INNOVATIVE PRACTICES of TECHNOLOGY-ENHANCED LEARNING

Editors
DONNIE ADAMS
DOROTHY DEWITT
INNOVATIVE PRACTICES
of TECHNOLOGY-ENHANCED LEARNING

EDITORS
DONNIE ADAMS
DOROTHY DEWITT

PENERBIT UNIVERSITI PENDIDIKAN SULTAN IDRIS
TANJONG MALIM, PERAK
2021
CONTENTS

Preface vii
Acknowledgements xiii
List of Contributors xv

1 Technology-Enhanced Learning: Benefits and Considerations 1
   Kenny Cheah Soon Lee and Donnie Adams

2 Blended Learning in Action: Innovative Practices, Methodologies, and Implications 21
   Donnie Adams and Kenny Cheah Soon Lee

3 Technology Applications used among Undergraduates from 2013 to 2018: Implications for Instruction 35
   Dorothy DeWitt and Norlidah Alias

4 Perceptions and Challenges in Blended Learning Approaches among University Educators 55
   Kristina Francis

5 Implementing E-Book in a Mathematics Course: Investigating Postgraduate Students Patterns of Usage 67
   Malathi Letchumananan, Balakrishnan Muniandy and Mariam Mohamad
6 “Eye-Tech”: Flipping Fundamental Funduscropy For Medical Students
Prabal Bhargava

7 Gamification in a Blended Learning Environment: The Mojo of ClassDojo
Kee-Man Chuah and Fitri Suraya Mohamad

8 Screencasting for Assessment of Content Knowledge: Learners’ Experiences and Beliefs
Dorothy DeWitt and Norlidah Alias

9 Augmented Reality (AR) Experiences: A Tool to Enhance Conceptual Understanding for Education Counselling Students
Vinothini Vasodavan, Dorothy DeWitt and Norlidah Alias

10 Blended-Learning Applied in a Joint Master Program in Vietnam –Voices from Professionals
Le Hoang Dung

11 Instructor Characteristics and Satisfaction In a Blended Learning Implementation Environment
Mugenyi Justice Kintu, Chang Zhu and Edmond Kagambe

12 Building a Creative School Environment to Push Technology – Enhanced Learning – Case Study at Schools in Vietnam
Vu Thi Mai Huong

13 Virtual Reality for Evoking Emotions: A Motivational Design for Instruction
Dorothy DeWitt and Donnie Adams

About the Editors and Contributors
Technology has the potential to transform teaching and learning practices. Information communication technologies (ICT) for transforming education has been noted in research through the last three decades. Although the conceptions of use of ICT and the effect of the transformation seem to vary, the focus was always on learning and improvements in the cognitive processes for learning. The emergence of web 2.0 technologies led to the need for transformative practices in higher education. Bates and Sangra (2011) in their book “Managing Technology in Higher Education: Strategies for Transforming Teaching and Learning” addressed this need as they suggested ways to use technology to transform educational practice in higher education.

The process of transforming teaching and learning is a complex process which may involve changes in teachers’ beliefs and conception of teaching and learning. In Malaysia, the Malaysian Education Blueprint 2015 – 2025 (Higher Education) lists transformation of the delivery of higher education as one of the shifts in the aspiration to deliver a world-class higher education system. For this purpose, change is required in the processes of learning so as to develop students with enhanced capabilities to be future-ready Malaysians, as well academics who could perform this task (Ministry of Education, 2015). Hence, academics and students alike may need to unlearn and relearn concepts of teaching and learning.

This book is an effort to achieve the aim of transforming education through technology-enhanced learning (TEL) and to showcase practices from Malaysia and surrounding regions. The task of transforming education is not limited to Malaysia, as the concept of education is evolving. This is especially made evident during the COVID-19 pandemic when the delivery of education had to change.
Hence, in order to be competitive, all higher education institutions need to consider transformative practices. Traditional practices of teaching may not be suitable for preparing our youth for the technology-rich and competitive future. Hence, TEL practices may help enhance this transformation.

TEL is concerned about the “enhancement” of learning using technology. In the Malaysian context, technology has been used as an “enabler” when the Smart School concept was introduced in 1996, putting emphasis on the pedagogy rather than on the technology. Hence, technology is an enabler when access (including at anytime and anywhere) to resources on online platforms or courses such as on Learning Management systems and Massive Online Open Courses (MOOCs) is provided. Technology is also an enabler when contextualised situations and simulations are provided for the learner to visualise and practice in sometimes risky situations (Gauttier, & Arnedillo-Sanchez, 2016).

The concept of TEL needs to be carefully determined. UNESCO’s International Bureau of Education (http://www.ibe.unesco.org/) defines TEL as the use of “information and communication technologies as mediating devices supporting student learning”, which encompasses different applications and processes from the delivery of digital content to creation of resources to inform learners and enable learners’ reflection so as to integrate new knowledge into existing knowledge structures. Although the collaborative processes for learning is highlighted in the UNESCO’s definition, they do state that TEL is also referred to as ‘e-learning’ (or electronic learning) and ‘digital learning’. Hence, a common misconception is that TEL is e-learning.

The role of technology in TEL is to enable new learning experiences and enrich learning through interactive and collaborative digital media (Laurillard, Oliver, Wasson, & Hoppe, 2009). In Kirkwood and Price’s (2014) review of literature on TEL, there were three types of interventions for TEL practice: interventions that replicated existing (traditional) teaching practices new technologies; interventions that supplemented existing teaching with resources or tools so as to increased flexibility for learners, and interventions which transform and enrich teaching and/or learning processes and outcomes, example active learning and collaborative learning. Hence, the current practice of TEL may still be related to traditional teaching and not all has been transformative. Hence, with this book, we hope that the TEL practices
outlined will enable other researchers to use as exemplars to transform and enrich their students’ learning.

In TEL, technology is the “enhancer” of learning. Gauttier, & Arnedillo-Sanchez (2016) claims that this is a person-centered event, and in this case, a student-centered event, to extend the abilities of the individual, either his competency, mood or performance. This could mean enhancing memory, flexibility or time spent on a task, improving engagement or attitude, test scores, deeper understanding and reflection, or even improved interactions and sharing online (Gauttier, & Arnedillo-Sanchez, 2016). Hence, in this book, Laurillard, Oliver, Wasson, & Hoppe’s (2009) definition of TEL is taken, where the role of technology is to enable new learning experiences and enrich learning through interactive and collaborative digital media.

In Chapter 1, Technology-Enhanced Learning: Benefits and Considerations, the evolution of technology from computer-based training to e-learning models is discussed before going into the tools for TEL and the benefits. Lastly, suggestions on implementing TEL are shared.

In Chapter 2, Blended Learning in Action: Innovative Practices, Methodologies, and Implications, an overview of blended learning and the characteristic features is elaborated. Blended learning is one form of TEL due to the flexibility of the learning as well as the interactive processes involved. Several models of blended learning are discussed, and findings regarding students’ readiness for blended learning is described. This data indicates the form of blended learning preferred (50% blended) as well as the forms of online media preferred. This would be useful for lecturers and teachers when designing their TEL environments.

Chapter 3 is on Technology applications used among undergraduates from 2013 to 2018 and the implications for instruction. The technology applications used by undergraduates is elaborated. Most of the applications are collaborative and interactive tools which may not be used specifically for learning. However, there is potential for some of these tools to be used for learning as majority of students have access to them. However, the trends related to the use of tools shows that some technology apps that were popular 5 years ago have declined in popularity. Hence, technology changes according to the needs of the community. Instead of focusing on learning specific technology tools, it is more important to encourage life-long learning skills, and allow students to develop on their existing skills, using apps
Innovative Practices of Technology-Enhanced Learning

that students were familiar with for learning. This may also engage learners for TEL.

Lecturers may not have the capabilities and skills to implement TEL. Hence, it was important to investigate the perceptions of TEL among university educators. For this purpose, in Chapter 4, Perceptions and Challenges in Blended Learning Approaches among University Educators, was investigated. In the higher education institution sampled, majority of educators do not have sufficient knowledge in using blended learning. The implication of this study is that administrators and managers need to be aware of this situation and provide opportunities for educators to be trained in TEL practices. This would enable the transformation of educational practices in line with the needs of the students so that their institutions could be competitive.

The next section of the book looks into implementing TEL in the classrooms. As the aim of the book is also to share best practices in TEL so that it can be implemented by other practitioners, the chapters have been organised such that the definition of the technology and some additional links to implementing the technology are given. In addition, the instructional strategies in using the technology is suggested.

A mobile e-book for learning abstract algebra was used for TEL in Chapter 5, Implementing E-Book in a Mathematics Course: Investigating Postgraduate Students Patterns of Usage. The patterns indicated that there were some difficulties in some of the tools which the students used. In addition, the search feature in the e-book was useful for the students. Hence, e-books and other resources should be considered for interaction and collaboration in TEL.

Videos were used in flipped classrooms in Chapter 6, “Eye-Tech”: Flipping Fundamental Funduscopy For Medical Students. Flipped classroom, a form of blended learning, can be used for TEL as it enables interactions and collaborations, especially during the face-to-face sessions. In this chapter, the limited class time was spent in more effective processes.

Features of gamification can engage learners. In Chapter 7, Gamification in a Blended Learning Environment: The Mojo of ClassDojo, presented a strategy for using this application in engaging students, based on the Octalysis model. The challenges that arose from using this app was also discussed.
Assessment related to TEL may pose some difficulties. In Chapter 8, an innovative form of assessment is presented in Screencasting For Assessment of Content Knowledge: Learners’ Experiences and Beliefs. Learners develop screencasts based on their readings and present it among the other participants in their community of learners. The ability of the learners in developing their screencasts and the effectiveness of conveying their knowledge was investigated. As a form of assessment, this can develop cognitive processes and higher order thinking for TEL.

TEL should enhance understanding, especially when the cognitive processes are activated. In Chapter 9, Augmented Reality (AR) Experiences: A Tool to Enhance Conceptual Understanding for Education Counselling Students, additional information in the form of videos was augmented on posters students viewed to enhance understanding. The usability of the tool and the effectiveness for learning was investigated. This proved to be an engaging way to learn and to collaborate.

In Chapter 10, Blended-learning applied in a joint master program in Vietnam – voices from professionals, discussed the voice of instructors using a learning tool, Brightspace. The study was discussed from the dimensions of blended learning. The thoughts and pedagogical implications in using TEL was recorded.

Learning Management Systems such as MOODLE offer a suite of applications on a platform, which is at most times customised to the institution. Most times, the instructor need not even look for other applications as the most pedagogically-sound tools would have been included for TEL. In Chapter 11, Instructor Characteristics and Satisfaction in a Blended Learning Implementation Environment, instructor characteristics as well as level of use and satisfaction was investigated. It is hoped that the predictors of the characteristics of successful instructors for TEL implementation could be determined.

In the next chapter, a creative school environment is designed. Chapter 12 is on Building A Creative School Environment to Push Technology- Enhanced Learning – Case Study at Schools in Vietnam. Creative TEL environments could be designed and the researchers suggest several solutions.

Lastly, In Chapter 13, a motivational instructional design model is used to engage students in using virtual reality for learning. Virtual
Reality for Evoking Emotions: A Motivational Design for Instruction used the ARCS motivational model to design an environment to engage with trainee counsellors and show them the potential of this tool to engage their clients and evoke emotions during sessions as future counsellors.

REFERENCES


1. Introduction

Digital technology has influenced how people communicate, connect and learn (Adams, Sumintono, Mohamed, & Noor, 2018). From literature reviews, it is found that there have been numerous effects from the impact of technology on students (Bontly, Gomez, Khalil & Mansour, 2019). Firstly, technology changes the roles of teachers and students (Harper, 2018), and this also transformed the processes and methodologies in teaching and learning (Englund, Olofsson & Price, 2017). Secondly, scholars posit that there are increased levels of motivation and self-esteem among students because technologies have enhanced their learning from all three aspects of cognitive, affective and psychomotor (Khan, Hameed, Yu, Islam, Sheikh, & Khan, 2018). As such, students are now more technologically savvy, able to accomplish more tasks within their space and time, collaborate with their peers and be more resourceful in seeking information that could support their learning experience (Yuen, Koo, & Woods, 2018).

Thirdly, learning with technologies has allowed created more opportunities for them to improve their technical skills, and this could
Innovative Practices of Technology-Enhanced Learning

improve their marketability in the job market as globalization has changed tremendously in the era of Industry 4.0 that is confronted also with Machine Learning and Artificial Intelligence (Simic, & Nedelko, 2019). In recent years, the increased interest for applying digital technologies aiming to improve learning and teaching has led to the evolution of technology enhanced learning. Typically, the role of technology in technology enhanced learning is to enable new learning experiences and enrich learning through interactive and collaborative digital media (Laurillard, Oliver, Wasson, & Hoppe, 2009).

The chapter is structured into three parts. Part I discusses the evolvement of technology in education. Part II provides a glimpse of emerging tools supporting technology enhanced learning to facilitate effective learning. Part III introduces the benefits, considerations and limitations in technology enhanced learning; as a result, readers will gain insights of how to integrate technologies into learning.

2. The Evolution of Technology in Education

The 21st century comes with different challenges and demands. As society is rapidly changing, it is evident that much of it is brought by the infusion of technology in everyday life. The generation of students we have now is different from before. They are digital natives, and technology is very much a significant part of their life (Adams, Tan, Sumintono, & Oh, 2020). Technology has also evolved exponentially since the start of the internet in the 1990s, and this has allowed students to achieve more than before. Technological, Pedagogical and Content knowledge has also improved the lives of students so much that teachers’ role shifted from being the authority with the knowledge to the person as a facilitator. (Ersanli, 2016).

Historically and chronologically, the following are the prominent technologies used in the classroom setting;

a. 1800s: Chalkboards and Slide Rules
b. 1900s: Pencils, Paper and Film Projectors
c. 1940s: Mimeograph Machines and Ballpoint Pens
d. 1950s: Television. Interestingly, a review of the past (circa 1950s) revealed that schools relied on the television and coined them as Instructional Television (ITV) as people at that point in time
have also speculated that televisions could replace teachers in the classroom.

e. 1960s: Overhead Projectors  
f. 1970s: Handheld Calculators and Scantron Sheets  
g. 1980s: Use of computer networking/computer-based training (CBT) and Open online courses  
h. 1990s: Start of the World Wide Web (1991), Google (1999), and also the expansion of Learning Management Systems. Also emerged in the late 1990s was the definition of e-learning in the late 1990s.  
i. After 2000: Massive Open Online Course (MOOC) in 2008 and the Social Media that covers a wide range of different technologies, including blogs, wikis, YouTube videos, mobile devices such as phones and tablets, Twitter, Skype, and Facebook.  

In the present day, the term e-learning is synonymous with online learning, online education. (Singh, & Thurman, 2019). They rely heavily on the use of the internet and electronic devices, which also allows learning to be carried out anytime and anywhere. Expanding from here, there are two types of e-learning. The first is recognized as the Synchronous e-Learning; It occurs when the teacher and the students interact with each other in real-time, from different locations. The second is recognized as Asynchronous e-Learning, whereby the learners undergo a self-learning according to their pave and circumstance without the teacher being there. In other words, the learner and the instructor are not online at the same time (Xie, Liu, & Bhairma, 2018).  

Additionally, some other researchers observed that they are three different e-learning models: a) adjunct, b) blended and c) fully online (Algahtani, 2011). See Figure 1. Bielaczyc (2006) claims that when designing TEL, technology should be considered as one component in a holistic endeavor, which should include other, socially driven design elements in four critical dimensions: “(a) cultural beliefs of the people who are to use the designed product, (b) their practices in engaging in both online and offline activities, (c) the socio-techno-spatial relations (d) their interaction with the ‘outside world’.” (p. 301).

Tools are an integral part of TEL in which educators can use to create a more meaningful learning experience for their students. The Centre for Learning & Performance Technologies categorized these learning tools into 30 categories (Top Tools for Learning, 2018). Some of the categories and common examples are given below. See Figure 2.

![Figure 1.2 Categories and examples of common tools in education](image-url)
Additionally, there are some popular TEL tools used for various learning activities. Here we listed the 10 most common ones and their functionalities.

**Padlet**

Nitesh Goel (the founder and CEO), started Padlet’s in 2008. The tool attracted users with a modest interface that allowed users to drag and drop files from their desktop. Also, this feature enables students to add links from the web onto a web-based canvas (called a “padlet”). It is a free multimedia wall that allows real-time interaction both among students and between the students and the teacher and that facilitates whole-class participation (Fuchs, 2014). An increasing number of educators during recent years has recognized that Padlet is a useful tool to improve collaborative learning (Beltrán-Martín, 2019). Some of its advantages are a) easy to use, b) instant collaboration (any student can see when anyone else is uploading something in the wall, illustrated in Figure 4), c) multimedia (almost everything can be placed on the Padlet) and d) mobile (it can work on many different devices) (Zhi & Su, 2015).

Its applications in the classroom are endless, from a tool to evaluate lessons and a way of asking ideas. Besides, files from the Padlet walls can be saved and copied into any other application. Padlet can be used for simple tasks or expert teaching and it does not require special training or experience in the use of web 2.0 tools (Weller, 2013).

![Figure 1.3: Padlet interface projected on screen](image-url)

Padlet can be perceived as an online bulletin board that students can use to display information for any topic. Both teachers and students
can add images, videos, links, or columns for organizing information and also tasks (Hoang, 2019). However, there are limitations to Padlet and one of which students or teachers could only create three Padlets, and for additional ones they have to upgrade to a monthly or yearly subscription. In other forms of applications, some teachers could set up ‘Padlet Walls’ to share media like images or text with other learners. On the plus side, Padlet is free to use, within the three limitations, and works on most devices including desktop, mobile, and tablet. (Lowe & Humphrey, 2018).

Additionally, students could be anonymous in their postings for fearing or shying away from sharing their contradictory points of view. Nevertheless, some teachers see it as a disadvantage because they could not specifically address or follow up with more explanation for the anonymous student. Alternatively, this problem could be addressed by the teacher making it mandatory for their students to register before accessing the padlet. This also requires the teacher to change your wall’s privacy settings to Private, and subsequently adding their email addresses or their Padlet usernames prior to use. Evidently, scholars will continue to study the feasibility, effectiveness of treating Padlet as a teaching and learning tool (Deni, & Zainal, 2018).

Kahoot!

Kahoot! is a game-based quiz application that can be used in the classroom to obtain real-time feedback and data from students’ answers. It is designed with gamification elements in place such as competitiveness, rewards and podium (e.g. audio and a score board with a points system). For instance, educators can utilise Kahoot! to project quiz questions as regular lecture slides to which students respond using a web browser on their digital devices (illustrated in Figure 5).

Quizzes can be enhanced with images and videos educators are able to control the pace of play. Students are awarded points for answering questions correctly, and the timeliness of correct responses also impacts the points awarded. Displaying students’ points on the screen motivates students to get to the top of the leader board. It is simple to set up, easy to create question and can be played with no limitation of players. Educators have option to create individual or team game to answer the quiz questions. Usually Kahoot! is played in
the classroom with the presence of instructor to control the Kahoot! and may be followed by the discussion after each question or after the session has ended.

![Kahoot! interface projected on the screen and mobile device](image)

**Figure 1.4:** Kahoot! interface projected on the screen and mobile device

Source from Licorish, Owen, Daniel, & George (2018)

Kahoot! fosters motivation and engagement (Piskorz, 2016; Bernal, Ares, Bernal, Nozal, & Sánchez, 2018; Tan Ai Lin, Ganapathy & Kaur, 2018) and improves classroom dynamics as the system provides students with real-time feedback of their performance, and to some extent adapt teaching activities based on students’ responses to quizzes (Plump & LaRosa 2017). Moreover, the anonymous aspect of Kahoot! also implies that students’ privacy is not easily compromised.

In addition, since Kahoot! incorporates social media, it enables students to create, share and exchange content with others in the class, and hence, fosters a sense of community (Wang, 2015). Further, time constraints are minimal as Kahoot! collates and aggregates individual responses to questions within minutes. Therefore, teachers can focus on designing questions, administering the quiz, and, afterward, facilitating discussion about the (in) correct responses.

**WhatsApp**

WhatsApp is another application technology that is powerful for Teacher-Student interactions. There have been uses of WhatsApp
Innovative Practices of Technology-Enhanced Learning

as a virtual classroom for students. In terms of convenience in communication, students can ask their teachers freely in two-way communication (Suardika, Suhartini, & Pasassung, 2020). Additionally, students could also provide feedback to their teachers, and this feature serves as an important component in education. Listed below are the other common use of WhatsApp in Education:

a. Use the Group Chats feature to create learning and study groups based on topics, common interests or tasks
b. Create audio lessons or video links that can be sent directly to students.
c. Stay in contact with students outside the classroom, locally, regionally or internationally
d. Send out problems or assignments to students even when they are not in class.
e. Stay in contact with parents through groups or individuals
f. Send videos, audios, and other printable materials to students.

Researchers who did their studies on WhatsApp has indicated that students perceived positively towards the use of WhatsApp in their courses and that there is certainly demand to use it to promote higher order thinking skills (Baguma, Bagarukayo, Namubiru, Brown, & Mayisela, 2019). Scholars reported that learning with WhatsApp could also take place routinely and the messages with images were more effective for their learning. Some also defended that WhatsApp is good for students when it comes to sharing notes and study material, for it is communicated fast and that the maximum number of people are using WhatsApp is more than any other known application (Jackson, 2019).

**TES Teach (formerly known as Blendspace)**

TES Teach is another free online application is free that is designed to help teachers produce digital lessons that can be collaborated with students. Previously known as Blendspace, TES Teach allows the creation of interactive lessons by using own content or using other content on the Web. As such, this allows educators to digitally connect the material to create a lesson in a presentation format. As for students, they may also add images, videos, presentations, text documents, and other information searches from the browser bar to the left.
TES Teach is known to be a tool that could be used in a flipped classroom. In other words, students would first experience the instruction outside of class, and subsequently, use the class time to develop and practice the skills they learned (Zainuddin, Habiburrahim, Muluk, & Keumala, 2019). Alternatively, TES Teach could also be used to do an “in-class flip” rather than the traditional flip. The other benefit of TES Teach is the ability to create multiple quizzes throughout teachers’ lessons and to package to assess their students’ comprehension. This leads to the functionality of TES Teach for grading, and to also incorporate Google Forms or Word documents in an open-ended or more involved questions (Zainuddin, & Perera, 2018).

**Edpuzzle**

EdPuzzle is another application that is useful for both teachers and students to produce online videos, and embed them in open-ended or multiple-choice questions. There is the option to embed videos from YouTube or Vimeo to engage students through the learning process. Also inclusive is the functionality of including audio notes, audio tracks and commentary on the video, and thereafter embed them into the existing website or other forms of Learning Management Systems. Scholars have uncovered that Edpuzzle support low-achiever’s development of self-regulated learning and learning chemistry (Silverajah, & Govindaraj, 2018). Others have also discovered that Edpuzzle could improve cognitive thinking skills of students (Littlefield, 2019). Interestingly, it is cost-free and allows assessment centered tools for teachers and students to assess their learning outcomes when compared against the learning objectives.

**Screencast-O-Matic**

Educators and students could rely on Screencast-O-Matic for easy screen recording and video editing. Through this application, video lessons are used in the classroom for flipped/blended learning, for student assignments. Also feasible is the two-way mentorship teachers can a large group because this video platform could save time and create videos of training, demos or video walkthroughs. Thus, the features are easy to use, and this allows a quick way to create, manage and share video, content, and ideas. Scholars have uncovered that
this application could facilitate students to learn calculus virtually (Foong, & Mahmud, 2019) and even improved reading skills (Hasanudin & Fitrianingsih, 2018). However, there is a disadvantage to it in terms of time recording limits for the free version as compared to the paid version. Because of the ease of creating videos, teachers and students can communicate more effectively through video screen casting or publishing.

**VideoScribe**

VideoScribe is a whiteboard video animation application that is accessible to make fascinating recordings. VideoScribe was created in 2012 by a UK organization called Sparkol. As of April 2014, it had more than 250,000 clients in 135 nations around the globe. VideoScribe is created in Adobe Flash and delivers QuickTime motion pictures and Flash recordings. As such, its application is to be installed onto the PC before use. Exceptionally simple to use, teachers and students could produce a whiteboard video in only 2 hours. Alongside this, there is a lot of pictures in the library that teachers and students can browse. Interestingly, there is likewise an assortment of music that one can choose for the recordings. The expansion of components, for example, content, pictures, base hand, sound and music, and altering part are done uniquely with the simple command button.

In practical terms, the video creation process is moderately simple with numerous alternatives are made accessible to utilize. The video produced could be reviewed before distributed or downloaded. Users of VideoScribe likewise have the choice to share or embed their content to Youtube channel, Facebook or Powerpoint Slides. Under its preliminary free to use the program, users can enjoy a 30-day use before any decision to purchase the full version. Studies have shown that VideoScribe could improve writing skill for descriptive text of English language study (Aryuntini, Astuti, & Yuliana, 2018), and cooperative learning (Arini, Joyoatmojo & Riani, 2019).

**Flipgrid**

Flipgrid is a site that permits educators to make matrices (also known as grids) to encourage video conversations. Every network resembles a message board where instructors can suggest conversation starters (or topics) and their students can post video reactions that show up in
a tiled matrix show. Interestingly, Flipgrid is owned by Microsoft. It shares a mission to empower every student in their learning. Similar to Office 365, Flipgrid is presently free to use for educators and students, and that this application is used by 20 million people throughout the world. Their functionality also allows Student-to-Student interactions, and this creates the opportunity to respond to any questions from their peers within a Flipgrid topic. This would also allow every participant to have an ongoing dialogue, at any given time and place. From empirical studies, it is found that Flipgrid could promote interpersonal and intercultural communication in the language learning and teaching (Lee, 2020). Others have also found that Flipgrid app could increase learners’ motivation to speak the English language (Phạm & Vu, 2019).

**VoiceThread**

VoiceThread is a collaborative, mixed media slide show that could hold pictures, text-reports, recordings and permits individuals to explore slides and leave remarks in 5 different ways, such as utilizing voice (with a mic or phone), text-content, sound documents, or video (through the means of a webcam). The team that developed this application worked 17 months and propelled for a beta version of VoiceThread on April 15, 2007. After four months of improvements, the second and official launch of the site was released on October 10, 2007. By utilizing VoiceThread, students could focus on each other’s work, including their remarks and comments in areas they like. Their discussions can be followed effectively, and it very well may be made private or open that are contingent upon the teacher’s inclination. Also, by utilizing the zoom instrument, the students could study more carefully at the piece, and recognize any key highlights within. It is found that VoiceThread could develop oral proficiency (Dugartsyrenova & Sardegna, 2017) and foster positive community learning in the virtual classroom (Stamps, & Opton, 2019).

**Socrative**

Socrative is a cloud-based framework to facilitate student response, and it was created in 2010 by Boston-based graduate students. It permits educators to design simple tests that students can take conveniently on personal computers or notebooks. It can also be accessed by tablet PCs or their cell phones. In terms of function, Socrative creates a
Innovative Practices of Technology-Enhanced Learning

virtual classroom that the students can join the test by entering the code shared with them. When the teacher posed a question, students can access it from their gadgets and their answers will be updated in the system instantly. Alternatively, Socrative is known to be an extraordinary choice for tests, because teachers can randomize the questions, reducing the probability of students cheating. Students perceptions on the benefits of Socrative has been positive (Guarascio, Nemecek, & Zimmerman, 2017), and that it promotes active learning (El Shaban, 2017).


