaching schedule, based on their experience during the synchronous lecture. The challenges are as follows:

1. Internet service and connectivity are significant barriers to effective participation for some students.
2. Lecture halls require robust Internet and Wi-Fi connections that properly connect academics' and students' devices to these online web-based platforms.
3. Some students may lack a suitable device to enable them to participate in this type of lecture.

4. Some students and academics lack the technical knowledge required to use such tools, making technology and the Internet more difficult to use without more training and technical support.

5. Academics must adhere to the course preparation process's requirements, including preparing lecture materials and questions and adjusting them to be time appropriate.

6. The lecturer needs to spend some time familiarizing himself or herself with the website's interface and its essential processes and features.

7. It is challenging to integrate these platforms with the university’s learning management system (Blackboard).

8. Academics must adopt appropriate learning theories and pedagogical approaches to ensure optimal integration of the platforms. A previous study reported that the pedagogical approaches employed affected students’ use of Padlet, with some of them creating barriers to learning (Deni & Zainal, 2018). Zainuddin et al. (2020) stated that several perceived barriers to participation in classroom activities include difficulty speaking, shyness, fear of interaction, and reluctance to provide comments.

9. Online classes mean an absence of eye contact with students to ascertain their comprehension of lecture content, as well as the absence of certain tools necessary for practical and design courses.

10. The unrestricted use of computers and smartphones for web-based learning platforms may cause students to become distracted during face-to-face instruction.

11. Academics suggested that when applied uniformly to all lectures, some students will initially be fascinated by the new interactive approach, but their enthusiasm and attraction will possibly diminish over time. This suggestion is supported by the Wang (2015), who noted that Kahoot had a less positive influence on classroom dynamics after several months in use.

Based on a literature review by Wang and Tahir (2020), the challenges mentioned by lecturers include that Kahoot had less impact after five months than initially. In addition, for teaching, getting the difficulty level of questions and answers right, network connectivity, and speed-based scoring reduces students' reflection time and cause some to guess without thinking and some adverse reactions when a student fails a quiz. Some lecturers find it challenging to use the technology.

The observed opportunities and advantages of utilizing Web-based learning platforms include the following:

1. The interaction of students, their passion, and the rate at which they learn.
2. The opportunity for lecturers to create materials that help students engage and learn more effectively.
3. The powerful motivation to enhance teaching methods is due to the implementation of web-based learning platforms' processes.
4. The facilitation of students' close attention and active participation in learning processes and activities.
5. Some lecturers observed that students are interested in these platforms because of the enhanced interactivity, which contrasts with what academics described as the monotonous atmosphere of the university's LMS (Blackboard).

The overall conclusion of Wang and Tahir (2020), the literature review is that Kahoot can have a positive effect on learning performance, classroom dynamics, students' and academics' attitudes, and students' anxiety. However, they also identified a few studies indicating that Kahoot has little or no effect, i.e., (Stoyanova et al., 2017; Tan & Saucerman, 2017; Wang & Lieberoth, 2016).

However, in the context of COVID-19 measures, there was a belief among some lecturers that it is essential to utilize these platforms because students are now being taught online from home. Therefore, when these technologies are employed for online learning, as in the circumstances of the pandemic, the benefits reported by the interviewees included the following:

1. It was invaluable because it kept students further engaged.
2. Academics were able to monitor students' learning development and behaviour remotely.
3. Time cost of transportation to and from university campuses and housing for those who live in rural areas was reduced.
4. Additionally, larger groups of students could be integrated. This virtue is also affirmed by Nkhoma et al. (2018), who stated that Kahoot allows the lecturer to engage with a large number of students. Furthermore, electronic tests can be automatically corrected.

These findings support an assertion by Mehta et al. (2021) that using Padlet as a digital tool could boost and retain student engagement during and after the COVID-19 pandemic by promoting remote collaborative learning. Using Kahoot to keep students engaged during online instruction through COVID-19 lockdowns was explored by Martín-Sómer et al. (2021). They reported greater student participation, which is a good predictor of better performance. In addition, after switching from face-to-face to remote education, it was possible to restore students' interest by playing Kahoot games. Toma et al. (2021) affirmed significant and direct benefits of using the Kahoot platform for assessment during the COVID-19 pandemic.

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