With the advancement of technological tools for teaching and learning, it is undeniable that new versions and areas of application will continue to come to existence. Schools not only need to introduce or innovate with technologies, but they also have to manage the ecosystem that hosts the technology for teaching and learning in areas of:

a. Speed, Efficiency, and Agility of the internet network
b. Storage and Sharing of both public and private data
c. Mobility and Remote Connectivity to cater towards sustainability
d. Automation of repeated processes and systems so that teachers and students can focus on the important matters
e. Communication that is accessible for all, and is backed-up by contingency plans in any case of power or technological glitch

TEL is considered a tool and a catalyst for change because schools can expand the productivity and capacity of teachers and students (Majeed, 2017). This leads to a change in pedagogical change. Also, teachers would be able to address issues that affect learning, teaching and lesson management. Regarding TEL, they can enhance interactions and teacher-student relationships (Harper, 2018). Undeniably, teachers play the roles of advisers, content experts, and coaches if they effectively integrate technology into subject areas. Technology helps make teaching and learning more meaningful and fun, which is vital to impact the cognitive, affective and psychomotor domains of learning. This is where technology can positively impact the classroom learning environment is because it motivates students to learn, enhances their self-esteem and causes them excited about
coming to school. Alternatively, with TEL, students gain greater control of their education and they can learn at their own pace (Mercer, Hennessy & Warwick, 2019).

5. Considerations

TEL will continue to evolve and improve as time pass. To enhance teaching and learning, TEL have to continue to stay relevant, functional and continued to be used by teachers and students. Henderson, Selwyn, & Aston, 2017). This is because most of the background of TEL is created by private entities, and therefore have business objectives behind their establishment. For educators, they have to make the best use of the myriad of tools to enhance the teaching and learning process. As educators, there are a few good practices to manage TEL and among them are:

- Decide on learning objectives and learning outcomes to be delivered and assessed
- Scope the content according to the time, resources available, features and functions of the TEL so that the learning objectives can be achieved
- Know the advantage and disadvantage of the TEL so that it will achieve the learning objectives effectively and efficiently
- Run some pilot and tests before the real session to experience and improve on the challenges and obstacles to teaching and learning with TEL
- Implement, evaluate and make a note from the TEL sessions from time to time. Also be updated with the innovation, improvements, and user-limitations of the TEL (for some TEL would need teachers to purchase or subscribe to enjoy more functions).

Using technology for teaching and learning has some definite advantages, but not without disadvantages. Some potential risks and downsides must be considered and managed when introducing technology into the classroom environment. The advantages and disadvantages of technology in education apply to all levels and types of educational institutions. The next section will highlight some limitations of TEL.
6. Limitations

While not referring to TEL, in particular, some scholars posit that students could be addicted to technologies when they value entertainment more than education. From previous studies, students have shown symptoms of having short attention spans, being easily distracted (Panova, & Lleras, 2016), being narcissistic of wanting to be important (O’Sullivan & Hussain, 2017), higher expectations for instant gratification (Johnston, 2018), and even depression (Lin, Sidani, Shensa, Radovic, Miller, Colditz & Primack, 2016).

Besides affecting users’ mental health, some scholars viewed that excessive use of technology can also have negative repercussions on physical health causing vision problems, hearing loss, and neck strain (Zheng, Wei, Li, Zhu, & Ning, 2016). Educators need to help their students to be responsible learners. As much as technology has changed the roles of teachers and learners, it should be emphasized that TEL should always be the tool that supports and transform education in many ways, from making it easier for teachers to generate instructional materials to permitting new ways for people to learn and work together.

In addition, interacting online is a very different experience compared to interacting face-to-face. If there are opportunities for students to be anonymous, teachers could lose control to filter unwarranted, offending and insensitive words and behaviours online. Students could disconnect from regular social interactions behind fake or anonymous profiles (Raut, & Patil, 2016). That is why technology should be used as part of the process to support teaching and learning in the classroom. It cannot be the only component of the learning process for students.

In another aspect, if there are loopholes and weaknesses in the TEL, there is the possibility of manipulation and abuse. That ease of communication also makes cheating more likely, and there are cases of cheating in online tests or quizzes, even it could be in the form of games, Chen, & Ong, 2018). Because students are so connected through social media and communication apps, a single group email or message broadcast to share the answers to a quiz or test is a potential threat to the effectiveness of the assessments. This is unfortunate if the teacher is not monitoring student interactions on the computer. An easy way to counter this issue is to provide assignments that
require an individual perspective. Encouraging thought instead of memorization typically reduces the urge to cheat.

From the students’ point of limitation, information can also be misleading and false if they acquired the information from an unreliable source. Teachers must teach students how and where to seek information, and if this information could be publicly used for dissemination. As such teachers and students must learn to be both alert and responsible digital citizens.

7. Conclusion

Compared to the era before the days of the internet, students once had to carry heavy textbooks and learning would not be continuous or convenient if they do not physically attend schools. On the contrary, most of those textbooks are available presently online and can be accessed through a computer, tablets or even smartphones. For teachers, technology in the classroom is important because they are tools for student engagement, assessments and monitoring of student performance. TEL could focus on the individual students, identifying their learning gaps with greater effectiveness and efficiency. School leaders, teachers, and students could automate more of the tedious and repetitive work so that there is more time for actual teaching and reviewing for quality work (Sheninger, 2019). TEL ought to be the ultimate tool to prepare students for the challenges of a society that is rooted in technology. As educators are learning lessons of the past, but they must also be ready for what the future as teaching and learning evolves with TEL.

REFERENCES


student response system and its impact on classroom engagement. Currents in Pharmacy Teaching and Learning, 9(5), 808-812.


1. Introduction

There is a myriad of definition on the term of blended learning. As an introduction, it is an educational approach that integrates online teaching resources to assist students in their learning as compared to traditional face-to-face classrooms (Adams, et al., 2018). While conventionally blended learning is used in the contexts of educational settings across different faculties (Poon, 2013; Tselios, Daskalakis & Papadopoulou, 2011; Alkhatib, 2018; Chen, Zhang, Han & Xie, 2018; Zhu, Huang, Gao & Liu, 2018), there are newer contexts where blended learning has been used for continuing education such as professional development and human resource trainings due to the cost and geographical factors of communication (Attwell, 2019; Becker & Eube, 2018; D’Agostino & Kowalski, 2018; Dede, Richards & Saxberg, 2018; Smyth, Houghton, Cooney & Casey, 2012).

It is important to differentiate that blended learning focuses on the ‘learning’, rather than the ‘teaching’. In other words, it is
concentrated on the students’ perspectives on learning, although teachers’ perspective on ‘teaching’ would also be influenced by how students learn in cyberspace, and vice versa (Wong, Hwang, Goh & Mohd Arrif, 2018; Luo, 2018; Prescott, Bundschuh, Kazakoff & Macaruso, 2018). For the benefits of the reader, we shall not opt on the latter stand as there are other considerations to explain about the teaching aspects in blended learning.

The essence of the enjoying a successful learning experience through blended learning rests on many factors, mainly can be categorized into internal (within the learner) and external factors (out of the learner) from the assessment point of view (Zheng, Wang, Doll, Deng & Williams, 2018). On the broadest term, basically, three distinctive features that characterise successful blended learning:

a. The availability and access to online educational resources and the teacher in cyberspace (Aspden & Helm, 2004)

b. The ability student and the teacher to engage online in the teaching and learning process (Bosch & Pool, 2019). However, the success of the learning outcome tilts on the ability of the student (also called student-centric or personalized learning) to control his time of learning, his place and pace of his learning (Heinze & Procter, 2004). Teachers act as facilitators to ensure the materials are sufficient, effective and accessible (Barnard, Lan, To, Paton & Lai, 2009).

c. The quality of interaction resulting from the communication between the students, the computer-mediated tools for teaching and learning, and the teacher in cyberspace (Boyle, Bradley, Chalk, Jones, & Pickard, 2003).

The use of Social Media, wikis, forums, Massive Open Online Course (MOOC) and Blogs have all contributed to the betterment of Blended Learning (Jimoyiannis, Schiza, & Tsiotakis, 2018; Miyazoe & Anderson, 2010; McCarthy, 2010).

2. Importance of Blended Learning

One of the key functions of Blended Learning is revolutionizing teaching and learning and breaking away from the traditional classroom approach (Adams, et al., 2018). Learners can enjoy the availability,
access, quality, and equity to education according to their personal and environmental circumstance (Kaspar, 2018). Thus, learners are able to improve their time efficiency in managing personal learning, experience their professional development in a meaningful way whilst providing more opportunities for collaboration with other people (Shea & Bidjerano, 2010).

Historically, the term blended learning was first conceptualized in the 1960s, and with the boom of Information, Communication and Technology (ICT) that is fuelled by the exponential growth of the Internet in the 1990s the terminology evolved by leaps and bounds (Dziuban, Hartman, Juge, Moskal, & Sorg, 2006; Sheshasaayee, & Malathi, 2018). In the year 2006, Bonk and Graham in their book Handbook of Blended Learning enhanced the terminology of blended learning to encompass learning systems that integrate between computer-mediated instruction with face-to-face instructions (Hinkleman, 2018). As a result, the learner is in control over the context of where, when and how they work (Lynch & Dembo, 2004). The technological device is only used as a tool to maximize the opportunity for personalization and social learning (So, & Bonk, 2010; Shea & Bidjerano, 2010; So & Brush, 2008). In other words, blended learning can be described as a mix of learning online and face-to-face approach (Ginns & Ellis, 2007).

In line with these educational developments, one of the main initiatives of the Malaysian Ministry of Education under the Malaysian Education Blueprint 2015-2025 (Higher Education) is the use of Blended Learning (BL) as a conduit for transforming existing pedagogy. “Blended learning models will become a staple pedagogical approach in all HLIs [Higher Learning Institutions]. Key initiatives include: Making online learning an integral component of higher education and lifelong learning, requiring up to 70% of programmes to use blended learning models” (Malaysian Education Blueprint 2013, p. E-16).

Although blended learning can serve its purpose to reach out many students (extended reach), it may have its limitation and challenges in aspects of technology usability, the readiness, and capability of students in computer literacy. These three factors may be prominent in less developed countries as compared to First World Nations. Without a doubt, there are both positive and negative aspects in blended learning (Moskal, Dziuban & Hartman, 2013; Holley & Oliver, 2010). Additionally, the Learning Management System
Innovative Practices of Technology-Enhanced Learning

(LMS) such as Moodle or Totara developed their way to facilitate and track the process of students’ learning in blended learning so that their experience and outcome can be positively enhanced (Cheng & Yuen, 2018) with various types of approach such as asynchronous and synchronous learning (Young, Bailey, Guptill, Thorp & Thomas, 2014).

The effectiveness of blended learning has been a subject of empirical research throughout the last decade across many different contexts (Adams, Tan, Sumintono, & Oh, 2020; Adams, et al., 2018; Drysdale, Graham, Spring & Halverson, 2013; Holley & Oliver, 2010; Napier, Dekhane, & Smith, 2011; Alebaikan & Troudi, 2010; Hass & Joseph, 2018). Generally, their common findings of blended learning were reported in areas as flexibility, effectiveness, efficiency, economical and most importantly personalisation because it can cover all types of learning styles (Bruff, Fisher, McEwen, & Smith, 2013; Means, Toyama, Murphy & Baki, 2013; Bosch & Pool, 2019).

3. Contemporary Models of Blended Learning

As adopting a blended learning model of instruction continue to build in momentum, various models (or types of blended learning) have evolved into what expert say as multifaceted (Graham, Woodfield & Harrison, 2013). The distinct and contemporary models/types of blended learning are illustrated in Figure 2.1:

a. Station Rotation Model of Learning: This model consists of learning ‘stations’ or ‘stops’ that are usually procedural to assist in the construction of knowledge of the learner. It is also known as the ‘Lab Rotation blended learning’ because teachers anticipate with the process of students learning at the stations and stops (D’Agostino, & Kowalski, 2018; Sheshasaayee & Malathi, 2018)

b. Remote Blended Learning (or Enriched Virtual): This model allows students to complete a series of learning online, and only require them to be supervised by their teachers when needed. It is a very student-centric approach method of learning because teachers do not need to see the students all the time or on regular basis (Prescott, Bundschuh, Kazakoff & Macaruso, 2018; Huang, Hsu, Yang, Chen, Yang, Chang & Hwang, 2018)
c. **Flex Model of Learning**: The Flex Model of Learning is an approach where the subject (or syllabus) leads the students’ learning through online or offline activities. The other feature is that students experience the blended learning in classroom together with their teachers on-site because both provide the support for the students learning in a ‘flexible’ manner that encompasses activities like group discussions and presentations to even individual tutoring. After the session, students may be required to complete their assignments off-site (Luo, 2018; Sheshasaayee & Malathi, 2018).

d. **'Flipped Classroom' Blended Learning**: This approach is widely known as having the students to learn by themselves first off-site and followed by practice on-site, that is usually in the classroom. Also known as ‘Remote Blended Learning’, this model enhances students’ learning when they share their personal learning other people (such as their teachers and peers) through collaborative learning and support. Thus, the traditional roles of teachers as persons who disseminate knowledge have ‘flipped’ to students’ initiation instead (Sergis, Sampson & Pelliccione, 2018; Cheng, Ritzhaupt & Antonenko, 2018; Cheng, Ritzhaupt, & Antonenko, 2018; Shih, Liang & Tsai, 2018).

e. **Self-blended (or Individual rotation) Model of Learning**: Unlike the Station Rotation Model of Learning, this model may not be sequential, and students learning may be assisted by software
algorithms that creates playlists for them to follow. In other words, each student will have personal learning paths (or personalization) to address their individual needs for learning (Zhu, Huang, Gao & Liu, 2018; Alkhatib, 2018).

f. Project-Based blended learning: As the name suggests, the outcome for the blended learning is a project such as learning assignments, products, and other related outputs. Learners use both personal online learning and face-to-face instructions (or even through collaborative interactions with others) to design, iterate, and publish projects respectively (Dede, Richards & Saxberg, 2018; Stroth, Knecht, Günther, Behrendt & Golba, 2018).

g. Self-Directed Blended Learning: This model defines the student as having his/her autonomy to decide who, where, how, when and how much to learn from. Students can use a combination of online and face-to-face learning to achieve both formalize and unformalized learning goals. Because there are the unformalized learning goals, teachers may face the challenge to evaluate the learning outcome of the students. On the other hand, students are more likely to benefit personally from this approach because they can seek out answers from their own curiosity and with the help of their social circle (Shea & Bidjerano, 2010). Consequently, this can sustain their learning stamina while making personal adjustments to deal with their personal challenges in learning. This model breaks away the one size fits all approach for the teacher, because every student is uniquely different, and that they can be encouraged to grow in their own autonomy, reflections and self-criticism to improve (Bosch, & Pool, 2019; Jimoyiannis, Schiza, & Tsiotakis, 2018).

h. Inside-Out Blended Learning: The outcome from the learning experience ends beyond the classroom. It is also similar to the Project-Based blended learning because there is a need for expert guidance initially, followed by feedbacks, interactive content teaching throughout the process. Nevertheless, this model is characterized by the having student move from the physical spaces to the digital spaces (Kraehe, 2018; Shih, Liang & Tsai, 2018).

i. Outside-In Blended Learning: In contrast to the inside-out approach, this model describes how the learning objectives are set at the beginning with the physical and digital environment but leading into completion inside the classroom. Even so, there is a need for daily guidance and support from face-to-face interactions.
for between students and teachers (Becker & Eube, 2018; Hass & Joseph, 2018).

j. **Supplemental blended learning:** Students will need to meet their learning objectives entirely and completely in one space such as in their online courses and activities daily. As the word supplementing suggests, students may need specific supplementing knowledge to support their learning that is not found or not provided in one learning space. In the contexts of supplemental blended learning, this model can be exemplified by the interchangeability of learning between one space (such as between online resources) to another (such as face-to-face learning), to achieve the overall learning objectives of the student (Prescott, Bundschuh, Kazakoff, & Macaruso, 2018; Kaspar, 2018).

k. **Master-Based Blended Learning:** As the name suggests, the learning outcome for this model of blended learning is for the student to be mastering a certain field of knowledge and skills. In this model, students can inter-change between face-to-face learning with online learning. Although face-to-face and online learning can be in a variety of forms, assessment is vital for the student to master the learning objectives (Chen, Zhang, Han & Xie, 2018; Cheung, Wang, Au & Xie, 2018).

There are many more definitions that describes the models and processes of blended learning, and as these definitions continue to be defined, they will continue to be used to enhance the learner, the learning and the outcome from the learning.

### 4. Research on Blended Learning

The University of Malaya funded a small research project to investigate students’ readiness for blended learning in 12 public higher education institutions in Malaysia. The research adopted a quantitative approach comprising. The research project employed a cross-sectional quantitative survey method. A sample of 2592 undergraduate (67%) and 1273 postgraduate (33%) students from various fields of study were selected from a public higher education institution in Kuala

---

1 University of Malaya’s Bantuan Kecil Penyelidikan (BKP) (BK031-2017) grant.
Innovative Practices of Technology-Enhanced Learning

Lumpur, Malaysia. Convenience sampling technique was used, where respondents were administered hard copy questionnaires by the researchers personally, as well as an online survey administered via the university’s student mailing list. The demographic profile of the students is indicated in Table 2.1.

Table 2.1 Demographic Profile of the Students

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1334</td>
<td>34.5</td>
</tr>
<tr>
<td>Female</td>
<td>2531</td>
<td>65.5</td>
</tr>
<tr>
<td>Age Range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19 years old and below</td>
<td>299</td>
<td>7.7</td>
</tr>
<tr>
<td>20 - 29 years old</td>
<td>2986</td>
<td>77.3</td>
</tr>
<tr>
<td>30 - 39 years old</td>
<td>434</td>
<td>11.2</td>
</tr>
<tr>
<td>40 - 49 years old</td>
<td>120</td>
<td>3.1</td>
</tr>
<tr>
<td>50 - 59 years old</td>
<td>24</td>
<td>0.6</td>
</tr>
<tr>
<td>60 years old and above</td>
<td>2</td>
<td>0.1</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malay</td>
<td>2207</td>
<td>57.1</td>
</tr>
<tr>
<td>Chinese</td>
<td>544</td>
<td>14.1</td>
</tr>
<tr>
<td>Indian</td>
<td>385</td>
<td>10.0</td>
</tr>
<tr>
<td>Sabah/Sarawak</td>
<td>447</td>
<td>11.6</td>
</tr>
<tr>
<td>International</td>
<td>282</td>
<td>7.3</td>
</tr>
<tr>
<td>Enrolled as:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postgraduate student</td>
<td>1273</td>
<td>32.9</td>
</tr>
<tr>
<td>Undergraduate student</td>
<td>2592</td>
<td>67.1</td>
</tr>
</tbody>
</table>

The Blended Learning Readiness Engagement Questionnaire (BLREQ)© was used to gather data on students’ readiness for blended learning. The BLREQ developed and validated², contains five basic demographic questions (i.e. age, gender, ethnicity, field of study, and level of education), 57 close ended items, 3 multiple choice questions

and 4 open ended questions. For the purpose of this chapter, only data from the 3 multiple choice questions will be presented.

Students were asked 3 multiple choice questions; 1. If your university implements Blended Learning, how much of face-to-face (F2F) vs online do you prefer? 2. If your university implements Blended Learning, what is your preferred teaching and learning content made available online? 3. If your university implements Blended Learning, how often do you prefer to meet your course lecturer face-to-face?
Finally, students indicated they preferred PDF files that contain reading text only followed by power point presentations in terms of teaching and learning content made available online. See Figure 2.4.

![Figure 2.4 Students’ Preference of Teaching and Learning Content Made Available Online](image)

### 4. Conclusion

As a summary to this chapter, we have introduced and described about what blended learning is, its application, its importance, and benefits. Blended learning has also been the subject of empirical research, be it in the aspects of the learner, the various types of approaches in blended learning, and the outcomes (both positive and negative) resulting from the process of blended learning. We have also highlighted the various models and types of blended learning that is non-exhaustive but gives a general understanding for the readers. In addition, we presented preliminary findings of a small research project to investigate students’ readiness for blended learning in public higher education institutions in Malaysia.

In consideration of these findings, higher education institutions should have a re-prioritisation of fund allocations towards identifying students’ characteristics, and their readiness for a blended learning environment (Adams, Sumintono, Mohamed, & Noor, 2018). How pedagogy and course designs affect students’ current engagement in a blended learning model of instruction deserves closer attention as well. Besides that, what specific blended learning strategies are
most effective for different subjects or fields of study, and the various learner types would be valuable areas for exploration.

REFERENCES


1. Introduction

The rapid advancements in technology has changed the way people conduct their daily living and disrupted business processes and educational delivery. The mobile phone has become an essential for productivity in recent years. Malaysia’s Individual and Household Survey Report on ICT Usage and Access 2017 reported that 80% of Malaysians had internet access and 97.7% of individuals were using mobile phones (Department of Statistics, Malaysia (DOS), 2018). Activities involving ICT which Malaysians did according to the survey were participating in social networks (86.3%), downloading images, films, video, music and games (81.2%), getting information about goods and services (80.4%), downloading software or applications (74.5%), sending or receiving e-mails (70.4%), internet banking (37.6%) and e-Commerce activities (23.2%) (DOS, 2018).

Malaysia’s Ministry of Education (MOE) had been supporting the use of technology in education since the 1990s. There were projects on developing computer literacy and computers assisted learning,
the Smart School Pilot Project, School Computerization Project, and The SchoolNet project for internet connectivity to schools (DeWitt, Naime, & Siraj, 2013; MOE, 2001; MOE, 2008). Until recently, all government schools were provided access to 1BestariNet for internet connectivity and VLE Frog for the schools virtual learning environment. Hence, school leavers are expected to graduate from school with a higher level of experience in the use of technology before commencing higher education.

Although there has been a tremendous use of information communications technology, there has been few studies to determine what technology applications are being used, and especially among students who were going to enrol in higher education institutions. Knowledge on what students were using when they entered institutes of higher education would help inform educators and trainers of instructional strategies and tools they could apply for use in instruction. Surveys on tools and applications used previously may not be relevant, as it is believed that the technology tools which were used by students five years ago may have differed. The trends in the use of applications may inform educators of future trends and expectations. Hence this study aims to determine the technology apps and tools which undergraduates in a higher education institution use since 2013, and to observe the trends in the use of the technology applications from 2013 to 2018.

2. Technology Applications for Teaching and Learning

There are a variety of technology applications and tools which have been used for teaching and learning (Roblyer & Doering, 2010). In Alias, DeWitt & Siraj (2013), these tools were classified as social media tools, repositories for information and interaction, content interactive tools and content development tools. For online discussion, social media tools included email, discussion forums, chats, blogs, microblogs and wikis, while repositories include Youtube, Vimeo, TED Talks and EduwebTV. Content interactive tools were tools such as graphic and interactive tools such Glogster, Padlet, Wordle and Google Earth and content development tools included tools for video development, animation, and graphic features as well as web pages. However, there does not appear to be a distinct difference between the
features of these tools, which has resulted in all of these tools being referred to as social media (Alias et al., 2013).

For the purpose of this study, these applications were divided into the following categories according to their function: social media, discussion tools, repositories, Screencapture applications, collaborative workspaces, web development tools, games as well as virtual reality and augmented reality apps. A discussion of these categories of tools will follow.

**Social Media**

Social media tools enable the sharing of media and as well as interaction among a community of learners. Social media sites enable the user to create a profile, which may be made public or may be limited to a particular community from the security settings of the sites, with whom the user will be able to connect with, and view their connections, as well as share content through different forms of media (Bower, 2017). Facebook and Twitter are microblogs in which text, graphics, videos can be posted and shared to reach a wide expanse of viewers. Privacy settings also enable the community to be limited to specific family members and friends.

For this purpose, graphic logs or glogs, such as Glogster and Instagram have been used to share media elements such as posters, and pictures to organise and present content in a graphic or visual manner (Alias et al., 2014). There are also social networking sites which provide users with the same areas of interest to follow and connect with each other on areas of interest, such as LinkedIn and ResearchGate (Bower, 2017). Some tools, such as Pinterest, enable users to share resources on related topics, while Snapchat enables synchronous communications with text, image and video messages (Bower, 2017).

Facebook seems to be the more well-known social media tool (Bower, 2017). In Malaysia, Facebook seems to be used by almost every undergraduate as a survey in 2012 indicated that all students had Facebook accounts (DeWitt, Naime, & Siraj, 2013). Social media is widely used. In Turkey, social media had the highest usage among science teacher trainees, followed by instant messaging (Balkan Kiyici, 2012). In this study, social media covers applications that enable profiles to be created for connections among a community and enables the sharing of media. Instant messaging is included as a social
media tool as it enables the user to create profiles and share media among their networks.

**Discussion Tools**

Discussion tools differ from social media. While social media enabled a profile to be created and view, discussion tools focused on the communication and interactions. Hence, discussion forums, instant messaging and synchronous media tools were used for discussions and interactions. Discussion forums are included in most Learning Management Systems (LMS) and on some websites such as Freewebs, is used for asynchronous discussions and enables information to be archived and retrieved easily later for review (Andrews & Haythornthwaite, 2009).

In a discussion forum, dialogue and social interaction are enabled as questions and suggestions to solutions can be formed, and support can be given. Instant messaging could be used on the mobile device (Mobile instant messaging, or MIM) and on the personal computer (PC instant messaging or PCIM) could also be included in this category and differ from discussion forums due to its synchronous nature. MIM in groups in tools such as Whatsapp, Messenger, Wechat, Line and Telegram enable the members of the group to interact and share media instantaneously. PCIM, such as Chat on an LMS, or Web Whatsapp may be more restrictive as it may limit accessibility.

There are other discussion tools which enable synchronous video interactions, such as Google Hangouts and Skype. These are synchronous rich-media tools which enable real time communications. In some cases, such as in Hangouts, they may sometimes enable the user to represent himself with a separate identity. When these tools are used for learning, they are referred to as Blended Synchronous Learning (BSL) tools (Bower, Kenney, Dalgarno, Lee, Kennedy, 2014).

In this study, discussion tools cover applications for both synchronous and asynchronous discussion and exchange of media. They include forums, instant messaging and video interactions.
File Sharing Applications

File sharing tools and applications enable users to share and receive multiple files, which may be in the form of documents, images and videos for shared projects, from other computers or devices from the Internet or a local network. Finances Online (see https://financesonline.com/top-10-file-sharing-services/) has listed Dropbox, Google Drive, and Apple iCloud among the 10 best file sharing services. Most of these services are cloud-based services such as Dropbox and Google Drive, which enables users to automatically sync their files from anywhere.

Other file sharing services online include Slide share (https://www.slideshare.net/), for sharing pdf versions of presentations, and Prezi (https://prezi.com/) is an online platform for developing presentations which uses motion, zoom and spatial relationships to make interactive presentations. Photobucket considers itself an image hosting website, while Tumblr and Instagram are actually microblogging platforms. Pixlr (https://pixlr.com/) is a set of tools for advanced photo editing. File sharing includes files of different media from images and slides to repositories for dropping in different media. These services have seemed to be more cloud-based for easily access in recent years.

Repositories for Storing Information and Interaction

Repositories are ideally platforms for storing digital resources, which may be in the form of text, audio, graphics or videos, which are tagged and hence can be easily retrieved. Video repositories such as TEDTalks may be a source of inspirational and educational talks by renowned people in the field. YouTube and Vimeo are the more common video repositories. YouTube is sometimes considered as social media, as users can get a profile and upload videos for their followers. However, as a repository, there are a tremendous number of materials here which can be used. Other repositories, such as Vine, launched in 2012, enabled short videos to be uploaded but this platform was discontinued (Roettgers, 2016), thus leaving it open to other competitors such as Instagram and Snapchat.

One Music is an audio repository for accessing music and podcasts. There are many other applications related to these repositories. For example, Tubemate, which is not a repository but an app for mobile android phones to download YouTube videos directly to the mobile
phone, and XF Player, an android video player for mobile devices. These apps may enable the media files to be accessed easily from these repositories. Repositories are for sharing and retrieving files in different media.

**Content Development Tools for the Web**

Content development tools in this case covers screencapture applications, collaborative workspaces, and Web Development Tools. Content development tools are for developing content in different media for the web.

These tools include screencapture tools, which are used for capturing or recording digital content on the computer screen (screencasting) in the form of images or videos. Screenr seems to be popular and has a Google Chrome extension, while Movenote had the addition of a window with a webcam video of the user in addition to the screencast. However, both of these apps “retired” in 2015, and alternatives such as Screencast-o-matic, Jing, and Camtasia were suggested (Josh, 2015).

Snagit a screencapture tool which enables video editing as well (https://www.techsmith.com/store/snagit). FRAPS is a video capture tool, specifically for games (http://www.fraps.com). With the trend towards mobile learning, we need screenrecorders apps for the mobile, such as Du Recorder (http://www.duapps.com/product/du-recorder.html). As for image capture, the Windows Snipping tool can be used.

Collaborative workspaces and tools are also used to post content on the web. Google documents enables synchronous collaboration as users work on documents and other file types in their Google Drive. Wikis are websites created in a collaborative environment and contribute to the creation of content (Alias et al., 2013). Common wikis are Wikipedia, Seedwiki, PBworks, originally PBwiki. Seedwiki has also been “retired” but many LMS have wikis for project works.

Web development tools originally used HTML programming for webpages. When Microsoft launched Frontpage, a WYSIWYG (what you see is what you get) web editing tool in 1997, it made web page design available to everyone. Since then, there have been many different web development tools. Freewebs, and Frontpage are no longer available, but Webs (https://www.webs.com/) and Wix (https://www.wix.com) are the common cloud-based web development tools being used now.
Technology Applications Used Among Undergraduates...

Blogs are also tools for creating content. However, the feature of a blog differs from websites. As a weblog, a diary of events or articles are expected, and interactive discussions are enabled. However, they are easy to create and have a WYSISYG format. Examples are Blogspot, Blogger and WordPress. Hence in this study, content development includes screen capture applications, collaborative workspaces, and Web Development tools.

**Games, Virtual and Augmented Reality**

Games seem to be popular among the younger generation. Facebook, which is widely popular among Malaysian, had also game apps linked to it such as Farmville and Candy Crush Sage. Linking the game app to the social media site was believed to encourage users to game. Video games on mobile devices such as Pou (http://www.pou.me/) encouraged users to take care of the alien, but enabled interactions between different pous belonging to others.

Games that required role playing were role playing games (RPG). However, when these games involved a large number of players it became massive and was known as Massive Multiplayer Online Role-Playing Game (MMORPG). MapleStory (http://maplestory.nexon.net/landing/ and http://www.maplesea.com), which was a 2D MMORPG in which players can interact and defeat monsters as well build their skills in the Maple World has been so successful that a 3D version MapleStory 2 was released in 2015 and the mobile version Maplestory M in 2016. In MMORPGS, a large number of players interact in role-playing video games in a virtual world. In the role play, the players take on a different role and identity which may be part of fantasy. MMORPGS normally involve people throughout the world in a common virtual world. World of Warcraft (https://worldofwarcraft.com/en-gb/), Guild Wars (https://www.guildwars2.com/en-gb/), and Runescape (https://www.runescape.com/splash) are among the popular games.

Multiplayer online battle arena (MOBA) video games allow teams to go online and control the games characters to compete between the teams such as Dota. In the Dota2, the use of artificial intelligence is incorporated into the games to make them more challenging (http://blog.dota2.com/?l=english). Currently, Dota has also gone on to being a virtual reality game with it being made available on the STEAM
platform as a virtual reality game (https://store.steampowered.com/app/570/Dota_2).

Games have started to be more mobile as they were made available on mobile devices. Tower of Saviors is a mobile game with certain challenges which players need to take to advance in the game. Dream League soccer allows players to build their own football team, mobile legends for battles online.

Augmented reality (AR) games started to be popular with Pokemon-GO. Originally, augmented reality games only superimposed images or environments over certain triggers in the users’ environment. Pokemon-GO made use of the features of the mobile phone, such as the camera, the gyroscope and GPS to incorporate different Pokemons in the users’ environment as monsters which had to be captured.

Virtual reality (VR) brought an immersive experience into gaming and allowed the user to experience their own virtual worlds. Second life and Minecraft are games that allow the learner to walk through and explore, as well as be immersed in virtual worlds of their own. In addition, virtual reality has been used to make gaming a more immersive experience. Platforms such as STEAM and Oculus enable headsets such as the HTC Vive and RIFT to be used to experience VR games in real life.

The layers for AR can be added in using a mobile app such as HP Reveal (currently discontinued), formerly known as Aurasma. AR and VR development can be done using software such as Unity 3D.

3. Intention to Use for Learning

Students may have access to a number of technology apps. However, it is also not known if students would be able to use the apps, they are familiar with for learning. It has been seen that students would use e-learning platforms, especially if it were part of their grading system (Puteh, 2007). Hence, educators would need to take note that apps could be used in learning especially if the students were graded on its use.

A survey of postgraduate students’ use of the university’s LMS indicated that co-participatory activities, which are the communication and interaction among peer coursemates and with the lecturers and facilitator, information structure and design of the LMS and the learning activities, as well as qualia or learning outcomes and achievement in
the learning environment were predictors of the intention to use the LMS (Ghavifekr & DeWitt, 2019). In particular, the co-participatory factor, which are the interaction and participation among the learners and course facilitators, is the main factor for university’s students’ intention to use the LMS (Ghavifekr & DeWitt, 2019).

Hence, this would indicate that the choice of the technology applications to be used for learning would need to consider whether it could provide sufficient interaction for collaboration and had a user-friendly and accessible design which could ensure the achievement of the required learning outcomes.

These findings are supported in a qualitative study which considered the features of apps which were used for learning, postgraduate students in higher education indicated that their preference was for technology tools which enabled collaboration on learning tasks, provided immediate feedback and more importantly, appropriate to the context and the learning need (DeWitt & Ghavifekr, 2019). In this study, files and documents in Google drive were shared and content was uploaded for collaborative activities. Scaffolding among peers were also evidenced in Chat sessions and discussion forums on the Learning Management System (LMS) used. Immediate feedback, which could be evidenced in mobile tools also seemed to be an important criteria as mobile learning enabled instant connectivity and hence interactivity (DeWitt & Ghavifekr, 2019; Kim, Lee, & Kim, 2014).

Mobile instant messaging tools, such as WhatsApp provided the instant connectivity and also enable resources to be shared easily, making it user-friendly as well as easily accessible by many (DeWitt & Ghavifekr, 2019; Kim, et al., 2014). In their study, a BSL tool, Google Hangouts proved to be interactive, enabled non-verbal cues to be detected by the facilitator as well as enabled sharing of resources. However, DeWitt & Ghavifekr (2019) noted that BSL tools required a stable internet connection. Further, technical difficulties may contribute to a feeling of isolation among the learners (DeWitt & Ghavifekr, 2019; Wang, Quek, & Hu, 2017).

Hence, consideration should be made to use apps which would enable collaboration and were user-friendly. Apps that students had previously used, or which they friends could help them used may need to be considered for use in learning.
4. Methodology

The research employed a survey design. The sample were undergraduates in a premier university in Malaysia. They were selected from the Faculty of Education and were first-year undergraduates in a Bachelor of Counselling program. The undergraduates from this program were selected because they were from various institutions such as secondary schools, polytechnics and other institutions offering A-levels or equivalent, in the country and were from both the science and the social science streams. The respondents were volunteers who agreed to complete the questionnaire on the Technology Applications used by undergraduates.

This questionnaire was done during the first week of semester, at the beginning of the program. This would ensure that these undergraduates had not acquired any skills and knowledge on technology during their program, and that the applications they used were applications used prior to enrolling for the program. Data was collected every year from 2013 to 2018, except for 2017 when the researcher was unavailable.

The questionnaire was a survey instrument with technology applications in the following categories: social media, discussion tools, repositories, Screencapture applications, collaborative workspaces, web development tools, games as well as virtual reality and augmented reality apps. A list of some of the popular apps were given, and respondents were required to tick on apps which they used. Further, respondents were asked to add in the space provided, other apps in the category which they used. As the number of the respondents differed each year due to the difference in numbers of student intake, both the percentages and frequency of using an application, was reported.

5. Results

A survey of the social media applications indicated that almost all students used Facebook (see Table 3.1) In addition, the percentage of students using Facebook seemed to be constant, except in 2018, when it decreased slightly. This was somewhat similar to earlier studies which found Facebook to be a tool used by most undergraduates. The slight decline in recent years might be due to recent news of data breaches
with this app, and the lack of security caused by the loss of data. In addition, there seemed to overwhelming number of advertisements being pushed to users of this app.

On the other hand, the percentage of respondents using Twitter seemed to be somewhat constant from 2013 to 2018, while tools such as Google+, Yahoo, and My Space have declined in use. On the other hand, Instagram and WhatsApp have become popular in recent years. Instagram has increased from only 2.3% in 2013 to 95.3% in 2018; while WhatsApp increased from 3.2% in 2014 to an outstanding 100% in 2018.

Respondents had added on communication tools such as WhatsApp, Telegram and Messenger in this category. This was probably because of the potential of these tools being used with a large audience and for sharing different media. WhatsApp has features for sharing status of the user with large audience, making it more of a social media tool. Another interesting thing to note is that Snapchat, which uses the capabilities of augmented reality, also emerged as a social media tool in 2016.

Discussion tools were somewhat similar to social media. However, the affordance of discussion tools was that there were more possibilities for interaction and communication. Hence, WhatsApp seemed to be a popular tool used for discussion and has increased in use from 2013 (65.1%) to 2018 (95.3%) (see Table 3.2). It can also be noted that Skype was also used as a discussion tool, from more than half (62.8%) of the respondents using it in 2018, to only a third (34.9%) in 2018. Others such as Telegram and WeChat seemed to have some possibilities to be used as discussion tools but are not so popular among the respondents.
Table 3.1: Frequency and Percentage of Social Media Applications Used from 2013 to 2018

<table>
<thead>
<tr>
<th></th>
<th>2013 f</th>
<th>Percentage</th>
<th>2014 f</th>
<th>Percentage</th>
<th>2015 f</th>
<th>Percentage</th>
<th>2016 f</th>
<th>Percentage</th>
<th>2018 f</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook</td>
<td>43</td>
<td>100.0%</td>
<td>31</td>
<td>100.0%</td>
<td>27</td>
<td>100.0%</td>
<td>21</td>
<td>100.0%</td>
<td>41</td>
<td>95.3%</td>
</tr>
<tr>
<td>Twitter</td>
<td>21</td>
<td>48.8%</td>
<td>16</td>
<td>51.0%</td>
<td>18</td>
<td>66.7%</td>
<td>10</td>
<td>47.6%</td>
<td>25</td>
<td>58.1%</td>
</tr>
<tr>
<td>Google+</td>
<td>29</td>
<td>67.4%</td>
<td>23</td>
<td>74.2%</td>
<td>14</td>
<td>51.9%</td>
<td>15</td>
<td>71.4%</td>
<td>25</td>
<td>58.1%</td>
</tr>
<tr>
<td>Wechat</td>
<td>1</td>
<td>2.3%</td>
<td>3</td>
<td>3.2%</td>
<td>3</td>
<td>11.1%</td>
<td>4</td>
<td>19.0%</td>
<td>17</td>
<td>39.5%</td>
</tr>
<tr>
<td>Yahoo</td>
<td>1</td>
<td>2.3%</td>
<td>1</td>
<td>3.2%</td>
<td>3</td>
<td>11.1%</td>
<td>4</td>
<td>19.0%</td>
<td>17</td>
<td>39.5%</td>
</tr>
<tr>
<td>Myspace</td>
<td>1</td>
<td>2.3%</td>
<td>1</td>
<td>2.3%</td>
<td>1</td>
<td>3.2%</td>
<td>3</td>
<td>11.1%</td>
<td>4</td>
<td>19.0%</td>
</tr>
<tr>
<td>Blogger</td>
<td>1</td>
<td>2.3%</td>
<td>1</td>
<td>2.3%</td>
<td>1</td>
<td>3.2%</td>
<td>3</td>
<td>11.1%</td>
<td>4</td>
<td>19.0%</td>
</tr>
<tr>
<td>Instagram</td>
<td>1</td>
<td>2.3%</td>
<td>8</td>
<td>25.8%</td>
<td>15</td>
<td>55.6%</td>
<td>24</td>
<td>100.0%</td>
<td>41</td>
<td>95.3%</td>
</tr>
<tr>
<td>LinkedIn</td>
<td>1</td>
<td>2.3%</td>
<td>1</td>
<td>5.2%</td>
<td>1</td>
<td>5.7%</td>
<td>3</td>
<td>0.0%</td>
<td>3</td>
<td>7.0%</td>
</tr>
<tr>
<td>Whatsapp</td>
<td>1</td>
<td>3.2%</td>
<td>4</td>
<td>14.5%</td>
<td>3</td>
<td>14.3%</td>
<td>43</td>
<td>100.0%</td>
<td>5</td>
<td>11.6%</td>
</tr>
<tr>
<td>Weibo</td>
<td>1</td>
<td>3.2%</td>
<td>1</td>
<td>3.2%</td>
<td>1</td>
<td>3.2%</td>
<td>3</td>
<td>11.1%</td>
<td>5</td>
<td>11.6%</td>
</tr>
<tr>
<td>Youtube</td>
<td>1</td>
<td>3.2%</td>
<td>1</td>
<td>3.2%</td>
<td>1</td>
<td>3.2%</td>
<td>3</td>
<td>11.1%</td>
<td>5</td>
<td>11.6%</td>
</tr>
<tr>
<td>Skype</td>
<td>1</td>
<td>3.2%</td>
<td>1</td>
<td>3.2%</td>
<td>1</td>
<td>3.2%</td>
<td>3</td>
<td>11.1%</td>
<td>5</td>
<td>11.6%</td>
</tr>
<tr>
<td>Telegram</td>
<td>1</td>
<td>3.2%</td>
<td>1</td>
<td>3.2%</td>
<td>1</td>
<td>3.2%</td>
<td>3</td>
<td>11.1%</td>
<td>5</td>
<td>11.6%</td>
</tr>
<tr>
<td>Messenger</td>
<td>1</td>
<td>3.2%</td>
<td>1</td>
<td>3.2%</td>
<td>1</td>
<td>3.2%</td>
<td>3</td>
<td>11.1%</td>
<td>5</td>
<td>11.6%</td>
</tr>
<tr>
<td>Snapchat</td>
<td>2</td>
<td>9.5%</td>
<td>1</td>
<td>2.3%</td>
<td>2</td>
<td>9.5%</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pinterest</td>
<td>1</td>
<td>2.3%</td>
<td>1</td>
<td>2.3%</td>
<td>1</td>
<td>2.3%</td>
<td>2</td>
<td>9.5%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.2: Frequency and Percentage of Discussion Tools and Applications Used from 2013 to 2018

<table>
<thead>
<tr>
<th></th>
<th>2013 f</th>
<th>Percentage</th>
<th>2014 f</th>
<th>Percentage</th>
<th>2015 f</th>
<th>Percentage</th>
<th>2016 f</th>
<th>Percentage</th>
<th>2018 f</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skype</td>
<td>27</td>
<td>62.8%</td>
<td>17</td>
<td>54.8%</td>
<td>12</td>
<td>44.4%</td>
<td>12</td>
<td>57.1%</td>
<td>15</td>
<td>34.9%</td>
</tr>
<tr>
<td>Yahoo</td>
<td>20</td>
<td>46.5%</td>
<td>11</td>
<td>35.5%</td>
<td>2</td>
<td>7.4%</td>
<td>1</td>
<td>4.8%</td>
<td>9</td>
<td>20.9%</td>
</tr>
<tr>
<td>WhatsApp</td>
<td>28</td>
<td>65.1%</td>
<td>34</td>
<td>100.0%</td>
<td>19</td>
<td>70.4%</td>
<td>19</td>
<td>90.5%</td>
<td>41</td>
<td>95.3%</td>
</tr>
<tr>
<td>FB group</td>
<td>3</td>
<td>7.0%</td>
<td>1</td>
<td>3.7%</td>
<td>2</td>
<td>4.2%</td>
<td>2</td>
<td>4.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Messenger</td>
<td>10</td>
<td>23.3%</td>
<td>5</td>
<td>16.1%</td>
<td>4</td>
<td>14.8%</td>
<td>2</td>
<td>9.5%</td>
<td>3</td>
<td>7.0%</td>
</tr>
<tr>
<td>Line</td>
<td>1</td>
<td>2.3%</td>
<td>2</td>
<td>7.4%</td>
<td>1</td>
<td>2.3%</td>
<td>2</td>
<td>7.4%</td>
<td>1</td>
<td>2.3%</td>
</tr>
<tr>
<td>Freewebs</td>
<td>4</td>
<td>9.5%</td>
<td>1</td>
<td>3.2%</td>
<td>2</td>
<td>7.4%</td>
<td>1</td>
<td>2.3%</td>
<td>2</td>
<td>7.4%</td>
</tr>
<tr>
<td>Wechat</td>
<td>4</td>
<td>9.5%</td>
<td>2</td>
<td>6.5%</td>
<td>4</td>
<td>14.8%</td>
<td>2</td>
<td>9.5%</td>
<td>1</td>
<td>2.3%</td>
</tr>
<tr>
<td>Gmail</td>
<td>2</td>
<td>4.8%</td>
<td>1</td>
<td>3.7%</td>
<td>1</td>
<td>4.8%</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telegram</td>
<td>1</td>
<td>2.3%</td>
<td>4</td>
<td>9.3%</td>
<td>1</td>
<td>2.3%</td>
<td>2</td>
<td>7.4%</td>
<td>1</td>
<td>2.3%</td>
</tr>
<tr>
<td>Ovo</td>
<td>1</td>
<td>2.3%</td>
<td>1</td>
<td>2.3%</td>
<td>1</td>
<td>2.3%</td>
<td>2</td>
<td>7.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Twitter</td>
<td>1</td>
<td>2.3%</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There seems to be a variety of file sharing applications being used by the respondents such as Dropbox, SlideShare, Tumblr and Photobucket. However, the use of these file sharing applications seem to have reduced as less than a quarter (20.9%) use Tumblr in 2018, as compared to almost half (46.5%) in 2013. As for Photobucket, it reduced dramatically, from 25.6% in 2013 to 4.7% in 2018.
Repositories which were used by the respondents seemed to be mainly video repositories. Youtube was the most popular with a high percentage of respondents using it from 2013 to 2018 (see Table 3.4). However, there were other repositories for music and videos being used.

Screen capture tools to develop videos have been used since 2013. Screenr, which was popular in 2013 and 2014 (48.8% and 61.3% respectively) seemed to have reduced in usage in 2018 (30.2%). As for collaborative workspaces, Google docs seemed to be used by about three quarters of the respondents (see Table 3.5). Wikis were less popular among respondents. On the other hand, for content development, blogging tools such as Blogger and WordPress seemed to use by a larger number of respondents.

Table 3.3: Frequency and Percentage of File Sharing Applications Used from 2013 to 2018

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dropbox</td>
<td>8</td>
<td>18.6%</td>
<td>10</td>
<td>32.3%</td>
<td>8</td>
<td>29.6%</td>
<td>12</td>
<td>57.1%</td>
<td>16</td>
<td>37.2%</td>
</tr>
<tr>
<td>SlideShare</td>
<td>18</td>
<td>41.9%</td>
<td>10</td>
<td>32.3%</td>
<td>6</td>
<td>22.2%</td>
<td>5</td>
<td>23.9%</td>
<td>19</td>
<td>44.2%</td>
</tr>
<tr>
<td>Tumblr</td>
<td>20</td>
<td>46.5%</td>
<td>7</td>
<td>22.6%</td>
<td>3</td>
<td>3.7%</td>
<td>4</td>
<td>8.4%</td>
<td>9</td>
<td>20.9%</td>
</tr>
<tr>
<td>Photobucket</td>
<td>11</td>
<td>25.6%</td>
<td>1</td>
<td>3.7%</td>
<td>4</td>
<td>14.3%</td>
<td>5</td>
<td>10.5%</td>
<td>2</td>
<td>4.7%</td>
</tr>
<tr>
<td>Prezi</td>
<td>1</td>
<td>2.3%</td>
<td>5</td>
<td>16.1%</td>
<td>1</td>
<td>3.7%</td>
<td>7</td>
<td>16.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instagram</td>
<td>1</td>
<td>1.3%</td>
<td>1</td>
<td>3.7%</td>
<td>1</td>
<td>3.7%</td>
<td>7</td>
<td>16.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pixlr</td>
<td>1</td>
<td>3.2%</td>
<td>1</td>
<td>3.7%</td>
<td>1</td>
<td>3.7%</td>
<td>7</td>
<td>16.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Google Drive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>3.7%</td>
<td>1</td>
<td>4.8%</td>
<td>1</td>
<td>2.3%</td>
</tr>
<tr>
<td>One drive</td>
<td>1</td>
<td>2.3%</td>
<td>1</td>
<td>2.3%</td>
<td>1</td>
<td>2.3%</td>
<td>3</td>
<td>7.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ShareIt</td>
<td>3</td>
<td>7.0%</td>
<td>1</td>
<td>2.3%</td>
<td>1</td>
<td>2.3%</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.4: Frequency and Percentage of Repositories Used from 2013 to 2018

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Youtube</td>
<td>33</td>
<td>76.7%</td>
<td>31</td>
<td>100.0%</td>
<td>21</td>
<td>77.8%</td>
<td>18</td>
<td>85.7%</td>
<td>43</td>
<td>100.0%</td>
</tr>
<tr>
<td>TedTalk</td>
<td>1</td>
<td>2.3%</td>
<td>2</td>
<td>7.4%</td>
<td>1</td>
<td>4.8%</td>
<td>2</td>
<td>4.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vine</td>
<td>2</td>
<td>7.4%</td>
<td>1</td>
<td>3.7%</td>
<td>1</td>
<td>3.7%</td>
<td>2</td>
<td>7.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tubemate</td>
<td>2</td>
<td>7.4%</td>
<td>1</td>
<td>4.8%</td>
<td>1</td>
<td>4.8%</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily Motion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>xPlayer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onenmusic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3.5: Frequency and Percentage of Screencapture Applications, Collaborative Workspaces and Web Development Tools Used from 2013 to 2018

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th></th>
<th>2014</th>
<th></th>
<th>2015</th>
<th></th>
<th>2016</th>
<th></th>
<th>2018</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Screencapture</td>
<td>21</td>
<td>48.8%</td>
<td>19</td>
<td>61.3%</td>
<td>6</td>
<td>22.2%</td>
<td>8</td>
<td>38.1%</td>
<td>13</td>
<td>30.2%</td>
</tr>
<tr>
<td>Snagit</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jing</td>
<td>7</td>
<td>16.3%</td>
<td>2</td>
<td>6.5%</td>
<td>1</td>
<td>3.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fraps</td>
<td></td>
<td></td>
<td>4</td>
<td>9.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Movenote</td>
<td></td>
<td></td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Camtasia</td>
<td></td>
<td></td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DiRRecorder</td>
<td></td>
<td></td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snipping tool</td>
<td></td>
<td></td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaborative Workspaces</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GoogleDocs</td>
<td>37</td>
<td>86.0%</td>
<td>24</td>
<td>77.4%</td>
<td>16</td>
<td>59.3%</td>
<td>13</td>
<td>61.9%</td>
<td>33</td>
<td>76.7%</td>
</tr>
<tr>
<td>Wikipedia</td>
<td>1</td>
<td>3.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seedwixi</td>
<td></td>
<td></td>
<td>1</td>
<td>4.8%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ptwikii</td>
<td></td>
<td></td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web Development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Froutpage</td>
<td>6</td>
<td>14.0%</td>
<td>4</td>
<td>12.9%</td>
<td></td>
<td></td>
<td>3</td>
<td>7.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blogspot</td>
<td>28</td>
<td>65.1%</td>
<td>19</td>
<td>61.3%</td>
<td>14</td>
<td>51.9%</td>
<td>13</td>
<td>61.9%</td>
<td>19</td>
<td>44.2%</td>
</tr>
<tr>
<td>Wordpress</td>
<td>13</td>
<td>30.2%</td>
<td>9</td>
<td>29.0%</td>
<td>2</td>
<td>7.4%</td>
<td>5</td>
<td>23.8%</td>
<td>14</td>
<td>32.6%</td>
</tr>
<tr>
<td>Freeweb</td>
<td>8</td>
<td>18.6%</td>
<td>7</td>
<td>22.6%</td>
<td>1</td>
<td>3.7%</td>
<td>1</td>
<td>4.8%</td>
<td>1</td>
<td>2.3%</td>
</tr>
<tr>
<td>Dreamweaver</td>
<td></td>
<td></td>
<td>1</td>
<td>3.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wix</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2.3%</td>
</tr>
</tbody>
</table>

There seems to be more games in 2018, and a number of these games were MMORPG. World of Warcraft is one of the MMORPG which was used by the respondents, ever though less than 10% have used it (see Table 3.6). In addition, the emergence of AR being used in games when Pokemon-Go was introduced in 2016. Although awareness of Virtual reality emerged in 2018, there were respondents who had used Second Life since 2013. This indicated that the respondents may already be familiar with VR in gaming.
Table 3.6: Frequency and Percentage of Games and Virtual Reality Tools and Applications Used from 2013 to 2018

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmville</td>
<td>30</td>
<td>69.5%</td>
<td>19</td>
<td>61.3%</td>
<td>7</td>
<td>25.9%</td>
<td>4</td>
<td>19.0%</td>
<td>17</td>
<td>39.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Candy Crush</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saga</td>
<td>1</td>
<td>2.3%</td>
<td>1</td>
<td>3.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second Life</td>
<td>2</td>
<td>4.7%</td>
<td>2</td>
<td>7.4%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>World of Warcraft</td>
<td>2</td>
<td>4.7%</td>
<td>1</td>
<td>3.2%</td>
<td>1</td>
<td>3.7%</td>
<td>2</td>
<td>9.5%</td>
<td>3</td>
<td>7.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POU</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guild Wars</td>
<td>1</td>
<td>2.3%</td>
<td>2</td>
<td>6.5%</td>
<td></td>
<td></td>
<td></td>
<td>4.8%</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maple Story</td>
<td>1</td>
<td>2.3%</td>
<td>1</td>
<td>3.2%</td>
<td>1</td>
<td>3.7%</td>
<td>3</td>
<td>14.3%</td>
<td>3</td>
<td>7.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Runescape</td>
<td>1</td>
<td>2.3%</td>
<td>6</td>
<td>19.4%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clash of Clans</td>
<td>2</td>
<td>7.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tower of Saviors</td>
<td>1</td>
<td>4.8%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pokemon Go</td>
<td>1</td>
<td>4.8%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dots 2</td>
<td>1</td>
<td>4.8%</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tifa</td>
<td>1</td>
<td>4.8%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dream League</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soccer</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobile Legend</td>
<td>3</td>
<td>7.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PUBG</td>
<td>2</td>
<td>4.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pool</td>
<td>2</td>
<td>4.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mission Against Terror</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crisis Action</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hayday</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plants vs Zombies</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rules of Survival</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Escape Room</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minecraft</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS:GO</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VR/AR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oculus Rift</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HTC Vive</td>
<td>1</td>
<td>2.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unity 3D</td>
<td>5</td>
<td>11.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HP</td>
<td>2</td>
<td>4.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Implications and Conclusions

In this study, the technology apps and tools which undergraduates in a higher education institution are using since 2013 were determined and the major trends in the technology apps used from 2013 to 2018 was investigated. The analysis of the technology applications used has indicated that social media, namely Facebook, is hugely popular. Hence, social media and apps which can engage the learner to socialise, create a profile and an online presence, has the potential to be used
Innovative Practices of Technology-Enhanced Learning

for learning (Balkan Kiyici, 2012; DeWitt et al., 2013). Learners can share media files as well as participate in co-participatory activities for interaction and collaboration (Ghavifekr & DeWitt, 2019). The user-friendly design of a social media tool could encourage participation among learners. However, the instructor will also need to ensure the information structure and design of the learning environment could enable immediate feedback for collaboration (DeWitt & Ghavifekr, 2019; Ghavifekr & DeWitt, 2019).

The analysis of the trends of the use of the applications has shown that some tools loses its popularity. Some were well-established tools in earlier years such as MySpace, which were replaced by more versatile and mobile tools. Mobile instant messaging tools (MIM) which enabled media sharing has seemed to grow in popularity in recent years. Discussion tools which provided opportunities for synchronous discussion on the mobile platform, such as WhatsApp also seemed to be more widely used. The affordance of mobile apps over PC-based apps is that technology is available at “anywhere and anytime”. This has made the use of mobile apps more accessible. The implication for educators is that technology apps which are accessible and convenient to use would be more effective for learning and could ensure the achievement of the learning outcomes.

Social media which incorporated image and graphic-sharing tools, such as Instagram and other file sharing tools, such as Slideshare and Dropbox were also popular. The use of images to convey information seem to appeal to undergraduates, possibly because of the visual nature which addresses the different modalities. Hence, use of posters and infographics for learning should be considered as these media could be shared online and in social media groups for discussion and interaction for learning.

Videos seems to be a media that could engage students. YouTube was popular among students since 2013. However, it is not known what kind of media they were used to in videos, and whether it could be used for direct instruction or for discussion. In addition, which form of video types would appeal to students, whether screencasts, animations, life recordings or entertainment videos were most suitable, is not known. Hence, more research could be conducted to determine the types of videos which could be used for instruction.

Since videos and social media are popular, there is a possibility of conducting Blended Synchronous Learning (BSL). Apps such as Facebook Live, Hangouts and Skype also had possibilities for
discussion and incorporating video for learning as students were already using both these apps. BSL had affordances of both the synchronous nature of the discussions, with possibilities for feedback and collaboration (Bower et al., 2014). In addition, resources could be archived for a later stage of asynchronous learning interactions.

There was a possibility of having student-generated content. The number of students who were using screencapture tools, collaborative workspaces and blogging have increased. Student-generated content had the possibility of students synthesising their knowledge, reflecting on what they have learnt and sharing their knowledge on social media and other discussion platforms. It encourages discovery learning and creation of new knowledge. However, what seems to be missing is the use of video editing and video development tools. It would be useful to determine which tools undergraduate students are familiar with. Hence, these tools could also be incorporated in to develop more student-generated content.

There seems to be more use of games in recent years among undergraduate students as the number of games in the last few years have increased. Games which were mobile and could be accessed on the mobile phone were hugely popular as it was also more accessible. Many of the games used were strategy games in which the users play a role (MMORPG). Hence, there is also the possibility of using games for learning. In addition to games, the potential of VR and AR in a gaming scenario, could make learning more immersive and engaging.

It was also noted that some technology apps that were popular 5 years ago have declined in popularity in recent years. If the apps did not fit into the needs of the populace, it would not be used. Hence, educators should implement a need analysis among their students before any intervention, to determine what tools they were familiar with and whether these tools or tools that were somewhat similar, would engage with their learners. The learners’ prior knowledge of the tools would help to make the learning more meaningful.

In conclusion, technology tools which enabled collaboration, immediate feedback and was suitable for the context and need of learning could be considered (DeWitt & Ghavifekr, 2019). The trends on the use of different technology tools would change due to advances in technology and popularity. In addition, during the times of the COVID-19 pandemic, the uptake and popularity of tools which were used have changed much due to the convenience and affordance of the tools. Hence, studies on the trends of use of technology apps could be
continued and could also include other aspects such as how these tools were used and the frequency of use of these tools. In addition, studies on projections of technology tools which may be useful for instruction could be conducted to determine the future trends of using technology for instruction in higher education.

REFERENCES

1. Introduction

The rapidly changing teaching landscape in Malaysia has contributed on the technological rise of the 21st century and widespread integration of technologies. Today, it has become a great impact not only on the economy but also on the education system in the country. A paradigm shift is needed towards appropriate implementation of technology tools to enhance teaching quality and augment the learning process (Krasnova & Vanushin, 2015). Technology is impacting education to such an extent that educators and industry-professionals are claiming a revolution is underway (Abaidoo & Arkorful, 2016). Thus, the new paradigm shift will not only be able to expose educators to knowledge but also teach them to think in many ways, enhancing their creativity, developing their problem-solving skills and thus, help them to perform well in any situations.

The Internet has opened new possibilities and now any type of online learning content, it may be for school, graduate or master’s level, employee training, research activity or any other type of
academic offering is called e-Learning (Pande, Wadhai & Thakare, 2016). With the advancement of technology, courses or lessons can be learned completely at a students’ own preferred time, place and pace as E-learning is considered among the best methods of education (Pande, Wadhai & Thakare, 2016). E-learning helps in enhancing collaborative learning as it helps transforming ordinary knowledge and activate creative potential among educators and students. Many higher institutions in Malaysia are moving towards the practice of E-learning as it greatly impacts on the education in the 4th industrial revolution by currently being the game changers of education.

There are various types of E-learning technology which has its own classifications and functions. One of the most popular and capable E-learning trends in the higher institutions in Malaysia that can be practiced for an effective teaching and learning environment is blended learning. Blended learning is a combination of face to face learning and online learning (Adams, et al., 2018; 2020; Picciano, 2009). It is a paradigm shift as blended learning is suitable for educators and students in meeting their teaching and learning needs. The integration of blended learning and the use of technology is effective because currently, technology is profoundly transforming education, training and learning, while engaging and motivating students all over the world (Krasnova & Vanushin, 2015).

According to Wood (2004), there are two kinds of learning. The first is “shallow learning”, which characterized with memorization and secondly, “deep learning”. “Deep learning” is associated with “obtaining new knowledge, understanding it and checking that it fits in with one’s existing knowledge, and incorporating it into one’s present framework of knowledge” (Wood, 2004). Shallow learning involves recalling of information where it is a less effective way of learning. Nevertheless, deep learning is a complete learning where the information gained, digested and stored. As to it, blended learning might be the most effective way of deep learning as it enables learners to learn in various ways possible and contributes to meaningful learning by ensuring the learners are engaged and driven through individual learning experience.

Blended learning is known to be effective as it practices the better of two forms of the traditional method with the combination of online interactive collaboration. Blended learning provides individuals with the opportunity to enjoy the best of both worlds (Picciano, 2009). For
example, a student might attend classes in a real-world classroom setting, and then supplement the lesson plan by completing online multimedia coursework. Creating a blended learning environment for students can be very challenging for the academics. However, blended learning is important because it breaks down the traditional walls of teaching, one that does not work for all students and now with access to present day technologies and resources we can tailor the learning experience for each student (Dziuban & Picciano, 2007).

There are various forms of blended learning which can be implemented with three characteristics in general. Firstly, blended learning is flexible in providing learning resources because it is an instructional strategy developed in a networked environment. This strategy is supported by virtual learning environments (VLEs). VLEs is computer-based standardized learning system and are used to sustain content delivery of online learning as well as to promote online communication between an instructor and learners (Huang, Zhou & Wang, 2006). Previous studies have shown that there are three most common uses in blended learning which uses the mediums of VLEs to provide course information, supplement on-campus studies and access internet resources.

Secondly, blended learning supports learners’ diversity as there are diverse of learners with unique learning styles, learning proficiency and also learning ability where blended learning enables for individualized learning and self-regulated learning (Huang, Zhou & Wang, 2006). These approaches can be combined and used to accommodate the needs of students and also to create a successful equal learning experience through creating possible opportunities. Lastly, on-campus blended learning enrichment experiences enables educators to improve on existing teaching practices. This is because apart from educators’ teaching styles, the learning process is individualized as decisions are made solely on the achievements of target and goals as learning at one’s own pace, self and time has become a reality by a learner.

University A is one of the higher education institutions in Malaysia to emphasize on blended learning and its current focus is on the importance of education in the 4th Industrial Revolution. Blended learning will be a good platform in coping with the growing demands of education in the current wave of the industrial revolution. In addition, blended learning also promotes a shift towards lifelong and
interactive learning in University A. The emergent and widespread integration of blended learning in University A contributes to using new technology trends in the educational context and thus promotes effective and meaningful learning in University A.

Although it is strongly emphasized and encouraged, many University A educators are encountering issues in implementing blended learning. Probably it is because, blended learning gives unique challenges that can become barriers in the teaching and learning environment. The objectives of this study is to identify the perceptions among University A educators in implementing blended learning and thus, draw out the challenges in implementing blended learning.

2. Purpose of the Study

The purpose of this study was to investigate university educators’ perceptions and challenges in using blended learning in their courses. The findings resulted for a drastic change and professional learning enhancement among university educators in the blended learning setting. Professional development and continuous learning of university educators for the improvement of student centered learning and understanding also has implications for the skills and mastery of essential elements where it greatly impacts on the implementation of blended learning in courses.

This study employed a mixed-method approach, using both qualitative and quantitative methods. Qualitative research is gaining understanding on non-numerical data collected. Quantitative research is gaining understanding on numerical data collected. Based on the objective of the study, the research was conducted in University A. The criteria of selection were based on setting and convenience where it is also an urban university. Research was conducted among University A educators from various faculties. Educators was chosen based on convenience sampling. A total of 30 University A educators participated in the study. All the educators were a mix of religion and culture. A questionnaire and interviews were carried out in this study and in the end, as for data analysis, all 30 sets of questionnaire and interviews were used in analysing the data needed. There were two sections in this study. The first section utilized a questionnaire to identify the perceptions of educators in implementing blended learning where 10 questions based on Likert scale was
developed. The second section is conducted through interviews on all 30 participants to identify the challenges faced by University A educators in implementing blended learning where 5 open ended questions were used for this study. Descriptive and content analysis was employed in this study to analyse the data respectively. The main questions that were generated for this study were:

1. The perception of University A educators in implementing blended learning.
2. The challenges faced by University A educators in implementing blended learning.

3. Literature Review

Blended learning in usually practiced in higher education as it is defined as a combination of face-to-face (F2F) and online learning, a model that is increasingly being used in higher education institutions in response to some of the social, economic and pedagogical challenges that they are currently facing (Dziuban & Picciano, 2007). As argued by Bach, Haynes and Smith (2006) on online learning, blended learning is also a part that contributes on the result of the modern transformation of higher education alongside other aspects such as globalization and the expansion of higher education in many countries.

As the demand increases, it can be implied that “there is a reduction of input costs and resources in relation to the number of output graduates” (Bach, Haynes & Smith, 2006, p.10). Blended learning concepts have been addressed by many authors in various ways and meanings. Tayebnik and Puteh (2012) define blended learning concepts as more general and conservative and more specific and technology related. According to Driscoll (2002), blended learning is an integration of instructional methods or pedagogical approaches. However, several other authors define blended learning as a combination of online learning or web-based training with face-to-face communication and more traditional methods of learning and teaching.

Based on past researches and information gathered on blended learning perceptions and challenges, a gap was identified. This gap identifies the needs to find out the perceptions and challenges faced
by educators in using blended learning in their courses. Therefore, through this study, the perceptions and challenges were identified in implementing blended learning.

4. Findings and Discussion

Table 4.1: Perception of University A Educators in Implementing Blended Learning

<table>
<thead>
<tr>
<th>Factors</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have not received BL pedagogical support for my course</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>25</td>
</tr>
<tr>
<td>I don’t have enough BL influence on the course content and activities</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>8</td>
<td>22</td>
</tr>
<tr>
<td>I know how to blend my classroom and online teaching</td>
<td>25</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>I felt technically prepared to teach my course</td>
<td>25</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>Using BL did not make this course more demanding to teach</td>
<td>-</td>
<td>5</td>
<td>20</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>I would like to teach other courses using BL</td>
<td>3</td>
<td>10</td>
<td>4</td>
<td>10</td>
<td>3</td>
</tr>
</tbody>
</table>
Table 4.1 shows perceptions among 30 University A educators were tested with a mixture of positive and negative factors. From the statistics obtained, positive and negative responses were identified and in particular, the online and classroom activities integrated well.

Almost all participants strongly agreed that they do not receive blended learning pedagogical support for their particular course (6% strongly disagreed, 11% neutral, 83% strongly agreed). Majority of participants also agreed that they don’t have enough blended learning influence on the course content and activities (27% agreed, 73% strongly agreed). In keeping with this, 83% strongly agreed that they knew how to blend their classroom and online teaching as they were technically prepared to teach their course. 66% participants responded neutral in using blended learning to make course more demanding to teach.

Due to this, there were various responses from all 30 participants (10% strongly agreed, 33% agreed, 14% neutral, 33% disagreed, 10% strongly disagreed) on expressing their opinion in using blended learning to teach other courses. Almost ¾ quarter of the responses (73%) strongly agreed that the online activities used works well and in contrast, only (27%) strongly disagreed. The same results were obtained is effective usage of classroom activities. Nevertheless, in confirming the good balance between classroom and online activities, 66% neutral, 17% strongly agreed, 17% strongly disagreed. Lastly, as for the most important concept of blended learning used in their course
content and activities, 73% strongly disagreed and 27% strongly agreed that the online and classroom activities integrated well.

Based on the survey conducted, it can be summarized that majority of the participants does not have enough knowledge in using blended learning in their course and therefore, they do not know how to blend their classroom teaching and online teaching. Participants are aware on the effectiveness in using classroom activities and online activities for their course yet, they do not how to balance nor integrate those activities and achieving desired results using blended learning. Based on the results of the survey, it is important for educators to understand the concept of blended learning and also the implementation of blended learning in their course for an effective teaching and learning platform. Educators must understand the effectiveness in using blended learning for their course in achieving better results. Educators also must be able to accept the changes and ready to face challenges in using blended learning in the course.

The Challenges Faced by University as Educators in Implementing Blended Learning

Based on the Table 4.1, it is evident that the biggest challenge of using blended learning in the course as one does not receive enough blended learning pedagogical support for the course. Respondent R5 exclaimed: “I agree I have heard the term blended learning, but I do not know exactly, how blended learning works or can be used in my course”. This is in support of not receiving enough blended learning pedagogical support for the course. Whereas respondent R6 expressed: “I feel the biggest challenge using blended learning in my course as I do not have enough hands-on experience and support. I tried to carry on blended learning in my course but eventually it became unsuccessful nor effective”.

The second challenge responded by almost 73% of the respondents strongly agreed that they do not have enough blended learning influence on the course content and activities. Most of the educators claimed that they do not know how blended learning platform looks like and how to carry out blended learning in their course. Even some of the respondents have stated that although being tech-savvy yet, we do not know how to carry out blended learning for our courses effectively.
To quote on the above matter respondent R10 wrote “We are not given enough training or information on how to use blended learning in our courses. Moreover, there are also no guidance in using blended learning in our courses. This eventually makes me difficult in choosing the right way in using blended learning on my course content and activities.

This shows that educators do not know how to carry out effective blended learning in their course. As a result, they face challenges in trying to choose an effective way to use blended learning in their course which in end, creates frustrations and disappointments which lead educators in losing their interest in using blended learning in their course. The last and the crucial challenge responded by 73% of the sample would be strongly agreeing that online and classroom activities works well but strongly disagreeing on integrating the both well in the blended learning course content and activities.

To support this respondent R19 in detailed, “I have used various classroom activities and online activities in teaching my content. The both are quite effective for my students, but I always do these separately as I don’t know how to integrate the both and create a good balance in using blended learning in my course content”.

This depicts that the educators are being unaware on how to integrate classroom and online activities which create a good balance of online and classroom activities. Thus, it fails the idea of using blended learning in the course content and activities if educators are unable to integrate and balance the usage of classroom and online activities in their course. This will further deplete their sense of interest in using blended learning in their course and thus becomes major challenges among educators.

5. Implications and Conclusions

The limitation for this study was on the sample size where only 30 educators were chosen to participate in this study. Furthermore, the results identified may not automatically reflect on perceptions and challenges faced by educators from other universities. Hence, the study limits generalizability to the other university educators. The research could be expanded in investigating the perceptions and challenges of other university educators’ face in implementing blended learning. Thus, through the results, it can be concluded that implementing
blended learning creates positivity or negativity. This study also opens possibilities for further research on students’ perceptions and challenges in understanding blended learning and accepting the implementation on blended learning in their courses.

Overall, the outcomes of this study have provided some information that has some pertinent pedagogical implications. University educators are encouraged to implement blended learning. Therefore, in order to implement successful blended learning, university educators must have the vast knowledge and experience in blended learning as it allows educators to think in many ways, enhancing their creativity, developing their problem-solving skills and thus, help them to perform well in any situations.

The success of implementing blended learning in universities are strongly dependent upon university educators. The implementation of blended learning will not only create new possibilities for university educators to engage new ways of teaching, but also provide students with opportunities in experiencing a supportive learning platform where the teaching and learning process will be effective. This is because, the exposure to the latest and current trend in using technologies in teaching and learning will contribute to the effectiveness of blended learning implementation as it has dramatically changed the learning and teaching process, and has created a new path way to access educational resources beyond the traditional classrooms.

Therefore, further research must be conducted to further investigate students’ perceptions and challenges in accepting the implementation of blended learning in their courses and also on other university educators across public and private universities in Malaysia when implementing blended learning in their courses. Then, implementing blended learning will be considered as an effective approach as it promotes personalization in the teaching and learning process.

REFERENCES

Functioning Analysis of Students’ Backgrounds. Malaysian Journal of Learning and Instruction, 17(1), 133-158.


Gray’s School of Art from URL: http://www.challengingcraft.org/ [11/10/2006].
IMPLEMENTING E-BOOK IN A MATHEMATICS COURSE: INVESTIGATING POSTGRADUATE STUDENTS PATTERNS OF USAGE

Malathi Letchumanan, Balakrishnan Muniandy and Mariam Mohamad

<table>
<thead>
<tr>
<th>Abstract Algebra Mobile e-book</th>
</tr>
</thead>
<tbody>
<tr>
<td>The study used mobile e-book entitled Abstract Algebra. This mobile e-book is freely available at the university library web site. It is divided into 27 chapters including several main topics, for example, set theory, group theory, ring theory, vector space, field extensions, finite field, Grobner basis, rings of matrices, and Noetherian and Artinian rings. The book contains 657 pages. The authors of this mobile e-book provided a rigorous treatment of the fundamentals of abstract algebra with numerous examples to illustrate the concepts. The book also contains Worked-Out Exercises which appear after every section.</td>
</tr>
<tr>
<td>The abstract algebra mobile e-book is available in PDF format. It has a very simple design with white background and black text. The interface is also very static with text, formulas, diagrams, graphs and tables. It has a table of contents on the front part of the book.</td>
</tr>
</tbody>
</table>
and index at the back. It has feature such as highlight, annotate, bookmark, underline, search, share contents, print, zoom in, zoom out and change the reading mode from continuous to single mode.

### Instructional Strategies for using Abstract Algebra

#### Mobile e-book

The participants were given short briefing on how to use the mobile e-book. The participants were informed to use the mobile e-book for their research activities inside and outside of the classroom. They were encouraged to use the features in the mobile e-book. The participants used the mobile e-book as the reference during the research group discussion. They read each section of the mobile e-book as presented by the head of research group. The also referred the mobile e-book to solve the exercises given during the research group discussion. Generally, the participants used the mobile e-book to get relevant information for their research activities and have discussion with their supervisors and peers to get clarification on their research problems.

Mobizen application was installed in the mobile e-book devices of the participants to monitor and record their mobile e-book activities throughout the study. The recordings captured all the actions of the participants on the mobile e-book which enabled us to understand the mobile e-book use pattern of the participants.

### 1. Introduction

Electronic book (e-book) is the digitization of printed book. E-book has redefined the learning experience of students. The availability of handheld mobile devices to read these e-books further alleviated their learning experience. These handheld mobile devices enable the students to access and read the e-book easily at any time and in anywhere. This research refers the e-book which can be accessed and read via handheld mobile devices as mobile e-book. Researchers suggested that mobile e-book model provides learning opportunities that are informal, portable, pervasive, contextual and personal to the students (Kukulska- Hulme et al., 2011). Thus, it produces millennium learners who are productive, self-driven and ubiquitous.
Past studies related to mobile e-book have investigated issues such as usage level (Jesse, 2014; Martyn, Larkin, Sander, Yuginovich & Jameison-Proctor, 2014), factors that promote and hinder its use (Alexiou-Ray & Wright, 2012; Lai & Ulhas, 2012; Parson, 2014; Polonen, Jarvanpaa & Hakkinen, 2012; Schomisch, Zens & Mayr, 2013; Weisberg, 2011), effectiveness of using mobile e-book to learning activities (Glackin, Rodenhiser & Herzog, 2014; Jesse, 2014; Olsen, Kleivset & Langseth, 2013; Rockinson-Szapkiw, Courduff, Carter & Bennett, 2013), but very limited study have explored the actual user behaviour on mobile e-book. Understanding this user behaviour can provide interesting outcome on how really users interact with mobile e-book that has comparatively smaller interface, consequently, can facilitate a user-centered approach to improving mobile e-book as well as their adoption in academic libraries.

2. Purpose

The present study was designed to explore the usage patterns of mobile e-book and the activities performed on the mobile e-book by mathematics postgraduate students. Mathematics postgraduate students were selected as the participants of the study because past literature suggested that they are the rare users of mobile e-book (Letchumanan & Tarmizi, 2011). Thus, understanding their user behaviour on mobile e-book can provide resourceful information to improve mobile e-book design to captivate more users’ attention.

3. Relevant Literature

Awareness, Usage and Acceptance Level of Mobile E-Book

Past studies show that awareness rate on e-book availability among higher learning institutions’ students had increased (Croft & Davis, 2010; Woody, Daniel & Baker, 2010). For instance, Levine-Clark (2006) and Shelburne (2009) reported that 59% and 55% of their survey respondents in USA were aware of e-book availability in their university’s libraries respectively. This figure differs from the survey conducted by Zhang and Beckman (2011), also in the USA, where they noted that over 74% of undergraduates, graduates and academicians
were aware of the e-book availabilities. The increase in the awareness rate is mostly due to the promotional activities conducted by the universities and related publishers (Buczynski, 2010).

The increasing numbers of students are also aware that e-books can not only be accessed by computers, laptops and dedicated e-readers but also via the multipurpose handheld mobile devices such as tablets and smart phones (Hwang, Kim, Lee & Kim, 2014). It is noted that these devices are becoming popular mediums to access e-books (Hwang et al., 2014). Although the mobile e-book awareness level had increased, the usage rate and its acceptance level remain low (Small, 2000). It can be noted that most of the students still prefer to use printed book (p-book) although a lot of sophisticated and improved e-book reading devices had been introduced on the market (McCharthy, 2011). In accordance to that, Small (2000) stated that the acceptance level of mobile e-books is also low.

Martyn et al. (2014) noted that connectivity problems, compatibility issues, technology literacy level and small screen size of the mobile devices impact the acceptance level of mobile e-books. However, Glackin et al. (2014) reported that more nursing students show interest in using mobile e-books which are believed to provide positive learning outcomes. Dresselhaus and Shrode (2012) added that more than the average number (50% to 60%) of undergraduates and graduates in Utah State University are using handheld mobile devices and dedicated e-readers to read e-books. However, Jesse (2014) reported that an average of 26.8% college students from Thiel College and Robert Morris University have purchased e-textbooks to be used via tablets rather than via computer/laptop.

In conclusion, many studies show that usage and acceptance level of mobile e-book is generally still at the rate of 40 to 60% (Dresselhaus & Shrode, 2012; Small, 2000). In terms of e-book usage among mathematics students, it is noted that the mathematics students still prefer to use p-book compared to e-book (Jalal, Mohd Ayub & Tarmizi, 2014; Letchumanan & Tarmizi, 2011; Lim, Hong & Aziz, 2014). On top of that, past research had captured only their interaction with e-book which can be access via computers and laptops but very limited study has discussed about the mathematics students behaviour on mobile e-books (Letchumanan & Tarmizi, 2011; Lim et al., 2014).
Pattern and Activities of Mobile E-Book Use

It can be concluded that the low preference level towards academic mobile e-books can be partially explained by the mobile e-book using behaviour and pattern. Mobile e-books are mostly used for leisure and for personal interest (Hwang et al., 2014). Although some of the previous studies indicate that mobile e-books are used in academic work, the students mostly use it just for selective reading and reference (Hwang et al., 2014). When it comes to academic reading, students mostly read a short section of the e-book via screen but prefer to print the entire book for extensive reading (Hwang et al., 2014). In accordance to this, participants from Chinese University of Hong Kong reported that their concentration level towards the study materials decreased and they spent more time to process the mobile e-book contents (Lam, Lam, Lam & McNaught, 2009). However, Cote and Milliner (2014) reported that the reading speed is not compromised when the language undergraduates use smart phones as compared to computer and paper. In addition to that, the authors reported that the reading speed of e-book via smart phone is better than on computer. Cull (2011) argues that students usually read more quickly and less deeply via screen.

Olsen et al. (2013) surmised that iPad and dedicated e-readers are more suitable for reading journal articles than books. Their survey respondents were facing difficulties in reading mobile e-book. In addition to that, students also noted problems associated with searching for specific information when using the handheld mobile devices to read the e-books. This consequently affects the students’ information retrieval and processing state (Hartel & Cheek, 2011). Moreover, it is also surmised that active reading that involves interaction with e-book such as highlighting, bookmarking, annotating and non-linear reading were difficult when using e-reader and iPad (Olsen et al., 2013). Hwang et al. (2014) also noted that 50% of the graduates and undergraduates only spent about 30 minutes to read e-book via computer, e-reader and handheld mobile devices. Furthermore, Measureur (2013) reported that students were unable to engage with the longer reading activities via handheld mobile devices as compared to p-book because they were easily distracted by e-mails, phone calls and text messages.

In summary, users prefer to use mobile e-book for pleasure reading compared with academic reading. Moreover, when it comes to academic work, readers prefer to scan or read selected portion
of mobile e-book. These past studies mostly discussed the negative elements of mobile e-book reading pattern and concluded that many respondents resist reading the mobile e-book. Hence, it will be interesting to understand how the reading pattern of mobile e-book has evolved lately since many latest and improved models of handheld mobile devices were introduced on the market.

Mobile e-book comes with many additional features. Some features could be meaningful for some students and while some may not. Schomisch et al. (2012) noted that the participants of the study reported that full-text search and text marking are the most important features for them when using e-book via e-reader and iPad. Besides that, the participants also rated font extension, zooming and annotating as the subsequent important element for them when using e-book via e-reader and iPad.

3. Methodology

Research Design

This study employed qualitative case study design. Qualitative case study was used because the aim of this study was to explore the mobile e-book reading pattern and the activities performed on the mobile e-book by mathematics postgraduate students. This study used non-probability sampling method called purposive sampling. In this sampling method, the researcher develops a set of criteria to select the information rich cases or participants. In this study, the researcher ensured the participants are mathematics postgraduate students and they had experience in using the mobile e-book.

Participants and the Mobile E-Book Used

Eight postgraduate mathematics students from a mathematics department of a local public university were selected as the participants. The researcher contacted several academicians in that department to enquire about the mobile e-book use of the students. It was understood that postgraduate students from algebra research group were using the mobile e-book for their research and other learning activities.
Then, the researcher approached the potential participants personally during the research group discussion and explained about the purpose of this study.

The participants agreed to participate in this study and were willing to give full cooperation. The research group discussion was held for one semester. During the group discussion, the head of the research group lectured on and discussed topics related to their research. The head of this group further gave questions to the postgraduate students to solve. The postgraduate students had to refer to their mobile e-books, for example, by using abstract algebra to solve the questions and to have discussion later. The abstract algebra mobile e-book is available in PDF format. The mobile e-book came with white background and black text.

The interface is very static with text, formulas, diagrams, graphs and tables. It has a table of contents and index. This mobile e-book provides a platform for the users to highlight, annotate, bookmark, underline, search, share contents, print, zoom in and zoom out and change the reading mode of the book from continuous to single mode. The participants also referred to other related algebra mobile e-books to enhance their learning activities which freely available at UPM library website and Google web site. Table 5.1 summarizes the participants’ biographical information and the background of their mobile e-book use. The names of the participants listed in Table 5.1 are the pseudo names of the participants.

**Data Collection and Analysis Procedure**

The data of this study was collected via in-depth interviews and recordings of the mobile e-book use activities of the participants. The participants were given a brief description about the interview before starting the interview. The participants were also encouraged to ask for the clarification to the questions that they were unable to understand. The participants also informed that the interview will be recorded.
Table 5.1: Biographic Information and Background of Mobile E-Book Use

<table>
<thead>
<tr>
<th>Firstname</th>
<th>Surname</th>
<th>Age</th>
<th>Male/Female</th>
<th>Country of origin</th>
<th>Field of study</th>
<th>Year of experience with mobile e-book</th>
<th>Frequency of using mobile e-book in a week</th>
<th>Duration of reading mobile e-book</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firdaus</td>
<td>Salim</td>
<td>27</td>
<td>Male</td>
<td>Yemen</td>
<td>Algebra</td>
<td>1 year</td>
<td>5-6 times</td>
<td>1-2 hours per use</td>
<td>N/A</td>
</tr>
<tr>
<td>R.</td>
<td>Abdullah</td>
<td>23</td>
<td>Male</td>
<td>Malaysia</td>
<td>Algebra</td>
<td>1 year</td>
<td>3-4 times</td>
<td>20 minutes per use</td>
<td>N/A</td>
</tr>
<tr>
<td>Siti</td>
<td>Noraini</td>
<td>25</td>
<td>Female</td>
<td>Nigeria</td>
<td>Algebra</td>
<td>1 year</td>
<td>5-6 times</td>
<td>1 hour per week</td>
<td>N/A</td>
</tr>
<tr>
<td>Aiman</td>
<td>Chong</td>
<td>24</td>
<td>Male</td>
<td>Malaysia</td>
<td>Algebra</td>
<td>1 year</td>
<td>3-4 times</td>
<td>20 minutes per use</td>
<td>N/A</td>
</tr>
</tbody>
</table>

This study used semi-structured interview protocol. The interview guide of this study consisted of two main sections: demographic information of the participants and open-ended questions. The demographic questions included the participants’ background information relating to their family (age, education level, born and bred area, occupation of the family members, number of siblings, marital status and income status). The second part of the interview guide comprised open ended and semi-structured questions. These questions were designed to capture the details on how the mathematics postgraduate students used the mobile e-book. Each interview sessions lasted for about 60-80 minutes.

The researcher also used Mobizen application to record the mobile e-book activities of the participants. Mobizen application is a free application which can be installed into the participants’ handheld mobile devices to monitor their mobile e-book use activities. They need to stop the application when they stop reading. The recording will capture the reading duration and the activities of the participants on the mobile e-book. The participants were asked to record their mobile e-book activities and send the files to the researcher after they have read the mobile e-book. Each participant was asked to send at least 8 files to the researcher. The participants sent 8 files because it was observed that the saturation level for these files was achieved at file number 6 for each participant. The participants’ reading pattern and e-book activities were found to follow a similar pattern after file number 6. This researcher used these files to observe their activities of using the mobile e-book.

The data of this study was analysed by using constant comparative method suggested by Merriam (2009). Analysis of the data began...
with transcribing the interviews. The data was analysed in NVivo 11 software. The first interview transcript was read carefully to identify the statements that answered the research question. Then, the codes that relevant to the statements were created. After the coding process, the codes that have same meaning were grouped into a category. Then, the same process was repeated to the following interview transcript. After forming the categories for the second set of data, the researcher compared the first set of categories with the second set of categories to establish a primitive sketch which showed the recurring patterns or themes in the study. The same process was repeated for the other transcripts and screen capture of mobile e-book use activities.

**Trustworthiness of Data**

In qualitative research, the researcher should be primarily concerned about aspects of trustworthiness, for example, internal validity, external validity and reliability. In this study the researcher ensured the internal validity of the data by using triangulation, member check and expert examination method. In this study, the researcher used multiple methods where in-depth interviews and recordings of the mobile e-book use activities methods were triangulated. The data collected via interview were checked for consistency with the data collected via recordings. Furthermore, the researcher took back the interview transcription and tentative interpretation to the participants to check whether their responses had been interpreted accurately for member check process. Then, the real interpretation was taken back to the participants for confirmation to further enhance its internal validity.

Moreover, two academicians who were experts in qualitative research were approached to check for the consistency of the report. Later, the report was modified according to their comments and feedback. The external validity of the data was ensured by providing a rich and thick description of the report so that anyone who is interested in external validity has the appropriate information for judgment. According to Merriam (2009), reliability refers to the extent to which the research findings can be replicated in the sense that if we repeat the same study, it can yield the same result. In qualitative study the reliability issue is viewed differently, rather than purely on replication. This situation is because in social studies, the interpretation and feedback from the participants can be multifaceted and not static. In this study the reliability was evaluated in terms of the researcher’s
position, triangulation, and an audit trail describing the research process in detail.

4. Findings

Patterns of the Mobile e-book Used and Activities Performed

The interview transcripts and recordings about the use of the mobile e-book primarily explored the activities performed by the participants and their reading patterns of the mobile e-book particularly for research activities. The analysis of the interview transcripts and recordings revealed three categories of reading patterns among the participants. The findings are summarized in Table 5.2.

<table>
<thead>
<tr>
<th>Table 5.2: Categories of Reading Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select the topic of interest from the table of contents or bookmark</td>
</tr>
<tr>
<td>Read the entire content</td>
</tr>
<tr>
<td>Then, read the specific information</td>
</tr>
</tbody>
</table>

A reading pattern refers to the method that the participants used to read the mobile e-book. The participants of this study began their reading by selecting the topic of interest from either the table of contents or bookmark. For example, Salmah explained her reading pattern as follows:

“At the beginning I will browse through the table of content to search for the topic that I would like to read…and then I will go to that topic to start my reading”.

Similarly, Ruhaida described her reading pattern this way:

“I will go to the table of content and turn to the page that I want to read.”

Recordings on the use of the mobile e-book by Salmah and Ruhaida also showed that both of them normally visit the table of contents to select the chapter that they want to read.
Implementing E-Book in a Mathematics Course

For Fatimah, Abdullah and Pradeep, they used the table of contents and bookmark facilities to begin their reading. They elaborated on their reading pattern in these ways:

“I will use both table of content and bookmark to select for the topic that I would like to read. If I have read the topic before, I will bookmark the topic and open the bookmarked topic to read later.” (Fatimah)

“I will open the particular mobile e-book, look at the table of content and check for the relevant information that I should read. If I had stopped anywhere, I will look at the bookmark, I will look at it.” (Abdullah)

“I sometimes use table of content and sometimes use bookmark to access to the contents that I want to read” (Pradeep)

The recordings of Fatima, Abdullah and Pradeep also showed that they would normally bookmark the pages and select the bookmarked pages for future reading. The participants would also initially select the contents that they wanted to read from the table of contents.

In general, the recordings showed the same pattern of reading where the participants started their reading by searching the chapter that they would like to read from the table of contents and go to the topic of interest to read more.

After the participants had selected their topic of interest, they normally scrolled up and down to read the entire content in the chapter. It is clear from the recordings that all the participants read mostly the entire chapter. Sometimes, they also skipped some of the contents in the chapter. Then, they selected the specific information on which they needed to concentrate. The interview data also show the same patterns. Salmah elaborated on how she read a chapter:

“I will read the entire chapter first...Then I will select the specific information such as the algorithms, equations and further explanation that I need to focus more.”

Salmah’s statement was similar to those of the other participants who read the mobile e-book. For instance, Salleh said:

“I will go through the entire chapter first. Then, I will focus on the specific information that is more important for me or for my research.”
Salmah’s and Salleh’s recordings also show same pattern of reading where both of them would normally read the entire chapter. Then, they focus on specific information to read.

The results also show that the participants mostly read the mobile e-book in a linear pattern except when they attempted the exercises by scrolling up and down and used the search function to look for the answers.

**Activities Performed on the Mobile e-book**

The analysis of the interview transcripts and recordings showed that the participants performed five categories of activities with the mobile e-book. These categories were bookmark, highlight/underline, annotate, search; and zoom in and zoom out. However, the recording showed that they did not perform these activities regularly. The mobile e-book activities refer to the tasks that the participants performed on the mobile e-book. The findings are summarized in Figure 5.1 regarding how the mobile e-book assisted their learning activities.

**Figure 5.1 Categories of Mobile E-Book Activities**

The participants bookmarked the page that they had read and other pages that contained relevant or important information for their
Implementing E-Book in a Mathematics Course... | 79

research. They claimed that by bookmarking, they could retrieve the information that they wanted in a fraction of the time without scrolling up and down to find the relevant pages. This feature helped them to have more time for their research. The recordings also showed that the participants were able to access the pages that they intended to read faster. This excerpt from Fatimah illustrates how she used the bookmarking feature in the mobile e-book:

“It is easy to go back to the content if I bookmark the page...It saves my time.”

Abdullah also explained how he used the bookmarking feature when reading the mobile e-book:

“If I had stopped anywhere, I will bookmark the page. And then I will look at the bookmarked pages without necessarily turning to other pages. It saves my time.”

The recordings of Fatimah and Abdullah show that both of them use the bookmark feature to gain access to the pages that they want to read faster. Figure 5.2 shows the bookmark feature used by the participants on the mobile e-book.

![Figure 5.2 Bookmark Feature Used by the Participants](image)

The participants claimed that they used the highlighting or underlining feature to mark the important points and the questions that they planned to ask their supervisor later during the research group discussion. By highlighting or underlining, they claimed that they could remember the points better and retrieve or read back the important points quickly. For instance, Salleh, Ruhaida and Amin elaborated on how they used highlighting or underlining for their research activities:
“I will not highlight or underline the content regularly…ahh…ahh…I do that when needed. I normally highlight the questions that I want to ask my supervisor…by highlighting I remember what questions to ask.” (Salleh)

“I highlight only the important points but not so regularly.” (Ruhaida)

“By highlighting some part in mobile e-book, during the discussion with my supervisor or friends I can straight way find the information from mobile e-book and show to my supervisor” (Amin)

From the recordings, it can be seen that Salleh, Ruhaida and Amin did not highlight or underline the sentences regularly. They highlighted or underlined the points that they think are very important for them in their research activities.

The participants also highlighted or underlined a major portion in the mobile e-book. They referred to this major portion later and made it as their self-assisting summary. This feature allowed them to concentrate on only the portion that was more relevant to their research. For instance, Abdullah explained how they used the highlighting feature on the mobile e-book:

“I highlight to create the self-assisted summary so that I can read back only that portion that is related to my research.” (Abdullah)

The recordings of Abdullah showed that he highlighted a big portion of any paragraphs that he thought are very important for him. Abdullah explained this in the interview saying that he highlighted a big portion to use that as his self-assisting summary.

The recording about the mobile e-book use showed that Fatimah frequently highlighted and underlined the information on the mobile e-book. In 40 minutes, she highlighted 48 times and underlined 35 times. Most of her recording showed that she highlighted and underlined the text more than 20 and 15 times respectively. Fatimah shared her views on highlighting and underlining during the interview as follows:

“I frequently highlight and underline the important points so that I can read those points while I’m travelling in the bus. It is hard for me to read the entire content while I travel or while I’m walking.”
Implementing E-Book in a Mathematics Course

However, from the recordings it can be seen that other participants did not highlight or underline the text as frequently as Fatimah. All the other participants highlighted or underlined the text less than 10 times in 40 minutes. Figure 5.3 shows the highlight feature used by the participants on the mobile e-book.

Figure 5.3 Highlight Feature Used by the Participants

The participants clearly expressed their frustration with the annotation feature of the mobile e-book. All of them mentioned that they could not write the mathematics symbols and notations on the mobile e-book. The recording showed that all of them except for Ruhaida used the annotation feature at least twice throughout their readings. The interview transcripts showed that all of them wrote their notes on paper. They claimed that they wrote notes to remember the important points and when they had questions to ask the supervisor. Salmah and Salleh explained how they used paper to write notes:

“It is hard for me to write symbol on the mobile e-book. So, I write notes on a paper.” (Salmah)

“It takes time for me to write notes on the mobile e-book. Moreover, if I read the mobile e-book my hand moves automatically (laughing) and I started to write notes on papers...It helps me to remember the points better...ahh...ahh...it delays my learning if I write notes on the mobile e-book.” (Salleh)
The recordings of Salmah and Salleh also showed that both them seldom write notes on the mobile e-book. They used the annotation feature to write very short notes.

Ruhaida did not use the annotation feature at all because she could not write the mathematics symbols. She expressed her frustration as follows:

“I don’t know (laughing)... I prefer to write notes on paper. This e-book is not allowing me to write the symbols that I want.”

The recordings of Ruhaida also assured that she did not use the annotation feature throughout her readings. Figure 5.4 shows the annotation feature used by the participants on the mobile e-book.

The participants also used the search feature to search for the content easily in the mobile e-book. They claimed that it saved their time. Fatimah shared her view on the search feature as below:

“It is easy for you to find. If you search for any word, any page that contains that word will appear. So, you can see which page is relevant to you easily and faster.”

The recordings of mobile e-book use of Fatimah showed that Fatimah used the search feature to search for the information that she
would like to read quickly. Figure 5.5 shows the search feature used by the participants on the mobile e-book.

Furthermore, the participants used the zoom in and zoom out feature in the mobile e-book. They used this feature to enlarge the text so that they could easily understand the content. This feature also reduced the readability problem. Fatimah and Chong explained the use of the zoom in and zoom out features as follows:

“When it is small it is difficult for me to read, so I have headache. If I zoom out its better for me to read…and its faster.” (Fatimah)

“I use zoom in and zoom out feature to read long equations...without this feature it is hard for me to read the equations.” (Chong)

The mobile e-book use recordings of Fatimah and Chong showed that they used the zoom in and zoom out feature to enlarge the text. They used this feature when they wanted to read equations or formulas in the mobile e-book.

However, some of the participants stated that the zoom in and zoom out feature made their learning process difficult because they were unable to follow the flow of the text. For instance, Salmah said:

“My smart phone is very small...if I use the zoom in and zoom out feature it delays my reading. I’m also unable to follow the flow of the text.”
From the recordings it can be seen that those who used the tablet seldom used the zoom in and zoom out function. They mostly used this function when they read the formulae and equations. However, the participants who used the smart phone used the zoom in and zoom out function to read the entire text clearly. Figure 5.6 shows the zoom in zoom out feature used by the participants on the mobile e-book.

\[
\text{Figure 5.6 Zoom In Zoom Out Feature Used by the Participants}
\]

5. Discussion

The results of this study showed that the participants started their reading by selecting the relevant chapter either from the table of contents or bookmark. Then, they read the entire chapter line by line to get the general idea of the chapter. After that, they paid more attention to particular information that was more relevant to their research. However, the studies relating to the e-book for the past two decades show that students normally directly search for the information that they need rather than refer to the table of contents or read the entire chapter line by line (Folb, Wesssel & Czechowski, 2011; Gunter, 2005; Levine-Clark, 2006; Nariani, 2009; Shelburne, 2009). These studies also show that students usually read only a portion of the
information from the e-book or skim through it. However, this study revealed that all the participants mostly read the entire chapter in their mobile e-book. Although they tended to skip some parts of the chapter, they still read through the entire content of the chapter. The pattern of mobile e-book use by the participants of this study shows the change in how the students have been reading for the past two decades.

This finding is in line with the findings of Rockinson-Szapkiw et al. (2013) who claimed that students started to read the mobile e-book word by word, followed by skimming. This study also showed that the participants later would focus on the information that was more relevant or important for their research activities by using the mobile e-book. This way reveals that they can obtain the general idea about a chapter and then divert their attention to the content that is more relevant to their research. This study shows that the participants actually can read the mobile e-book the same way as they read the p-book.

This study also indicates that the participants can read the entire content of the mobile e-book conveniently if they use the appropriate device. They can read better if they use devices with larger screen size. The mobile e-book also enables the participants to select the relevant information that the participants wanted to focus without much problem. Hence, they can acquire the relevant knowledge for their research activities the same way they can acquire the knowledge from p-book. This proves that the participants can get the same benefit as they use the p-book.

The participants of this study used the active learning methods such as bookmark, highlight/underline, annotate, search, zoom in and zoom out when they read the mobile e-book. Parson (2014), Schomisch et al. (2012) and Sloan (2012) reported that their respondents also actively used these features which really assisted understanding and recalling better the mobile e-book’s content. However, the results of this study revealed that the participants seldom used the stated active learning methods. Both the PhD and masters students mostly in the same way used the active learning methods except for the participant, Fatimah, who was very active in using the features, for example, highlighting and underlining. The reading method of Fatimah was slightly different from the other participants as she read even while she walked around in the campus.

In addition, she claimed that she spent much time walking to her destinations. Hence, she read the highlighted or underlined parts in the
mobile e-book while she walked so that she could understand and recall better what she had read earlier. Furthermore, she actively participated in the research group discussion in class. When she was enquired about how she could actively participate in the discussion, she replied that she normally referred to the highlighted or underlined portions of the mobile e-book to ask questions from the head of the research group and obtained clarification to the information that she did not understand. Although the other participants did not use the highlight or underline features so regularly, they still read the highlighted portions for the same reasons as Fatimah while they were travelling and waiting for the transport or their orders at the restaurants.

Similarly, Schomisch et al. (2012) reported that their respondents stated that text-marking in the mobile e-book was one of the important features for their learning activities and remembering what they had studied earlier. This study shows that the participants seldom use the highlight/underline feature when they read the mobile e-book. Although the participants claimed that the highlight/underline feature assisted them in remembering the important points, the participants remained unfamiliar in using this feature on mobile environment. It is suggested to the mobile e-book users to use this feature regularly on their mobile e-book platform to gain more benefit.

In this study, the participants also used the zoom in and zoom out feature to read the mobile e-book. They used this feature in the smart phone to read the e-book regularly compared to those who used the tablets, possibly due to the size of the smart phone which was smaller than the tablet. They also found this feature to be easy to use, particularly useful for reading smaller texts and equations. This feature subsequently strengthened their understanding of the content that they read. The study conducted by Schomisch et al. (2012) revealed that their participants felt that the zoom in and zoom out feature was one of the most user friendly and useful features that enabled them to read the mobile e-book clearly.

However, the participants of this study claimed that the zoom in and zoom out feature sometimes caused them to be unable to follow the flow of the text, as zooming the text necessitated frequent scrolling vertically or horizontally. They then had difficulty viewing the entire text on a single page. Hence, they had problem following the flow of the text. However, the participants claimed that they could later adjust to the situation and understand what they had read. This shows that the zoom in and zoom out feature is a very important feature for
those participants who use smaller screen size devices. This feature enabled the participants to read and understand the contents of the mobile e-book appropriately. The participants who used the smaller screen size device will definitely face difficulties in reading the content without using this feature. Those participants who were experiencing difficulties initially when using this feature later could adjust with the environment and follow the normal studying pattern. Hence, this zoom in and zoom out is considered a very crucial feature for the participants.

According to Mallet (2010), the difficulty in using the annotation feature in the mobile e-book made his respondents unable to keep to the normal studying practice. Similarly, the participants of this study also reported that they faced difficulties in using the annotation feature as they could not write the mathematics symbols using this feature. On the whole, they used this feature although infrequently. However, a participant, Ruhaida did not use this feature because she was frustrated with the status of the feature at that time which did not allow her to write mathematics symbols. The annotation feature was helpful for them to remember the important points that were relevant to their research. However, they still preferred to write notes on the physical paper. They did not write electronic notes, but the practice of writing notes on paper was not affected by the use of the mobile e-book. Instead, they wrote more notes when using the mobile e-book. Similarly, Rockinson-Szapkiw et al. (2013) point out that student who use e-textbooks write more notes compared to those who use paper textbooks. The finding shows that the annotation feature is another important feature for the participants. Annotation feature enabled the participants to remember the important points better. Hence, this feature should allow the participants to write mathematics symbols on it. Therefore, the mobile e-book designers should be aware of the weaknesses in this feature and take appropriate actions to overcome this problem.

It was reported that many university students rated the search function as the most important function in the mobile e-book because it helped them in finding relevant information (Schomisch et al., 2012). The authors claimed that their participants could easily search for the needed information in a fraction of the time by using this feature, consequently saving their time. Similarly, the participants of this study also agreed that the search feature was the most important for them. They could save a lot of time when searching for the relevant
information required for their research. Due to the advantage of this feature, they preferred the use of the mobile e-book compared to the p-book. This shows that the search function is one of the most preferred functions in the mobile e-book environment. It saves the participants time and enabled them to find related information accordingly.

The bookmarking facility permitted the participants of this study to access faster the pages that contained the information that they had read earlier. Two of them used this feature and found it to be very useful and important for their research, although they seldom used it. Nie, Armellini, Witthaus and Barklamb (2011) also found that the bookmarking facility was very helpful for their respondents. However, the other participants of this study did not utilize the bookmark facility because they mostly used the highlight feature to access the information that they had read previously. This shows that the bookmarking facility gives another alternative for the participants to access the information quickly. However, not all the participants show interest in using the bookmarking facility. Hence, appropriate steps need to be taken to ensure that all the participants are aware of the importance of bookmarking facility and start using it during their reading process.

6. Implications and Conclusion

The findings yielded pattern of use for the mobile e-book by the participants, active learning methods and revealed how these methods assisted their research activities. The results showed that the participants adopted three kinds of reading patterns; namely, selecting the topic of interest from the table of content or bookmark, reading the entire content and specific information. The results also revealed that they performed five categories of activities on their mobile e-book. These categories were bookmark, highlight/underline, annotate, search, zoom in and zoom out. These active learning methods assisted the participants to access the relevant information faster, read the mobile e-book clearly and remember or recall the important points relevant to their research.

The findings of this study can help the students, academicians and mobile e-book designers to explore and increase their understanding of how mathematics postgraduate students use the mobile e-book.
Furthermore, they can get ideas about the active learning methods of the participants by using the mobile e-book to assist them in their research.

In this study, the categories emerged from the reading pattern showed that the participants selected the topics of interest from the table of contents or bookmark. Then, they read the entire contents and finally focused on reading specific information. By knowing the evidence about how the mathematics postgraduate students used the mobile e-book, the academicians can understand that students actually read the entire chapter to get the whole concept of the topic. They then divert their attention to the specific topic that can help them to focus on the information that is relevant to their research topic. The academicians can realize that students actually read the mobile e-book the same way as the p-book. They read the mobile e-book entirely just as they read the p-book from cover to cover. Hence, this study reveals that students tend to fully utilize the mobile e-book. The academicians should recommend more mobile e-books for research purpose, particularly among postgraduate students.

Furthermore, this study demonstrated that the participants used five active learning methods. The academicians can better understand how these features can assist in research activities and then find ways to discuss with the e-book designers to improve the design of certain features to be fully exploited. They also can introduce more meaningful features to their students, for example, sharing and e-mail in the classroom.

This study provided feedback regarding the types of information that the students looked especially for research work. Hence, as the main content developer of the mobile e-book, the academicians can enhance their knowledge of the kind of information to be included in the mobile e-book. Besides, they also can find ways to add more content to help future mathematics students to obtain more meaningful information for their research and fulfil the need for content.

It is recommended to conduct further research in this area in order to fully understand how students use mobile e-book. Future research should include participants of various disciplines, age group and experiences. Scholars may also be interested in knowing the usage patterns of mobile e-book by students of various backgrounds.
REFERENCES


Dresselhaus, A. L., & Shrode, F. (2012). Mobile technologies & academics: Do students use mobile technologies in their academic lives and are librarians ready to meet this challenge?. Information Technology and Libraries, 31(2), 82.


Implementing E-Book in a Mathematics Course... | 91

Nariani, R. (2009). E-books in the sciences: if we buy it will they use it?


The efficient and effective use of blended learning principles for acquisition and refinement of clinical skills is the core behind the development of this technology enhanced learning tool. An instructional video demonstrating the use and applications of the skill (examination of the posterior segment of the eye - the fundus oculi) was prepared and posted online. The URL link (https://youtu.be/mphJeSlbhEw) was embedded along with the other course material on the University’s e-learning system. The content presented in the video included exemplary details of not just the examination process but also documentation and interpretation of the results, good conduct and an empathetic patient interaction. A proper briefing to the students that clearly defines the flipped model – the process and expectations, is an essential pre-requisite. Equally important is to elaborate on the assessment and feedback mechanisms. These were therefore included in the module orientation. The in-class activity for the small group of learners focused on skill development, training and problem solving. Assessment that was aligned and centered on learning was an added fillip to the entire learner centered teaching activity.
Instructional strategies for using Eye-Tech: Flipping Fundoscopy

The flipped pedagogical model has recently gained much popularity among medical educators. Abeysekera, Lakmal, and Phillip Dawson (2015) described multiple benefits of flipped teaching as an instructional strategy. As a part of the Eye-Tech -teaching-learning strategy, the instructional video link was made available to the students prior to the scheduled face-to-face class. A QR code of the same was also provided. The in-class practice session that followed was primarily used for skill enhancement and problem solving. The simultaneous use of manikins, simulators and human subjects provided an authentic learning experience. Engaging content, participative in-class activities and the vibrant interaction amongst students and the facilitator made the learning more collaborative and meaningful. A Mini- Clinical Evaluation Exercise with an immediate feedback and quizzes with discussions helped complete the teaching-learning-assessment cycle. A meta-analysis by Liu et al (2017) showed that blended learning has a large consistent positive effect on knowledge acquisition. The author was further able to document the benefits to teaching and procurement of clinical skills using this technology enhanced flipped teaching method.

1. Introduction

Clinical skills are more than often taught/demonstrated during “Bedside” sessions. Hospital settings are considered to be the best teaching places and real patients the ideal subjects. However, there are multiple challenges that clinical teachers and students encounter during the teaching-learning activities in the hospitals and these often repress the learning process. There is a growing concern that a miss-match between theoretical knowledge and clinical/procedural skills and experience leads graduating doctors to lack confidence and many clinicians in the current climate are graduating with minimal real-world clinical experience. In the modern-day education structure, technology-enhanced learning environments offer a multitude of remarkable possibilities that may help overcome some of these challenges.

E-learning is increasingly used to deliver teaching at medical varsities across the globe. Multiple e-learning tools are being designed and developed to compliment customary education strategies, and to
provide new methods of learning. Blended learning (BL) has gained popularity in undergraduate medical education and is now established in many medical schools (Greenhalgh, 2001). Blended learning, defined as the combination of traditional face-to-face learning and asynchronous or synchronous e-learning (Adams, et al., 2018; 2020) has been presented as a promising alternative approach for health education because it is characterized as synthesizing the advantages of both traditional learning and e-learning.

Moreover, blended learning has shown rapid growth and is now widely used in education. Rowe et al (2012) in their systematic review reported that blended learning has the potential to improve clinical competencies among health students. Such technology mediated learning has the potential to provide the learner with an educational environment whenever and where ever they desire (Broadbent, 2002). Despite the widespread introduction of such learning technologies to medical education, their effectiveness on learning has been difficult to quantify (Cook, 2010).

Where some domains may lend themselves well to e-learning, clinical skills have been considered a challenging area for online learning. The need to adequately support and develop students in clinical skills is now arguably more important than previously considered due to reductions in practice opportunities. Online and blended teaching methods are being developed to try and meet this requirement, but the understanding about their effectiveness in teaching clinical skills is restricted.

The aim of this study was to determine whether the use of blended learning paradigm has the potential to augment the teaching of clinical skills in undergraduate medical students. This chapter examines the emergence of technology enabled active learning and how effective they are in enhancing teaching and learning outcomes and experiences. The objective was also to delineate the pedagogical rewards.

2. The Author’s Four Step Approach

Step 1: Inception
The author developed and introduced a blended session, to augment the traditional classroom and clinical teaching for undergraduate medical students in the Ophthalmology module at the Taylor’s University’s School of Medicine (TUSOM). The incorporation of a
blended approach in the Ophthalmology module was utilized to assist the teaching of a fundamental clinical skill that the students must learn within this specialty posting. This innovative refinement proposed to add technology in order to renovate and improve the teaching/learning activities. The target was to bring about a meaningful and viable alteration to the academic program.

While aligning together the traditional classroom and virtual educational media it was essential to organize the sequence of activities in a consistent and logical manner. The BL activity was planned to be included as a part of the specialty posting and would consist of an “Online learning” activity followed by a “Face-to-Face” interactive session. The integrated learning experience was to highlight the consolidation of the two above separate sessions and brings forth the benefits of the combination. The blending of the face-to-face and online environments in BL must be a well thought of and designed process. There are distinct prospects and trials. Multiple factors arbitrate the successful construction a blended course. Defining a teaching and learning philosophy is paramount. A constructive alignment to the program, module and course learning objectives and outcomes must be demonstrable. Pedagogical approaches ought to be clearly defined.

The author chose “Funduscopy/Ophthalmoscopy” as one of the themes to be taught as a blended session. Direct ophthalmoscopy (examination of the fundus of the eye- retina and the posterior segment of the eye using a direct ophthalmoscope) is an essential and particularly difficult clinical skill requiring preparation, dexterity and practice. The selection of this particular clinical skill session was deliberate and followed due deliberation. Multiple factors make the practice of ophthalmoscopy challenging for novice medical students. The procedure requires not just clinical skill and significant time but also extensive patient preparation and cooperation. The dearth of willing subjects and volunteers is often a major detriment.

The author chose to create an online resource - an instructional/demonstration video and make it available online along with other teaching/learning material and instructions on the University’s web-based learning module system (Figure 6.1 & 6.2). The video URL was embedded on the University’s online Moodle platform (TIMeS –Taylor’s Integrated Moodle e-learning System). In-class “Clinical Skills Session” was planned successively to supplement active learning.
Figure 6.1 Online Moodle for the Module Presenting the Demonstration Video for the Learners Along with the Other Course Contents

Figure 6.2 The Video Link Available Online and as a QR Code for Ease
Step 2: Implementation

An in-house video demonstrating the clinical skill was produced and presented to the learners on TIMeS - the University’s online Moodle platform. The video was for free access for the students; to be viewed at a time, place and pace (learner centred) of their choice before the face-to-face in-class session.

The demonstration video included explicit instruction on prerequisites essential to patient selection and preparation. The parts and functions of the instrument used (Direct Ophthalmoscope) were defined and particularized along with the procedural details and steps in the required clinical examination. Patient briefing and professional etiquette/conduct during the patient encounter was underlined and the author took extreme care in presenting to the viewers as a role model. The presentation also covered important aspects of documentation and record of the performed examination. A pictorial discussion on various pathologies/diseases expected to be diagnosed using the taught skill was also assimilated.

An in-class, activity based “Clinical Skills Session” was scheduled subsequently with patients and simulators to augment learning. The 3-hour session was conducted at the Clinical School a week after the students had been provided access to the demonstration video. While the short instructional video was viewed by students at home before the class, the in-class time was devoted to skill enhancement, practice & discussion. The face-to-face class time was utilized for supervised student activity using simulators, real patients and mannequins as shown in Figures 6.3-6.7. The supervising facilitator (author) gave instant feedback on steps of examination, procedural flaws and interpretation of examination outcomes.

Figure 6.3. Face-to-Face Session with Extensive Student-Instructor Interaction and Hands-on Learning with a Real Patient
Figure 6.4. Face-to-Face Session with Intensive Student-Instructor Interaction and Hands-on Learning on a Mannequin

Figure 6.5. Face-to-Face Session with Intensive Student-Instructor Interaction and Hands-on Learning on the Simulator (Ophthosim™)

Figure 6.6. Face-to-Face Session with Collaborative Learning Practices and Extensive Student-Instructor as well as Student-Student Interaction
Step 3: Introspection

The “Online resource” (demonstration video) served to seed propositional/ content concepts and present them in an appropriate and clearly accessible fashion; the in-class interaction helped build and bridge functionality. It not only provided a productive classroom climate for social and collaborative learning but also confronting and eradicating students’ misconceptions. It is necessary for students to have the opportunity to develop and improve clinical skills in appropriate teaching environments. The aim of this study was to assess undergraduate medical students experience and attitudes towards BL and their development of clinical skills. It was also intended to discern their attitudes towards BL in clinical skills education compared to other teaching methods.

A feedback was therefore obtained immediately after the blended session. This included a questionnaire and an open-ended feedback (comments) on their learning experience.

The questionnaire was reviewed by the author for face validity and piloted on a sample of medical students and revised accordingly. Participants’ responses were rated on the five-point Likert scale ranging from 1 = Strongly disagree to 5 = Strongly agree.

The students were asked to rate the perceived usefulness of the blended session and their experience of learning clinical skills using the BL activity. They graded the overall efficacy not just in terms of facilitation of the learning and application of the clinical skill but also preparation for assessment. They were asked whether or not they reviewed the e-learning material. The appropriateness of the topic and content selected for BL was also evaluated by the students. They
ranked their preference for flipped sessions over traditional instructor-centred teaching activities.

**Step 4: Iteration**
The robust and consistent feedback obtained at the end of each session had multiple and very useful suggestions from the students (End Users). A lot of them asked for more pictures to be included / detailed discussion on the diseases that were to be diagnosed. Thus, a year after the successful introduction of the “Flipped Session”, the concept of “Flipping the Flip” was added. A short quiz was conducted at the end of the in-class session using a cloud-based student response system (Figure 6.8). The post-class discussions/ reflections continued online as a “Discussion/Forum”. The facilitator and the students maintained a platform for discussion, experience sharing and problem-solving pertaining to their clinical work in the hospital/wards for the remaining duration of their specialty posting. This self-motivated and continual student–student as well as instructor-student interaction helped foster a very dynamic collaborative learning process.

![Figure 6.8. Face-to-Face Session Followed by an Interactive Quiz with Students Responding on Their Own Smart Devices](image)

**3. Analysis and Interpretation**

Over the last three academic years (between 2016 and 2018), a total of 175 (n=175) students enrolled in the Ophthalmology module. The clinical module is run during the clinical phase of the undergraduate medical training as a part of the M.B., B.S. degree program at the
Innovative Practices of Technology-Enhanced Learning

Taylor’s University School of Medicine, Faculty of Health and Medical Sciences. There were six academic semesters during this period. In each of the semester students’, in small group rotations, spent a 4 week in the Ophthalmology specialty. Of the 175 students there were 65 males and 110 female members. The entire group comprised of 165 Malaysian nationals while there were 10 students from overseas. The demographic characteristics of the respondents are presented in Table 6.1.

<table>
<thead>
<tr>
<th>Table 1. Characteristics of the enrolled students/respondents (n=175) in the Ophthalmology module at the School of Medicine, Faculty of Health and Medical Sciences, Taylor’s University, Malaysia (2016-2018).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristic of respondents</td>
</tr>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Malaysian Nationals</td>
</tr>
<tr>
<td>Chinese</td>
</tr>
<tr>
<td>Indian</td>
</tr>
<tr>
<td>Overseas students</td>
</tr>
</tbody>
</table>

The blended activity was scheduled during the 2nd week of the clinical rotation. A quantitative (on a Likert type scale questionnaire) and a qualitative (open ended feedback) were obtained from each of the students after the blended session. The author set out below the ways in which e-learning approaches engage students in learning clinical skills in three dimensions uptake, acceptability and perceived effectiveness.

**Uptake**

Hundred percent of the students (100%) attended the blended activity. All of the students registered in the module watched the online demonstration video before attending the interactive clinical skills session. The activity was “tracked” for students’ turnout on the online portal TIMeS after it was made accessible. The clinical activity that was scheduled a week later was also attended by all the students (100%) in the various cohorts. The feedback obtained at the end of the session was also completed by each and every student (100%).

**Acceptability**

 Ninety four percent (94%) of the students strongly agreed/ agreed that this educational tool was appropriate to the learning and augmentation of the clinical skill.
Effectiveness

Ninety two percent (92%) of the students strongly agreed/agreed that the flipped session was beneficial to their learning process of the clinical skill taught and eighty nine percent (89%) of the students strongly agreed/agreed that the blended session was more fruitful than a lecture. A further ninety three percent (93%) of the students strongly agreed/agreed that following the blended session they would be able to better apply their clinical expertise during patient evaluation and ninety five percent (95%) of the students strongly agreed/agreed that the instructional video helped enhance their learning process.

Students valued the flexibility and comfort of having the content to be viewed at their convenience, the opportunity to go back to the materials and be able to rewind/revisit the content. In the open-ended feedback, they highlighted the ease of learning in a personalized setting with the freedom to self-direct and navigate individually. The cohorts were largely happy to have the facilitator clarify doubts and correct misconceptions in-class. They acknowledged the benefit of having a homogenous and standardized content that was uniformly available for all the students, across the rotations- leaving little scope for bias or conflict. Many of them accredited that it was nice to see their own teacher in the video and this was far more motivating than to see an unknown instructor; they were highly appreciative and thought that it helped form a connection and they related to the video better. Learners admitted that the assessment was indeed fair and appropriate-as they knew what was required and expected and “that what was taught, was assessed”.

This mode of learning was also particularly suitable for students who found traditional lectures or speaking in face-to-face classroom settings challenging.

The perception of the facilitator was also critically crucial and the feedback bought forth the following pros. The facilitator affirmed that the students came better prepared for the class and that the face-to-face session was highly interactive; both student-student and instructor-student interaction was qualitatively and quantitatively substantial and more productive. It was generally observed that the learners engaged in comprehensive and more meaningful discussions and the in-class performance of the learners was much better than the class with a traditional session. The learners demonstrate a better understanding and deeper exploration of the course content. Instructor was able to
spend more time in skill enhancement and problem solving instead of explaining basic concepts.

The limited class room time was indeed utilized in a far more industrious and efficient manner. The facilitator was able to provide a consistent and standardized content while saving a lot of time and energy, for the lack of repetition for each cohort/ small group. This helped overcome space limitations and other logistic issues. Moreover, the challenges pertaining to the engagement of clinical patients were also circumvented as ethical climate has changed profoundly and it is no longer acceptable for unskilled novices to practice on patients.

The results suggest that teachers as well as undergraduate medical students value the use of BL in clinical skill studies however students vary in their approach to and utilization of such learning environments. It appears that students rate e-learning just as highly as other traditional methods of clinical skills teaching and acknowledge its integration in a blended approach to teaching.

4. Pedagogical Doctrine: Practice and Benefits

The recent increases in numbers of medical undergraduates, the trend towards student-centred learning and the emphasis on patient-related teaching exert a great pressure on teachers and resources in medical schools. At the same time modern undergraduate curricula are challenged by the need to teach an ever-expanding body of medical knowledge within a fixed time period. It is well documented that the current generation of learners is strikingly different. These learners prefer intrapersonal and independent learning over group work, yet like to do their solo work alongside others in a collective manner when studying. They fancy their learning to be practical and hands-on and want the teachers to help them engage with and apply the content rather than simply share facts and information that are otherwise available online. Moreover, they are extremely tech savvy and heavily rely on technology.

Over the past few decades there have been transfiguring advancements in electronic and digital technologies and they are being increasingly incorporated in academics. The introduction of e-learning tools into medical education has made significant changes in the way medicine is taught. In response to these developments, many innovative learning environments are being trialled. However,
the effectiveness of e-learning has been difficult to quantify and there have been concerns that such educational activities may be driven more by novelty, than pedagogical evidence.

BL is an important educational approach which aims to promote student-centred active learning with focus on a collaborative, participative and technology-aided learning process. It offers opportunities for the complexity of learning by integrating face-to-face and online interaction. There is limited research available on the appropriate use of technology-enhanced learning environments as part of a blended approach to the clinical education of healthcare students. Few high-quality studies were found to evaluate the role of blended learning in clinical education, and those that were found provide only rudimentary evidence that integrating technology-enhanced teaching with traditional approaches have potential to improve clinical competencies among health students.

BL refers to the systematic integration of online and face-to-face engagement to support and enhance meaningful interaction between students, teachers and resources (Garrison & Kanuka, 2004). Using principles of adult education, blended learning allows for greater flexibility and responsiveness in the teaching and learning process (Lewin et al., 2009). The integration of technology into pedagogy has the potential to facilitate flexible, learner-centred teaching, encourage interaction among students and staff and enable them to collaborate and communicate asynchronously (Ellaway & Masters, 2008). In addition, the integration of online instruction has been shown to overcome the limitations of time and space, support instructional methods that are hard to achieve using textbooks and reach a larger number of students without increasing resource requirements (Gray & Tobin, 2010).

Blended courses (also known as hybrid or mixed-mode courses) are modules where a portion of the traditional face-to-face instruction is replaced by web-based online learning (Littlejohn, 2007). The abstraction of blended learning has its origin in online learning and exemplifies a fundamental alteration in mode of instruction that has the potential to magnify the learning experience for an individual student (Bhargava, 2018). Blended learning has also enabled the emergence of a true synchronous/asynchronous and virtual/physical matrix of learning opportunities.

The important issue here especially in universities is that students can now partly learn off-campus on line. Personalized learning
environments that let students exercise control on the pace, time and mode of learning is exceedingly valuable to them. This is especially important in a demanding and comprehensive curriculum like the one followed at medical varsities. Educators need to identify these dynamics and integrate necessary alterations in the curriculum delivery.

The author used the flipped pedagogical model to redefine in-class activities. Psychomotor and dexterity skills and requisite knowledge are required for performing procedures. The learning and teaching of procedural skills have acquired an identity of its own and this has helped focus attention on clinical skills training. The learner progresses from a cognitive stage learning (what is to be done) through an associative stage of learning (how to do it) and finally to automatization stage when it falls from conscious awareness.

Active blended learning is a student-centred approach to support the development of subject knowledge and understanding, independent learning, and digital fluency. The author’s modification of a traditional teaching model to a four-stage, step-by-step approach to teaching clinical skills was applied to incorporate a blended (flip session) in the Ophthalmology clinical module. This involved inception (developing and blue-printing of the on-line content and activity), implementation (scheduling the blended sessions), introspection (deliberating on the feedback) and iteration (re-inventing for further learning). By introducing video-assisted technology the students were prepared for an interactive face-to-face session (using simulation as well as real human subjects).

The author selected to focus on the training and procurement of an essential clinical skill- “Funduscopy”; that the students must learn during their specialty posting in Ophthalmology. Roberts observed that the direct ophthalmoscope was an under-utilized tool in the clinical setting and that doctors lacked confidence in its use. Medical students, junior doctors and general practitioners have consistently reported low levels of confidence in ophthalmoscopy (Yusuf, 2015; Gupta, 2006). It can be used to quickly and effectively detect a number of disabling diseases and so remains a diagnostic tool with which all graduating doctors should be familiar. The conventional handheld direct ophthalmoscope remains the most readily accessible tool for the Fundoscopy to the majority of frontline clinicians.

Yet, clinicians still appear to avoid the direct ophthalmoscope in practice, putting patient safety at risk and placing increasing demand
on eye specialists (Dalay, 2013). In an effort to preserve the skill set of future doctors the author tried this novel approach to improve the teaching and assessment of Funduscopy (Direct Ophthalmoscopy). It was anticipated that this innovative approach to the teaching of clinical skills would enhance the ‘toolkit’ of learning, teaching, and assessment strategies appropriate to contemporary undergraduate medical education.

Abeysekera, Lakmal, and Phillip Dawson (2015) describe flipped teaching as an instructional strategy that reverses the traditional educational arrangement by delivering instructional content, often online, outside of the classroom and moves activities, including those that may have traditionally been considered homework, into the classroom. The flipped classroom intentionally shifts instruction to a learner-centred model in which class time is dedicated to exploring topics in greater depth and creating meaningful learning opportunities, while educational technology such as online videos are employed to deliver content outside of the classroom (Aaron et al., 2014).

The doctrine of BL was used to create an activity that was well specified in the intended learning outcomes, set up a learning environment that encouraged student engagement and performance and eventually helped assess the students’ performance against the intended learning outcomes. Thereby establish a constructive alignment within the curriculum. A perfect alignment between the module and course learning outcomes was defined in the lesson blueprint. These were clearly listed in the Module Information Booklet. The blended (Flip) session with a video (made by the author) along with the Face-to-face session proved to be unique and very successful.

The author was able to explicitly bring out the structure of the topic, elicit an active response from the students and build their declarative knowledge into a functioning understanding and application. Such “performances of understanding” are extremely valuable to the procurement of vital clinical skills for trainee doctors. Interaction maintained learner interest and provided a means for personalized learning and reinforcement. The learner was thus enveloped within a supporting learning system.

The clinical encounter is at the heart of clinical skills learning. Human interaction is very crucial and of paramount importance to the learning and practice of medical disciplines. Thus, medical students are provided with appropriate training opportunities in the form of
real patient encounters in hospital wards/out-patient departments, observation and practice of clinical procedures (both diagnostic and surgical), radiology image examinations and interpretation, patient medical history review, and other basic medical practices. Technology enhanced learning is an additional aid to provide fillip to the learning experience. Ultimately students need to transfer the skills from the simulated environment to the patients’ bedside.

Experiential learning aims to deliberately provide the learners with an experience or a learning activity which enables them to grow in knowledge and skills. The online demonstration video helped familiarize the context and develop an orientation to problem solving. The “active learning classroom” provided the authentic experience. Vigorous participation during the interactive face-to-face session displayed good practice in terms of active learning, engagement and retention.

Significant interaction between the students and the facilitator established a collaborative interface. Students need frequent opportunities to perform and receive apt feedback on their performance. The in-class activity – performance driven learning – made the session more evocative and meaningful. Generous student-faculty contact is the most important factor in student motivation and involvement. It also enhances students’ intellectual commitment. Technology supported active learning rather than memorizing pre-packaged assignments was the key element of the author’s flipped assembly.

Various approaches in pedagogy derive from the constructivist theory that suggests, that learning is accomplished best using a hands-on approach. Learners learn by experimentation, and not by being told what will happen, and are left to make their own inferences, discoveries and conclusions. Connectivism is a theory of learning in a digital age that emphasizes the role of social and cultural context in how and where learning occurs. Learning does not simply happen within an individual, but within and across the networks.

What sets connectivism apart from theories such as constructivism is the view that “learning (defined as actionable knowledge) can reside outside of ourselves (within an organization or a database), is focused on connecting specialized information sets, and the connections that enable us to learn more are more important than our current state of knowing” (Goldie, 2005). Connectivism sees knowledge as a network and learning as a process of pattern recognition (Newble, 1991). Connectivism has similarities with Vygotsky’s zone of proximal
development (ZPD) and Engeström’s Activity theory (Dornan, 2007). The phrase “a learning theory for the digital age” (AlDahdouh et al, 2015) indicates the emphasis that connectivism gives to technology’s effect on how people live, communicate, and learn. At its core, connectivism is a form of experiential learning which prioritizes the set of formed by actions and experience over the idea that knowledge is propositional (Bolander et al., 2011).

Such principles were the focus of the author’s blended teaching learning activity. While practicing the clinical skill during the face-to-face session the students in small groups were able to ascertain prior knowledge - that was obtained from the demonstration video. In class activities not only promoted active learning but also provided an opportunity to challenge misconceptions. This also encourages learners to take responsibility for their learning. They are able to elaborate their understanding by application and problem-solving; this helped promote deep learning.

Learners had an opportunity to see how the knowledge fits into a real-time framework of patients’ clinical examination. Cognitive interactivity reflects cognitive engagement required for course participation. The process of collaborative learning was best exemplified here. Collaborative learning refers to instructional strategies in which two or more learners work together towards a common learning goal, emphasizing interaction and group processes (Prichard, Bizo & Startford, 2006).

The BL session supported contextualizing learning. This meant locating procedural skills training in the context in which learners will eventually be expected to perform the skill. This is likely to include psychological, social and physical representations of the working environment. The clinical skills (face-to-face) sessions were built on this foundation and such was the sole purpose of inviting simulated/real patients to the session. It asserts that learning is a process whereby knowledge is created through the transformation of experience. Initial experiences are subjected to reflections which help conceptual understanding and leads on to potential action.

Transformative reflection added value to student engagement, curriculum delivery and assessment plan. And an experienced curriculum is what students actually experience. A meta-analysis by Liu et al (2017) showed that blended learning has a large consistent positive effect on knowledge acquisition. Blended learning appears to have a consistent positive effect in comparison with no intervention.
Innovative Practices of Technology-Enhanced Learning

and appears to be more effective than or at least as effective as non-blended instruction for knowledge acquisition in health professions – as documented in a systematic review by McCutcheon et al (2015).

One concern regarding e-learning is the potential isolation of the learner (Mckendree, 2006). This was successfully overcome by the author’s blended approach. The active collaborative learning process that was created within the classroom sessions affirms that there is a cognitive state (the zone of proximal development), in which learners can be helped to achieve higher levels of understanding by means of the actions of others. Peers and the facilitator were providing appropriate stimuli that helped the learning process and intellectual scaffolding.

Good practices also emphasize on a prompt feedback. Direct observation while they performed and practiced the clinical skills gave the facilitator (author) a distinct opportunity to provide an on-time and immediate feedback. This helped student correct mistakes and also clarify any doubts. Good learning, like teamwork, is collaborative and social, not competitive and isolated. This innovative session incorporated multiple aspects of the University’s teaching learning philosophy and the essential elements of the “Taylors’ Curriculum Framework”.

The core concept was to provide a “Technology-enhanced” learning environment and thereby promote on-line learning. The session contributed to the procurement and enhancement of an essential clinical skill and thus augments “Discipline Specific Knowledge”. The face-to-face interaction with the facilitator, peers and patients helped refine communication skills and professional conduct/manners. This immensely contributed to the refinement of “Personal Competencies and Social Competencies”.

The clinical discussion that followed the flipped session promoted “Critical Thinking and Problem Solving”. Having to correlate with the patients that they see daily in the hospital/wards helped validate the learning – an essential part of entrepreneurialism. After the class discussion (Forum and Bed-side) amplified lifelong learning. The varied nature of the diseases, epidemiological distribution and the impact of blindness on the individual and the society helped develop a holistic and global perspective. “Flipping the Flip” made mandatory the use of their own devices in class (promoting the concept of “Bring Your Own Device” to class).
5. Inferences

Educational institutes have placed a lot of emphasis on using e-learning. This is because it fits in with the distributed nature of today’s learning society and it can support the increasing size of the student population. BL is in line with societal trends and its value to medical education has been recognized. BL has found favour because it offers many advantages in educational settings. This is not only because of its ‘reach’ but also because of its inherent capability for non-linear interaction. Students can control the pace and sequence of their instruction and make meaningful choices which should help them in their understanding.

Figure 6.9. Bhargava’s Model – Acuity and Design of Blended Learning

Medical students value the use of BL in the learning of basic clinical skills however; there is an apparent lack of a cohesive approach to BL in health care and education. University students appear to have the necessary skills and opportunity to access the technology enabled learning environments. Developers of clinical skills curricula need to ensure that such learning environments utilize mediums that encourage deeper approaches to learning. Concerns have also been highlighted
that such educational activities may be premeditated by originality
than pedagogical evidence (Bates 1995, Cook 2010).

Distinct delineation of the pedagogical doctrines and advantages
were highlighted and the author’s findings also suggested that students’
rated BL higher than traditional methods of teaching. This is consistent
with Awad et al.’s evaluation of e-learning package for dental students
and Gerry et al.’s review of e-learning for health professionals where
in both cases satisfaction was higher with online than traditional
approaches. Limitations of our study include the validity of our
questionnaire. The questionnaire was designed and piloted by medical
educationists, clinical teachers and students and then reviewed by the
faculty for feasibility however it is a new questionnaire and is not been
validated by prior research.

In conclusion, BL appears to be a useful tool in the learning of
clinical skills; further research is required to explore how pedagogical
design can affect the effectiveness of BL in clinical skills. BL could be
promising and worthwhile tool for further application in the education
of health-care professionals.

REFERENCES

Aaron Sams, Jon Bergmann, Kristin Daniels, Brian Bennett, Helaine W.
flipped learning” and “Four pillars of F-L-I-P™” in “FLIP Learning”
Flipped Learning Network (FLN).

load in the flipped classroom: definition, rationale and a call for research.”

E-Learning Readiness among Students of Diverse Backgrounds in a
Leading Malaysian Higher Education Institution. Malaysian Journal of
Learning and Instruction, 15(2), 227-256.

Engagement in Higher Education Institutions: A Differential Item
Functioning Analysis of Students’ Backgrounds. Malaysian Journal of
Learning and Instruction, 17(1), 133-158.

“Understanding Knowledge Network, Learning and Connectivism.”
(1995) International Journal of Instructional Technology and Distance


ClassDojo is a class management application that is designed based on gamification principles. It can be accessed via three roles: teachers, parents, and students. It is primarily meant for primary and secondary schools by going against the usual learning management approach. The key to ClassDojo is it allows teachers to keep track of students’ progress by giving positive feedback to the students easily. Each student can be added to the class, and they will be randomly given an avatar of a cute monster. Every positive behaviour can be given points. Through ClassDojo, teachers acquire class management in an effective and funny way (ClassDojo, 2018). It is also available as an app, making it more convenient for students to access. Despite being perceived as childish, some researchers have applied it in higher education settings and have reported a positive impact on learners’ engagement and learning attainment. ClassDojo comes with vast resources to guide teachers as well, and it is available via https://www.classdojo.com/resources/ The link also contains tutorial videos as to how ClassDojo can be used for various learning purposes.
Although ClassDojo can be directly used, this chapter reports how it was applied to a course through gamified modules. The modules were designed using the core drives in Octalysis model. There are 8 core drives in the model, but the study only applied four core drives: Epic meaning and calling, Development and accomplishment; unpredictability and curiosity; and loss and avoidance. Details on these core drives can be obtained via Chou (2015) or https://yukaichou.com. The modules cover 7 units in a course which focus on computational linguistics, and each module was labelled as a stage in the gamified world. As they completed the challenges set for each stage, their progress was monitored via ClassDojo instead of using conventional ways such as Excel Sheets or whiteboard. Any action or behaviour that is commendable was also given points. ClassDojo makes learning “visible” as students can monitor their learning, which indirectly promotes self-regulated learning.

### 1. Introduction

With the increasing number of so-called digital natives entering the education system, the use of Internet tools in supporting teaching and learning is perhaps no longer an option, but a necessity. This “new breed” of learners is often perceived as a generation that always demands the teachers to adopt technologies in the delivery of lessons. While the classification and description of generational differences across diverse spectrums of learning have been somewhat controversial (Gardner & Galoozis, 2018; Lai & Hong, 2015), it is safe to assume that there is indeed a difference between pre- and post-Internet generations in the way they deal and cope with technological developments. Although the exposure to technology among the digital natives at the early age has no drastic impact on their learning characteristics (Lai & Hong, 2015; Sarkar, Ford, & Manzo, 2017), studies have shown that they prefer a technology-driven learning environment, and one that supports multi-modalities promotes co-creation among the learners (Jones & Shao, 2011; Margaryan, Littlejohn, & Vojt, 2011; Prensky, 2001; Oblinger & Oblinger, 2005; Rosen, 2010). This shift calls for a change in the way learning is conducted in the traditional classrooms. It is even more pivotal to examine the role of innovative pedagogies.
in tertiary education than primary or secondary schools, as higher institutions of learning tend to comfortable with the usual lecture-style of delivery.

One pedagogy that has gained the educators’ attention in dealing with digital natives is gamification. Gamification is widely defined as the application of game-based elements or mechanics to non-game context (Deterding, Dixon, Khaled, & Nacke, 2011) with the primary purpose of motivating users to perform specific tasks. At face value, it seems to indicate the elements of playfulness in learning, making it less attractive to faculty members in higher education as universities and colleges are widely regarded as “serious”. Nevertheless, in recent years, researchers have seen a profound increase in the number of studies on gamification conducted in higher education settings. The common topics of interest cover impact of gamification on students’ deep learning (Tsay, Kofinas, & Luo, 2018), learning engagement (Cassano, Piccinno, Roselli, & Rossano, 2018), and game elements that nurture self-regulated learners (Hamari, 2017; Ong, Chan, Cho, & Koh, 2013). Most of these studies have focused explicitly on technology-based gamification as it aims to make learning more appealing to students than using the teacher-centred approaches.

In doing so, blended learning environments are often chosen as it gives ample time for students to engage in online activities before meeting their lecturers face-to-face in class. The gamified learning activities are done mainly using the famous game mechanics of points, badges and leader boards. Despite its positive outcomes, these mechanics do not seem to be able to sustain the students’ engagement and satisfaction. Urh, Vukovic and Jereb (2015) mentioned in their proposed model that one problem of implementing gamification through e-learning is that the monitoring of learners’ progress can be a daunting task if the teacher is not technically sound to produce his or her own method of points tracking. Students are more likely to lose interest when they realise the teacher made no visible attempt to keep track of their progress. Previous studies have not provided enough suggestions in dealing with such a problem. In fact, very few studies mentioned how they monitor the progress of their learners in a gamified learning environment. Most tend just to report the use of specific tools ranging from quiz applications like Kahoot! Quizlet, and Quizizz to collaborative tools such as Google Docs, Padlet and Trello. It is due to this gap in research that this case study was conducted.
2. Purpose

The purpose of this case study is to examine the usefulness of ClassDojo as the technological tool for gamification to be done in blended learning mode. Specifically, it aims to:

i. Identify the affordances and constraints of ClassDojo in the implementation of gamification in a blended learning environment
ii. Find out the students’ perception of their learning experience through the designed gamified learning modules.

3. Related Literature

E-Learning in Higher Education

In general, e-learning is regarded as technologies that are used to assist students in improving their learning. Some researchers have talked about e-learning through various scopes, particularly in the ability of the e-learning platforms, often known as learning management systems. For example, Zamfirou and Sbora (2014) mentioned e-learning should be capable of supervising learning and managing learning materials online, permitting users to gain access to those resources conveniently online. In higher education, e-learning has become a must so much so that universities are investing heavily in maintaining ICT infrastructures and software related to e-learning. Jamian, Ab Jalil and Krauss (2018) reported the same trend in Malaysia, although most of the universities do not offer distance learning programmes. It is because e-learning has provided more opportunities for students to engage in learning activities and communicate with their lecturers than before (Draves, 2007; Lai & Hong, 2015). Most e-learning implementations in Malaysia, however, are still pretty much in blended learning mode whereby online activities and materials are provided as supplementary to face-to-face classes. Various tools and strategies are used for this purpose, and one of them is gamification.

Gamification and Game Mechanics

Gamification should not be confused with games. As explained by Maroney (2001), games can be accepted as “a form of play with goals
and structure.” All games, particularly computer games, are meant to have entertainment values, and with technology, the entertainment level is amplified through more realistic graphics and engaging effects. Some studies have revealed that playing these games provides opportunities for students to enhance their problem-solving skills, critical thinking and promote positive changes in behaviour (Gee, 2003; Hamari & Koivisto, 2013; Zimmerman, 2002). The latter, however, could be easily reversed as games are known to cause other adverse changes in behaviour from addiction to sedentary life (Ha, 2007).

On the other hand, gamification is “the use of game design elements and game thinking in non-game contexts” (Deterding et al., 2011). Strange enough, the term ‘gamification’ began to emerge around 2007 (Chou, 2015) but it became popular in 2012 until now. It seems to go hand in hand with the development of smartphones. As smartphones became prevalent, many mobile apps are embedded with gamification elements even if they are not meant to be used as a game. The whole point of gamification to include game elements of game mechanics into day-to-day contexts or in this case learning context. Instead of merely collecting virtual points for fun, gamification has a higher purpose of achieving goals that are beyond the game. The review by Alsawaier (2018) showed the higher education environment “could benefit a lot from gamifying not only their graduate recruitment strategies, but also the course content and curricula” (p. 2) but the real impact of gamification in higher education still needs further empirical evidence. The current data did not provide a longitudinal analysis of how learners benefit from the gamification process (Alsawaier, 2018; Hamari et al., 2016). The inconsistency in the results from previous studies may be rooted in inadequate understanding of how gamification derives learning outcomes in various learning environments and how game mechanics and dynamics should be designed in a gamified learning module.

In designing a gamified learning environment, the famous game mechanics are points, levels, badges, achievements, virtual goods, leader boards, and virtual gifts (Browne, Anand, & Gosse, 2014). Game dynamics, on the other hand, are the emergent behaviour that arises from gameplay, when the mechanics are put into use and aesthetics are the emotional response from the players to the gameplay. Some examples of game dynamics elements are rewards, status, competition, self-expression etc. The combination of game mechanics
and dynamics with careful design of activities would help create a meaningful gamified learning experience.

**Meaningful Gamification**

Previous studies have shown that properly designed gamified learning module primarily via blended learning mode can increase engagement, effectiveness, efficacy and overall satisfaction of students. This corresponds to what Csikszentmihalyi (1996) and McGonigal (2011) mentioned about the flow in a gamified learning environment, which requires four elements to make it meaningful. These elements are goals, rules, feedback and participation. By considering these elements, it would create a “flow” where a person’s concentration and skills are challenged for them to learn meaningfully. Admiraal, Huizenga, Akkerman and Dam (2011) found, on the other hand, an opposite trend with the role of flow in gamification. They found that flow was shown to influence the students’ game performance, but not on their learning outcomes. In their study on gamification of a history lesson, students were noted to be too occupied with competition between teams and other distractive activities within the gamified learning module. This situation affected learning outcomes (Admiraal et al., 2011).

Hamari et al. (2016) conducted an empirical study on engagement and immersion of gamified learning environments. They found out that the challenge designed for each game was a strong predictor of learning outcomes. Their results also show that engagement in the game has an apparent positive effect on learning, but there is no significant effect between immersion in the game and learning (Hamari et al., 2016). Thus, for a gamified learning module to be successful, high-level immersion is not needed and what matters more is the linkage of activities with game mechanics.

**The Octalysis Model**

The Octalysis model to gamification was developed by Chou (2015), a human-centric gamification design framework that proposes eight core drives of human’s motivation. The framework prioritises human-focused gamification design that acknowledges the role of motivations and engagement in influencing someone to change his or her behaviour. The Octalysis suggests that if there are no existing core drives, then motivation and behavioural change might not happen.
The mode has its fundamental basis that all games should be designed according to specific core drives, and it should motivate humans to perform a series of decisions and desired behaviours. Table 7.1 shows the description of each core drive, as explained by Chou (2015). There is no requirement to fulfil all core drives, as Chou (2015) mentioned that it depends on the context and designers should pick those most relevant to the context.

**Table 7.1: Core Drives in Octalysis (Chou, 2015)**

<table>
<thead>
<tr>
<th>Core Drives</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epic meaning and calling</td>
<td>This Core Drive is in play when a person believes he or she is doing something greater than oneself or was “chosen” to act. An example would be Wikipedia volunteers who maintain the page and contribute to the development of its content. Contributors do not receive any extrinsic reward, but they feel that their contribution will help to develop and protect human knowledge. The implementation of this drive can vastly differ, and is not limited to altruistic behaviour.</td>
</tr>
<tr>
<td>Development and accomplishment</td>
<td>Development and accomplishment is our internal drive for making progress, developing skills, achieving mastery, and eventually overcoming challenges. The perception of the challenge is important. For example, a badge or trophy without a challenge is not meaningful for a person. This is the drive that most PBLs: Points, Badges, and Leader boards focus on.</td>
</tr>
<tr>
<td>Empowerment of creativity and feedback</td>
<td>This drive is expressed when users are engaged in a creative process where they repeatedly figure new things out and try different combinations. People not only need ways to express their creativity, but also need to see the results of their creativity, receive feedback, and adjust in turn. This is why playing with Legos, Minecraft, and making art are intrinsically fun. When properly designed and integrated to empower users to be creative, a game designer no longer needs to continuously add content to keep the activity fresh.</td>
</tr>
<tr>
<td>122</td>
<td><em>Innovative Practices of Technology-Enhanced Learning</em></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Ownership and possession</strong></td>
<td>This drive refers to users feeling like they own or control something. When a person feels ownership over something, they innately want to increase and improve what they own. For example, the overvaluing of objects within one’s possession are the result of this drive. People might think their house is worth far more than the market is willing to pay for it, not because of any intrinsic property of the house but because they personally own it.</td>
</tr>
<tr>
<td><strong>Social influence and relatedness</strong></td>
<td>This drive incorporates all the social elements that motivate people, including mentorship, social acceptance, companionship, and even competition and envy. When you see a friend that is amazing at some skill or owns something extraordinary, you become driven to attain the same. Think about how we naturally draw closer to people, places, or events that we can relate to.</td>
</tr>
<tr>
<td><strong>Scarcity and impatience</strong></td>
<td>Scarcity and impatience are the core drive of wanting something simply because it is extremely rare, exclusive, or immediately unattainable. Many games have Appointment dynamics or torture breaks within them (come back in 2 hours to get your reward). The fact that people can’t get something right now motivates them to return to check the availability of the product.</td>
</tr>
<tr>
<td><strong>Unpredictability and curiosity</strong></td>
<td>Unpredictability is the core drive of constantly being engaged because you do not know what is going to happen next. When something does not fall into your regular pattern recognition cycles, your brain kicks into high gear and pays attention to the unexpected. This is the primary core drive behind gambling addictions, but also present in every sweepstake or lottery program that companies run.</td>
</tr>
</tbody>
</table>
Loss and avoidance are the core drive that motivates us to avoid something negative from happening. On a small scale, it could be to avoid losing previous work or changing one’s behaviour. On a larger scale, it could be to avoid admitting that everything you did up to this point was useless because you are now quitting. Opportunities that are fading away have a strong utilisation of this core drive because people feel if they did not act immediately, they would lose the opportunity to act forever.

In this case study, only four core drives were taken into consideration in the process of designing the gamified learning modules. The core drives are epic meaning and calling, development and accomplishment; unpredictability and curiosity; and loss and avoidance. The incorporation of these core drives will be explained in the following section.

**ClassDojo**

ClassDojo is a free classroom management application that was initially developed around the principles of psychological surveillance, measurement and modification of children’s social learning in schools. It was launched in 2011 and mainly based in the US, it has been used in 180 countries with more than 4 million teachers and 38 million students (ClassDojo, 2018). The study by Maclean-Blevins and Muilenburg (2013) revealed that ClassDojo was capable of encouraging self-regulated learning while increasing positive behaviours among the students. Williamson (2017) in his review, stipulated that ClassDojo is an effective tool that functions as a persuasive technology to reinforce positive student behaviours from coming to class on time to hand in homework according to requirements. However, Manolev, Sullivan and Slee (2018) argued that the performative data-driven discourses of discipline via ClassDojo may backfire and create unnecessary pressures on students. They strongly argued that ClassDojo should not be used as a “behaviour police” alone, and if gamification is to be done well through this tool, it is pivotal to examine the design of activities and align with the features in ClassDojo.
Despite having its initial target users set on elementary or primary students, ClassDojo has also been used at secondary and tertiary levels. Studies on its usage at the university level have shown positive outcomes, although the cute characters may be deemed as too childish for young adults. Bicen and Kocakoyun (2017) in their study, noted that ClassDojo (ranked second) is one of the top gamification tools preferred by students. In fact, it was ranked higher than ClassCraft, which is deemed as the more matured version of the gamified classroom management platform. This indicates that ClassDojo can be potentially used at all levels of education.

4. Methods

This case study was done on 68 students who were enrolled in a university course on computational linguistics. The whole course was turned into a set of gamified learning modules covering seven stages, which are aligned to seven learning units of the course. A game map representing those stages are shown in Figure 7.1. For example, in LangCom Station, they are learning on the Introduction to Linguistics and Computing, while XDarulHana covers Natural Language Processing.

Figure 7.1. Game Map of the Gamified Learning Module

In each stage, the students were required to complete challenges, which are posted on the course e-learning page (eLEAP) as well as conducted in face-to-face classes. Figure 7.2 shows challenges undertaken in the first stage via eLEAP.
The gamified module contains tasks that correspond to the four core drives in Octalysis, as shown in the following table.

**Table 7.2: The Tasks Designed for the Module**

<table>
<thead>
<tr>
<th>Core Drives</th>
<th>Tasks</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epic meaning and calling</td>
<td>• Solving the main problem of robots disrupting job marks</td>
<td>Blended</td>
</tr>
<tr>
<td></td>
<td>• Solving NLP issues in human-computer interaction</td>
<td></td>
</tr>
<tr>
<td>Development and accomplishment</td>
<td>• Challenges in each unit that give them points and special abilities (for both individual and team tasks)</td>
<td>Blended</td>
</tr>
<tr>
<td>Unpredictability and curiosity</td>
<td>• Mystery box challenge (Random rewards and ideation challenge)</td>
<td>Blended</td>
</tr>
<tr>
<td></td>
<td>• Sudden Attack (Quizzes)</td>
<td></td>
</tr>
<tr>
<td>Loss and avoidance</td>
<td>• Points deduction for not following rules or requirements (e.g. not meeting the assignment deadlines)</td>
<td>Blended</td>
</tr>
</tbody>
</table>

The students' progress in the gamified learning module is monitored using ClassDojo. All students were added to the course page on...
ClassDojo, and each was assigned a random monster’s avatar in line with narrative used in the module where they were transported into another planet (PBL2093 LangCom Planet) to learn more about alien beings to save the humans from being taken over by the robots. Figure 7.3 shows some of the 68 students’ avatar.

![ClassDojo Students](image)

**Figure 7.3** Some of the Students Enrolled in the Course’s ClassDojo Page

Whenever the students completed the tasks successfully, they are awarded points, which can be customised in ClassDojo. Examples of the points awarded are shown in Figure 4.

![ClassDojo Points](image)

**Figure 7.4** Examples of Points Being Awarded via ClassDojo

By the end of the 14-week course, students were given a simple questionnaire consisting of both close-ended and open-ended
questions asking their overall perception on their learning experience, particularly with regards to the use of gamification and ClassDojo. They were also asked to provide suggestions for improvements.

5. Findings and Discussions

Affordances and Constraints of ClassDojo

In the 14-week implementation of the gamified course via ClassDojo, the authors have noted several affordances and constraints to pay close attention to in further instructional use of the tool. The main advantage of using ClassDojo is in its visual appeal and user-friendliness. It took the students only minutes to master how to use it from participating in the portfolios to monitoring their progress. Also, it allows customisation in deciding the types of points to be awarded. This is useful since the lecturers can personalise the page to suit their needs. The main constraint of the tool, on the other hand, is the lack of other learning features such as content creation tools and formative quizzes. The affordances and limitations of the tool are summarised in Table 7.3.

<table>
<thead>
<tr>
<th>Affordances</th>
<th>Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy-to-use</td>
<td>No content creation tools</td>
</tr>
<tr>
<td>Highly-customisable points/reward categories for tasks</td>
<td>No quiz features</td>
</tr>
<tr>
<td>Engaging interface with music options</td>
<td>No linkage to other major storage tools such as Google Drive</td>
</tr>
<tr>
<td>Discussion tools (think-pair-share, watch-discuss-share)</td>
<td>Avatar cannot be changed by the student</td>
</tr>
</tbody>
</table>

Students Overall Perception of the Gamified Module

Due to the exploratory nature of this case study, only descriptive statistics were used to capture the students’ overall impression of the gamified module as well as the use of ClassDojo as the support tool.
Table 7.4 shows the constructs (learning-related, engagement-related, ClassDojo-related and challenge-related) with the highest mean scores (5 is the maximum set based on the scale of 1 to 5 for each question, 1 is strongly disagreed, and 5 is strongly agreed).

**Table 7.4: Constructs with the Highest Mean Scores**

<table>
<thead>
<tr>
<th>Construct Label</th>
<th>Items</th>
<th>Mean Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning 1</td>
<td>The gamified module helped me learn the topics.</td>
<td>4.87</td>
</tr>
<tr>
<td>Learning 2</td>
<td>I understood the topics better using this gamified way.</td>
<td>4.82</td>
</tr>
<tr>
<td>Learning 3</td>
<td>The gamified tasks made my learning visible.</td>
<td>4.76</td>
</tr>
<tr>
<td>Engagement 1</td>
<td>The tasks gained my attention.</td>
<td>4.63</td>
</tr>
<tr>
<td>Engagement 2</td>
<td>I enjoy completing all the tasks given.</td>
<td>4.60</td>
</tr>
<tr>
<td>Engagement 3</td>
<td>The game storyline is interesting</td>
<td>4.51</td>
</tr>
<tr>
<td>ClassDojo 1</td>
<td>ClassDojo is helping to monitor my discipline.</td>
<td>4.50</td>
</tr>
<tr>
<td>ClassDojo 2</td>
<td>ClassDojo is simple to use.</td>
<td>4.48</td>
</tr>
<tr>
<td>Challenge 1</td>
<td>The challenges made me want to learn more.</td>
<td>4.34</td>
</tr>
<tr>
<td>Challenge 2</td>
<td>The challenges made me think critically about the topics.</td>
<td>4.33</td>
</tr>
</tbody>
</table>

As shown in Table 7.4, the top 10 items (out of 20 items, with 5 items for each construct) with the highest mean scores show positive outcomes of the gamified learning module implemented for the university course. In terms of learning, it echoes what was reported by Hamari (2017) where gamification helped students to be self-regulated learners in which they are made conscious of their learning through self-monitoring. A majority (86%) of the 68 students strongly agreed that gamified learning module helps them learn better than the conventional way, especially for this course which is often perceived as tedious and confusing.
In terms of learning engagement, the storyline used for the gamified module is seen as the key factor that engages the students to complete all the tasks. Students mostly reported how they look forward to each class as they did not want to miss out on the exciting activities and tasks. This is in line with what Cassano et al. (2018) found out in terms of the learners’ engagement in gamified learning environments.

Besides that, two items on challenges used were rated highly, especially in motivating them to think critically about the topics. This is similar to the situation in computer-based role-playing games whereby players must think carefully before making the next move. This finding is identical to the review done by Tsay, Kofinas and Luo (2018) on the relationship between gamification and deep learning. Clearly, gamification is not all about fun and exciting but also promote creative and critical thinking. It is also interesting to note that the high rating on challenges are aligned to the students’ positive opinion on learning as the challenges might enhance their learning since they have to apply greater range of strategies to complete them.

The construct also covers items on ClassDojo to gauge the students’ overall opinion about it. Generally, all of them were happy with the implementation as it is easy to use. 82% of them also mentioned how ClassDojo has made them more alert about their disciplines. This is apparent in the observable behaviours of the students as almost all students scored perfect attendance for the 14-week course. They were also asking more questions during face-to-face classes with high enthusiasm to complete both individual and team challenges.

6. Implications and Conclusions

This case study, although small-scale, has demonstrated how a proper gamification management tool is needed to ensure gamified learning modules can be implemented successfully. While the gamification of the course has allowed students to acquire the skills and knowledge need to complete the challenges given, without continuous monitoring, it would make them lose interest in the whole learning journey. As they progressed through each stage, they were virtually meeting the objectives of each learning units of the course without them realising it explicitly.

ClassDojo filled in this gap aptly by offering a highly-customised feature for educators to assign a point to different skill sets. While
Innovative Practices of Technology-Enhanced Learning

it could be lacking in terms of other learning features such as quiz and content creation tools, ClassDojo serves its purpose of creating a sense of self-regulation and accountability among the students. Apart from completing the tasks, they were noted to have some observable behavioural change such as increased attendance rate, active questioning in class and compliance to course requirements. Ultimately, this case study has shed some lights as to how gamified module with the support of ClassDojo increase the learning engagement and deep learning of the students. The limitation of the study should be addressed to yield more conclusive results, particularly with regards to the subjective nature of the students’ evaluation on their overall learning experience. Nevertheless, it has at least showed the charm or mojo that ClassDojo can bring to the classroom even at tertiary level.

REFERENCES


Screencastify

A screencast is a video recording which captures the onscreen view and actions on a computer display. Some screencasts may include audio such as narration and music, making use of the microphone of the computer for the audio recording. There are many different tools which can be used for making screencasts and many of them have free versions, with an option to upgrade to a paid version for better capabilities. Some common screencasting tools are: Screencast-o-matic and Screencastify.

The affordances of a screencast are that it enables fast and simple screen recordings to be made into a video format. Visual as well as audio formats can be included in the screencast as Powerpoint slides, graphics, and even video clips displayed on screen can be captured in the screencast. This enables narration and explanations to be included in the screencasts, making it particularly useful for

SCREENCASTING FOR ASSESSMENT OF CONTENT KNOWLEDGE: LEARNERS’ EXPERIENCES AND BELIEFS

Dorothy DeWitt and Norlidah Alias
teaching facts and procedures. Screencasts have commonly been used for demonstrating how to use specific operating systems, software applications or website features.

References and links to tutorials on screencastify:
Get started on tutorials of Screencasify at: https://youtu.be/uuJ2IF9RkgE

### Instructional Strategies for using Screencastify

Instructors may use screencasts to deliver their explanation of concepts online for direct instruction. Videos are used for delivering information and in some cases replace the instructor in an online course or MOOC.

When screencasts are used for flipped learning, teachers can design screencasts for delivering instructions and information before students come into the class, thus focussing the class time for discussions and problem solving.

Another instructional strategy for using screencasts is for student-generated content. This changes the learning paradigm for the student to research and find information and sharing his screencast with his peers. This form of learning can also be used to assess the student anywhere and anytime. Screencasts, just like videos can be paused, rewound and viewed again and again. They are also accessible anywhere and anytime.

References and links to best practices with Screencasts:
1. Follower Spotlight: Record Helpful Tech Tip Videos at https://www.screencastify.com/blog/record-helpful-tech-tip-videos/;
2. 3 Screencastify Features You (Probably) Didn’t Know About; https://jakemiller.net/3-screencastify-features-you-probably-didn’t-know-about/;
3. 7 Classroom Screencasting Activities: https://www.screencastify.com/blog/7-classroom-screencasting-activities/
1. Introduction

Assessments in most postgraduate courses are done at the end of semester. There is normally a lot of information and knowledge to be shared but insufficient time to interact with students to determine whether they have abstracted the knowledge transmitted and applied it correctly.

It is also not known how much learners are learning and applying their knowledge. Formative evaluation as an assessment during the course could provide a means to determine if graduates in the course are applying what they have learnt correctly. As lack of time seems to be an issue, one way to address this problem is for students to do virtual presentations to be shared with feedback and interaction among their peers and facilitator. Hence, as a solution to this problem, a learning experience was designed for a postgraduate course for learners to share their experiences and knowledge from learning and delivering it through videos, which could be assessed to determine if the videos had achieved its objective. The presentation could be done out of the lecture hours, thus saving time. In addition, the participants beliefs of technology would be investigated to determine whether this would influence the way they learners developed their videos.

2. Screencasts as Videos

Videos can be used to transfer information and knowledge. Videos are useful presentation tools as they can be a cognitive stimulator and enable the generation of new knowledge when used for instruction (Kaur, Yong, Mohd Zin, DeWitt, 2014). Videos have been used to bring stories and meanings alive through sound, action and visuals. This is valuable when teaching languages and cultures, as the combination of sound, images, and sometimes, text in the video provides social-cultural information about habits, traditions and cultures (Kaur et al., 2014). Videos can also be used in many different instructional settings, both in the classroom, as well as for blended and online learning. YouTube videos have been a facilitation tool and with humour and storytelling elements and have captured and engaged audiences of diverse demographics and cultural backgrounds through vlogging or video blogs (Alston & Ellis-Hervey, 2015).
Innovative Practices of Technology-Enhanced Learning

There are many forms of video recordings which can be edited to include different media. However, in this chapter, only screen recordings, or screencasts will be discussed. A screencast is a video recording which captures all the onscreen view and actions on a computer display. Simple screencasts may include Powerpoint presentations which can be converted into video formats. In this manner, the timings of the transitions of the slides can be determined in the Powerpoint application and the presentation runs automatically like a video. In Powerpoint 2016 it is called screen recording. Audio can be added in these recordings in the form of narration and music as it makes use of the microphone of the computer for the audio recording. The videos can then be pushed in a video format to platforms such as Youtube. The screencasts developed by the learner can be shared online on the learning platforms for discussion and evaluation.

Screencasting may be used in blended learning to save time for presentation in the classroom. In addition, the screencasts can be shared with the online community. There are many different tools which can be used for developing screencasts, some of them have free versions which can be upgraded to a paid version, with more capabilities. Some examples of screen casting tools are: ActivePresenter (https://atomisystems.com/); OBS Studio (https://obsproject.com/); and Apowersoft Free Online Screen Recorder (https://www.apowersoft.com/free-screen-capture); Screener (http://www.screener.com/), Jing (https://www.techsmith.com/jing.html); Screencast-o-matic (https://screencast-o-matic.com/) and Screencastify (https://www.screencastify.com/). However, in this chapter, the focus will be on Screencastify, an easy to learn and use application, which offers a free version of up to 10 minutes recording time.

There are several instructional strategies for using videos. Videos can be used for blended learning using several different models. Firstly, when used for directed learning, the teacher as the instructor, would refer his students to online resources which he identified, or to develop his own video resources. In this way videos have been uploaded on to learning management systems (LMS), or even in delivering Massive Online Open Courses (MOOCs). A flipped learning approach could be implemented when videos are used to deliver instructions and information before students come into class, and the class time is used for discussions and problem solving. On the other extreme, in the constructivist approach of blended learning, learners develop their own materials to be assessed (Vo, Zhu, & Diep, 2017). When the
learner develops his own videos, he has to apply the knowledge he has acquired and create a new material.

Although there are different models of instruction using blended learning with videos, there does not seem to be much research to investigate the learners’ perception of the constructivist strategy for user-generated content. Hence, in this chapter, a study on the process among students in a doctoral course using screencasts for constructing their learning and their perceptions, was investigated. These students developed screencasts to present their assignments to share their knowledge with their peers and was assessed by the instructor to determine if they had acquired sufficient knowledge. The students’ perceptions were investigated to determine whether their experience and beliefs of technology influenced the design and development of their screencasts.

3. Video Development for Screencasts

Videos can be easily developed as camera recorders becomes easily accessible. Currently, mobile devices (especially mobile phones) and video editing apps, have made the process of video recording and editing easily available to everyone. For higher quality video presentations, video-editing tools such as Windows Movie Maker which comes with Windows computers, and Apple iMovie for Macs can be used. In addition, many other software and apps can be used for professional video editing to combine different media in a video. In this chapter, video development is focused on screencasts with Screencastify, which is easily accessed as an extension in the Chrome browser (see Figure 8.1).

When designing videos for screencasts, the video should be developed as a design and development project. The first phase is a needs analysis of the audience. Instructional materials should be identified for the audience, so that the information can be communicated accurately for the right audience. For screencasts, the audience could be students, their parents or members of the public. In the design phase, the objectives of the instructional materials should be determined. A plan of the narrative of the video takes the form of a storyboard. Storyboards should be the first phase of design to form the basis for video development and may be evaluated to determine if the objectives are achievable for a particular audience. In a storyboard,
the graphics, text and other media required, as well as the Voice Over or narration would be determined. On approval of the storyboard (if necessary, by peers or the instructor), the video development process could proceed.

For the development phase, the resources need to be prepared. Video development consists of acquiring resources in the form of content, and media, and using video-editing tools to compile for presentation. Graphics and other materials have first to be prepared or gathered from online sources such as Creative Commons, or other sites with the required copyright permissions. When screencasting, the materials could be prepared in presentation slides in the order according to the storyboard. This will enable the screen capture to be done in a systematic manner in line with the narration. During the screen capture process, Screencastify prompts the user to enable the microphone, which will enable audio recording (See Figure 8.2). There are also options to include the web camera and drawing tools. When the resources are prepared, recording the on-screen process can begin for the screencasts. On completion, the videos can be downloaded or shared online on a learning platform or on YouTube.

Figure 8.1. Screencastify as a Chrome Extension

Figure 8.2. Enabling the Microphone and Record Options on Screencastify
4. Videos for Instruction

In many instructional sequences, video is used as a passive learning medium where learners view the information to acquire the information and content (Jonassen, Howland, Moore & Marra, 2003). When videos are used to engage the learner and provide stimulus for discussion, learning seems to improve (Alston & Ellis-Hervey, 2015). However, some researchers note that time is needed to allow the image at the given time to be sensed or the event experienced, before any meaningful discussion and argument on the topic can take place (Alston & Ellis-Hervey, 2015; Laurillard, 2002). Hence, when videos are used for direct instruction, sufficient time should be given to the learner to view and experience the content. This can then be followed by discussion and argumentation, on the highlights and main points of the content viewed.

For a constructivist learning strategy, active learning with some learner-control can be provided when learners work with materials which are meaningful to them and construct their own meaning from these materials, and then test their ideas when they present to their peers and instructor (Ally, 2004). This is a socio-constructive interaction process where dialogue and interaction followed with reflection, enables the building of knowledge (Garrison & Anderson, 2003; Laurillard, 2002).

Pedagogy is important when teaching with technology as putting a ‘pedagogy-first’ approach” enables the instructor to firstly understand the capabilities of the technology available and then identify the how these capabilities can enable one to achieve the pedagogical aims of learning with the technology tool at hand (Bower, 2009). In brief, the selection of the tool for the design of learning is done based on a concrete understanding of what can be accomplished with the technologies to which they have access which is the aims and objectives of the lessons (Bower, 2009).

For this purpose, sceencasting has several capabilities or affordances, which can be taken advantage of for learning. Firstly, sceencasting uses a video format and as a video, the sceencast can be paused, rewound and viewed again and again. This enables the need for students to sense the images and experience the required events and processes for meaningful discussions and argumentation on the topic to continue (Alston & Ellis-Hervey, 2015; Laurillard, 2002). In addition, videos are accessible anywhere and anytime.
Secondly, screen casting is a simple and fast process of developing videos. Simple screen recordings in a video format accompanied with audio can be included in the screen cast. Graphics and even videoclips can be inserted in PowerPoint slides in preparation for the screencast. This can be accompanied with narration and explanations as well as music or other audio effects. Hence, screencasting can be used by teachers and lecturers to provide powerful experiences. As a video, it can be a cognitive stimulator (Kaur et al., 2014) as teachers can identify stimulus suitable for their particular audience, their students whom they know and are able to maximise the potential of the video based on their aptitudes and needs to make the learning meaningful. As screencasts as videos are simple and easy to produce, teachers and instructors have a choice to transmitting information that is personal to the needs of their students. Most instructors would have their resources ready and by just displaying on the computer screen, they are able to do a screen capture and narrate it in the screencast format. The next step would be to share the screencast with the students concerned through learning management systems or other online platforms.

Thirdly, screencasts have been used for demonstrating how to use specific operating systems, software applications or website features. Hence, screencasting as videos can be used for teaching facts, procedures as well as attitudes. Screencasting as videos, are powerful for immersing the audience in social-cultural information about habits, traditions and cultures (Kaur et al., 2014), and to engage the students with a narration, provided by the teacher, which they are familiar with and may include humour and a context which the learners are familiar with. Hence, instructors may use screencasts to deliver their explanation of concepts, procedures and provide for different experiences.

Screencasts is a digital resource, like a video, and this enables online learning. Instructors also have an alternative for conducting flipped learning to be conducted. Tse, Choi, & Tang (2019) noted that the advantages of video-based flipped class has the advantage of optimising the internet technology, and is a suitable teaching method for adolescents, who would prefer the internet, as well as enable the instructor to determine the learners prior knowledge and understanding on a new topic before they attend class. Hence, teachers are able to adapt their instructional strategies directly to the needs of the learner, both in class discussions, and in the next set of instructional materials to be provided. Hence, individual differences
in learning are catered to (Tse et al., 2019). Learners who need more prior experiences can replay the videos, while advanced learners can explore more challenging concepts that capture their interests on their own (Tse et al., 2019). Hence, they claim that flipped class instruction can provide theoretically sound deep learning.

As screencasting is easy and simple, students can also be asked to make their own screencasts to share presentations of concepts that they have researched on to assess their learning formatively, in a timely manner. In this way, screencasts can be used as an assessment for evaluating students understanding. It would also provide a means of formative assessment, for active and meaningful learning.

Video development could also be provided as a collaborative group task. This would provide the opportunity for group members to be involved in development either directly, or in a supporting role as they collaborate and work as a team. Those who were technically inclined would be involved in the video development while the others focused on completing the written reports or storyboards. More importantly, the group members need to communicate their plans and generate content to communicate to their peers. Hence, communication and other soft skills such as teamwork, creativity, critical thinking and problem solving could be incorporated in such a task.

Hence in the next section, the research questions, followed by the methodology for the design of tasks for a formative assessment among the participants of the study who students in a selected course were, where screencasting was conducted as a form of formative assessment for students learning.

5. Research Questions

The aim of the research was to determine the process among participants of the study, who were students in a postgraduate course using a screencasting tool such as Screencastify to convey their knowledge for formative assessment and to determine the participants experiences and perceptions of the tool. The following are the research questions:

• Were the participants in the context of the study able to convey their knowledge through their screencast videos using Screencastify?
• How did the participants beliefs of technology influence the use of Screencastify?
6. Method

This study employs a design-based research in an innovation for a selected course. The course which was selected was a doctoral course in the Faculty of Education, in which the content of the course included theoretical knowledge, such as learning theories and instructional models. Due to the lack of time for students to do presentations in the face-to-face mode, a blended learning approach was incorporated into the course and the videos posted by the participants would be used as formative evaluation for the students’ benefit.

The sample, which comprised of five student participants attending the course, who were willing to respond to the open-ended questions relating to their use of technology, and their beliefs in the use of technology for learning, to gather insights into their intention to use technology. The participants were all educators who had more than 5 years teaching experience in their respective institutions.

For the first research question, data was collected from the evaluation of the content knowledge conveyed in the screencasts using a rubric to determine if the objectives were achieved. The screencasts and discussion forum posts were analysed to determine whether additional content knowledge was conveyed through the screencasts. For the second research question, participants responses to an open-ended questionnaire as well as from interviews, observations and analysis of their presentations (screencasts) to determine the participants beliefs on using technology.

The Activity

At the beginning of the course, students were informed of the assignments and presentations related to the assignments which had to be completed by Week 6 and Week 13 of the semester. The students were given theoretical exposure to the course content for the first 4 weeks through interactive face-to-face lectures. Presentation slides of the lectures were also provided. However, due to the time factor, formative assessment through a class presentation and interaction after, would consume time. Hence, it was decided to use a blended learning mode for this purpose. During the third week, the students were informed that they had to prepare for the presentation, not in PowerPoint as was usually done, but as a screencast. A simple
Screencasting for Assessment of Content Knowledge...

The screencasting tool, Screencastify, was introduced, and a demonstration on how it could be used to prepare screencasts was done. Students had to download the application on their own laptops, allow the app to access their web cameras and microphones. They were then allowed to explore and develop simple screencasts in the class on their own laptops.

Two tasks were assigned as follows:

**Task 1:**
Review at ten articles which have used the learning theory you have been assigned. Present the main elements of the learning theory and how this theory was applied in the research.

**Task 2:**
Describe the main components of an instructional model which you have been assigned to do and show how this model can be used education in your video.

The rationale for selecting Screencastify was that it was an easy to use screencasting tool for video development. Most of the participants had not been exposed to this tool before and it would be of interest to determine if the tool was difficult for them. Screencastify is a Chrome extension that records your desktop and screen. The free version records up to 10 minutes, which was sufficient as a time limit was given for the presentation.

**Limitations**

The study is limited to doctoral students, who may be considered academically included and were more likely to use technology to manage their time and learning. They were also educationists and were more likely to have used technology for instruction.

7. **Findings**

The findings are reported according to the research questions on whether the participants in the context of the study able to convey
Innovative Practices of Technology-Enhanced Learning

their knowledge through their screencast videos using Screencastify, and how the participants beliefs of technology influenced the use of Screencastify.

**Conveying content knowledge through screencast videos using Screencastify**

All the participants managed to score above 80% in the evaluation, indicating that they had managed to convey the relevant content knowledge for the related tasks. In Task 1, the screencasts on the presentation of the learning theory showed that the participants had reviewed the articles and indicated elements of how the learning theory was used in the research.

In Task 2, several instructional models were presented, and all participants had managed to show the main components of their instructional model and demonstrated how this model could be used in education. Hence, screencast videos could be used to convey content knowledge from the evaluation of their screencasts.

Content information could be easily presented as notes were easily displayed in the screencasts. This is evidenced through Screencasts L2, when content knowledge was displayed in the form of text (see Figure 8.3).

All the screencasts had used Powerpoint slides to display content. Hence, features from Powerpoint such as tables and graphics were incorporated. A sample of a screenshot from the screencast showed that tables were used in the Powerpoint slides to make comparisons as seen in Screencast S1 (see Figure 8.4). One of the participants used a modified and stylised table in screencast C1 (see Figure 8.5).

*Figure 8.3. Content Knowledge Displayed in Text in a Screencast for Task 1*
Figure 8.4. Composite Screengrabs of the Screencasts for Task 1

Figure 8.5. Screengrab of a Stylised Table Used in the Screencasts for Task 1

The screencasts could be made interesting and attractive with the use of relevant and meaningful graphics and videos. In Screencast P2, many interesting graphics were used to attract attention and display information in the form of charts when the Dick and Carey model was elaborated (see Figure 8.6). In addition to graphics, some of the participants incorporated other videos in their screencasts (see Figure 8.7). This was to take advantage of the affordance that everything displayed on screen would be captured and these additional videos derived from other sources were incorporated in their screencasts.

Other features which were used in the screencasts were annotations. Annotations was a feature available in Screencastify. During the explanation of the video, this feature was used to draw
attention of the audience to the points being elaborated and discussed, such as “Analyse Learners” in the flow chart in Screencasts P2 (see Figure 8.8).

In viewing an explanation such as when watching a video could be boring when viewed continuously. Sometimes a change in direction is required so as to break the monotony. This was obvious in screencast W2, where a pause for reflection and self-assessment was followed by a revision of the steps in the ASSURE model (see Figure 8.9). This provided a change of tempo and made the audience pay attention and focus.

Figure 8.6. Composite Screengrabs of Screencasts with Attractive Graphics for Task 2

Figure 8.7. Composite Screengrabs of Videos in the Screencasts for Task 2
The screencasts were used to convey content knowledge in terms of information as well as processes. For process and procedures, in the Dick and Carey model (see Figure 8.8) as well as the ASSURE model (see Figure 8.9), flow charts were used and with annotation, the audience could be assessed to focus on certain aspects and processes in the model. However, the screencasts could also be used for reflection to encourage thinking by posing questions and allowing for time to reflect (as in Figure 8.9).

Screencasts could also be used to display the higher order thinking that was happening within the students, allowing them to make their knowledge processes explicit. This was shown in Screencast S1 where the participant had abstracted the similarities and differences between the papers reviewed to display (see Figure 8.10).
The screencasts were posted on a discussion forum on the Learning Management System used in the course by the participants. The interactions on the forum also indicated that there were higher order thinking processes occurring. In posting the Screencast C2, there was evidence of the thinking that had gone on, and the encouragement of thinking and engagement with the audience, when it was asked “Why is it not ARCS and not CARS?” (see Figure 8.11).

The screencasts and provided further interactions and responses from the participants. However, most of the stimulus for higher order thinking came from the questions of the instructors and from the individual participants who started reflecting and making connections such as in Figure 8.12 and Figure 8.13. Peers were mostly appreciative and did not contribute much in terms of questions for this particular task.
8. Beliefs of Technology Influence the Use of Screencastify

The information gleaned from interviews and a survey provided the data to determine the participants’ beliefs on technology and whether this influenced their experience when designing the screencasts.

Firstly, we determined whether the participants were using technology extensively. Although all five participants had used technologies for communication, only two were active users of technology for instruction related to their work. In addition, most were using technologies which were easily accessible through mobile devices.

![Figure 8.12. Responses for Peers to Discussion Forum Posts](image)

![Figure 8.13. Responses from Instructor on Discussion Forum Posts for Sharing Video](image)
9. Technology for Instructional Activities

Only one of the participants, P3 who is a male lecturer in a private college, claims to be a power user of technology and uses technology in his work and life: “I rely heavily on technology to get my work done. I use latest technology in all aspects of my daily life.” However, the screencasts that he produced had more text than graphics (see Figure 8.3).

Another participant P2, who is a primary school teacher, claims to use technology a little less often: “If 10 is the full marks, I will give myself 7 marks because I will try to fully master the technology that I am using. But as the speed of development of new technology tools is too fast, sometimes I will stop myself from getting to know new technology which I might not have time to master.” Her emphasis is technology for work. However, P2 had created screencasts which incorporated videos (see Figure 8.7) and had interesting graphs and a pause for reflection (see Figure 8.9).

The other three participants do not grade themselves as expert users of technology and claim to use it less often. P1, a female lecturer at a private college states, “I only have basic knowledge on most of the technology devices/softwares.”, while P4, a female lecturer at a matriculation college, shares, “I use it moderately. I use technology at work, or in daily life but I rarely use the new apps.” P5, who is a teacher trainer, says, “There are still a lot more skills I am yet to learn.” However, all the participants managed to design and develop their screencasts easily and effectively.

While all the participants use technology for work, two of them, P1 and P5 seem to focus on the social interaction aspect of technology and the use of applications for socializing. In addition, P1 also uses technology for entertainment. However, screencasts did not pose to be a difficult technology tool for them.

10. Technology Use

*Mobile Technologies and Applications*

Mobile technology applications might be easier to use for the participants. When they were asked what technology tools and apps were used, almost all of them had stated “WhatsApp”. This mobile
instant messaging tool seems to be easy to use, perhaps because of its availability and convenience of use. Another application which was mobile is a student response system, Kahoot. P1 and P2 had stated Kahoot as one of the applications used, probably because of its ease of access.

In addition, mobile devices could be used to access online materials. P2 had used a QR code reader to access learning resources from textbooks: Teaching materials, the application developed by Chinese Language Department in the Curriculum Development Division, Ministry of Education, were accessed by scanning the QR code provided in the textbook for extra learning resources.

**Identifying Resources and Videos**

Participants would have used search engines to look for information online. Google and Google Scholar were mentioned by P2 and P4 respectively. In addition to search engines, P2 also mentioned that she used YouTube and the “Frog platform”, referring to the Learning Management System currently in schools, which is the Frog VLE. Hence, participants such as P2 would have identified resources such as webpages and YouTube videos and linked to the Frog VLE for teaching.

**Production Tools**

The participants had used technology tools for production, but the focus seemed to be on teacher creating content. Two of the participants (P1 and P2) had mentioned PowerPoint for producing resources. However, perhaps because this tool is commonly used and hence, was not mentioned by the other participants.

Other PowerPoint, some of the participants had used screencasts. P3 used screencasting often “Yes, I use it for my lessons. I use screen-o-matic. Very user-friendly.” P2 also had experience with screencasting, “I used OBS Studio to screencast a topic for students’ revision before they sit for an exam. The screencast process is tougher than on-site teaching, especially if the screen-caster is chasing for perfection.” P1 had used Screencastify once at work before.

However, experience in using technology tools, or lack of experience in using screencasts, did not seem to matter in the design and development of screencasts. This was because participants
with more experience in technology tools and screencasting did not necessarily produce better quality screencasts for this purpose.

11. Beliefs on Technology

Most of the participants believed that technology could improve their work performance. This was because their work was more easily accessible “Make work accessible anytime, anywhere.” (P1); and could be completed faster “Without accounting human factor, apps did improve the rate of completion for most of my tasks” (P3). In this way, it could save time “I can save the time to work on some other things” (P4).

Technology could also add variety to lessons. P1 says that, “Kahoot after completion of the lesson adds fun and challenge to the class.” This would definitely engage the students, as P2 states: “Yes, because students really love to see something new in the lesson and this make them love your subject.” The participants also seem to believe that technology could make work less of an effort. The amount of time that was saved using technology was mentioned by three participants (P1, P2 and P4). The search function is an important factor in saving time. P2 states “Yes, instead of opening a lot of books and search for the wanted content, I can get any information through the search engine directly.”

Efficient class management was mentioned by P3 and P5. P3 refers to classroom management, “For example, I use Google Classroom to manage my school.” On the other hand, P5 refers to the management of the training with her trainees, “makes my work more efficient because I do not have to wait to meet the person to deliver the message or receive information.”

Most of the participants enjoyed using technology, expect for P1, who shares: “Not really. Lack of skill, and sometimes, complicated to learn.”

However, they would all use technology in their teaching because it would engage students. P1 shares that she would use technology if it was relevant, “Yes, if it is applicable. It adds variation to the classroom.” P4 shares, “Students are more excited to learn using technology.” While P5 felt technology was “interactive”. In short, P2 feels that, “Yes, from my experience, technology is able to make my lesson preparation more effective, make the lesson more interesting
and compact, the most important is students show more interest to learn.”

Hence, the participants in the study seemed to find technology easy to use and would use technology in their instructional activities. The priority was on the student and if it was useful and relevant for student learning, the technology would be used. In the next section, participants identify the limitations on the use of technology, conditions such as lack of equipment and connectivity, as well as limited skills were identified.

12. Conditions on Use of Technology

Although only three participants (P1, P4 and P5) mention equipment and connectivity, it is assumed that wifi for internet connectivity and equipment are important factors to enable the use of technology. Some of the participants indicated that they required training as they had limited skills in use of certain software, “Yes, for particular software which need particular skills.” (P2). P4 had only basic skills in some of the software, “I have basic skill to operate the software/app, good enough for my work and etc. However, I didn’t maximize the function of certain software/ app. For example, I do not know many functions of Excel software, which can help in work even more efficient all have.”

P3 instead would explore on his own on the applications he needed to learn, “Usually I explore the platform by myself. If anything, that I’m not sure, I will send enquiry to the application developer.”

13. Social Influence on the Use of Technology

Students were seen as the main influencers of the lecturers, teachers and trainers in using technology. P3 states, “Students usually adaptive, they will follow the instructions on using the technology in their learning.” Many of them noted that colleagues and friends were also influential (P2, P3, P4 and P5). As P2 states, “Family, colleagues and friends because they are the persons, I contact the most.” While P5 believes everyone will influence her use of technology, “Everyone surrounding me if possible because it will make my work easier (to communicate / deliver tasks, etc.).” P3 notes that older staff were normally less comfortable with the use of technology, “The senior
staff are more reluctant to use the technology.” Hence, although there seemed to be some restrictions on the use of new technology tools, tools effective for the students’ use would be considered for use.

14. Experience in Using Screencasting Tools

It was the first experience for some of the participants. Some, such as P5, were amazed at the technology, “Yes, during my class (theory). Screencastify – to complete presentation tasks. It was very interesting and impressive because I can see what the content is and how am I delivering to audience.” P5 seemed to focus on delivering the content when using screencasting, “Can be used for teaching. Students will listen or watch the presentation in the classroom, while teacher can focus on students’ understanding and coaching while the video is on.”

P5 would also use screencasting, “Yes, because this is my original work after summarising the main idea, student/ audience will have more confidence on teachers’ knowledge in the delivering of any specific topic. At the same time, I can observe students/ audience reaction while watching the video and exactly how much attention is being paid to the subject.”

P1 was also experiencing for the first time and found it easy to use, “I will try to use in an assignment for my student’s presentation. It Screencastify was easy to use. Steps are not complicated like certain software/apps.” Her reason for using it would be “Yes. It is one of the ways to add variation to presentation. Students also can record and select the best video to be submitted. Friends and lecturers can share feedback/comment on the outcome of the video.” Hence, she was also thinking of student-generated content using screencasting on a platform to share and obtain feedback. She might be using it for big classes, “Yes, especially when it is a big class. Save time and add variation to different ways of presentation.”

P3, had already been using Screen-O-Matic, which he found easy to use. He believed it would be “useful for teaching and learning.” However, he did not believe in using it at the moment, “Not for now. Maybe for the future development of new teaching materials.”

P2 had also believed it could be used for both teaching and learning, “Yes, Screencastify can be used for teaching / learning because it can deliver information as how teacher deliver it in the class. Teacher can design assignments, assessments and even collaboration
Screencasting For Assessment of Content Knowledge... | 155

project through Screencastify although it is not a face to face teaching/learning.” The use of this technology might engage the students who had to watch the teacher. “Yes, I will use Screencastify in teaching for few lessons in order to avoid the dullness of face to face lesson, it might be fun to see your teacher having lesson in the screen.”

Although P4 believed it could be used for teaching and learning, she elaborated more on the affordances of screencasting for teaching “Yes, it can be used for BOTH teaching and learning. The benefit of using Screencastify is that the video that be played repetitively. Whenever students have doubts and misunderstanding, students can play the video again and again to enhance their understanding.”

P4 believed that the use of such technology would engage her students, “Yes, I would definitely use it in my teaching and learning in future...when I used more technology in classroom teaching. I realized that students have better classroom engagement and performance.”

Hence, only one of the participants doubted whether he would use screencasts immediately but would probably use it in future, while the others were more confident that they would use it.

Discussion

Screencastify could be used to deliver content knowledge. This was because in effect, it had the affordance of being a video and being able to be medium for knowledge acquisition (Jonassen et al., 2003). There was incorporation of different media as information was transmitted in textual, graphics, tables and other videos could be included. And this would enhance its use as a cognitive stimulator for learning. The affordance of videos is that the social-cultural aspects of the designer could be incorporated through the media shown and through the audio narration. All the participants had used their own voice for the narration during the screencast. In addition, pauses, intonation and emphasis could be included for a social cultural aspect (Kaur et al., 2014). The language was in a local tone and dialect which the learners were familiar with. Audio could be a powerful stimulus for sound effects in video. However, during these tasks, the audio was limited to narration by the participant, and not from other audio files. Perhaps the participants with more experience might include other sound effects to engage their audience.

However, in order to make videos more interesting, a change of pace was included in some of the videos. This was for the purpose
of reflections for audience to start their thinking process, and for a change of direction in the video. The advantage of screencasting software such as Screencastify over videos is that it had enhanced features such as annotations with was not available in normal video format. Hence, this was one way to signal the learner to emphasize points being explained.

Screencasts enabled students to abstract information and show higher order thinking, evidenced in the screencasts and during the discussion posts. This was because students had to construct their own meaning from the materials they obtained and test out their ideas when they presented to their peers and the instructor in the constructive learning environment (Ally, 2004). The screencasts were linked in the discussion forum on the course’s Learning Management System and enabled social interaction for the building of knowledge (Garrison & Anderson, 2003; Laurillard, 2002). Although there was some higher order thinking evidenced in the discussion forums, there was not much interaction between peers on the content, only between the instructor and learner. This was perhaps because the students needed time to sense and experience the content in the screencasts before they could contribute meaningful discussion and argument on the topic (Alston & Ellis-Hervey, 2015; Laurillard, 2002). Hence, future designs of the learning could include time to analyse the video content for a better experience.

Screencasting did not seem to be a difficult technology tool for learners. Although some of the participants had never used this tool much or had difficulties when using of technology, they did not seem to have problems when using Screencastify. Hence, the participants experience in using technology, or the lack of experience with screencasting, did not seem to matter when designing and developing screencasts for the tasks. Participants with more experience in technology did not necessarily produce better screencasts.

The participants were positive towards the use of technology as they believed that technology could improve their work performance. Hence, the participants seemed to find technology easy to use and would use technology in their instructional activities. However, when asked on the limitations on the use of technology, conditions such as lack of equipment and connectivity as well as limited technology skills were identified. Although there may be some resistance towards the use of new technology tools, when the tools were effective for the students’ use, the participants would consider the tools for use.
Conclusion

Screencastify seemed to be an easy tool to use for conveying knowledge among postgraduate students and hence could be used for formative assessment. The participants' beliefs and experience in using technology tools did not seem to have an effect on the use of Screencastify as participants with limited experience in using screencasting tools and technology could also use the tool with ease. This would mean there would not be much training required for using the tool. This would make it an ideal tool for emergency and remote learning as it could be implemented easily. On the other hand, the infrastructure and resources need to be provided for students attempting to use screencasts. None of the participants seemed to have considered using resources and media which had creative commons licensing and hence, future development may need to consider resources which had the proper licencing. In general, screencasting could be easily used to convey the content acquired by students to assess their learning for the purpose of formative assessment. In attempting to do so, students in higher education might not require much training or prior experience before using this tool. Hence, it could be a viable option for formative assessment in courses which had limited time for face-to-face interaction.

REFERENCES


Innovative Practices of Technology-Enhanced Learning


Augmented Reality (AR) with HP Reveal

Augmented Reality (AR) is a rapidly emerging field that combines the real and virtual world that may appear in the form of 3 dimensional (3D) overlays whereby users could have interaction with these virtual objects using handheld devices such as tablets and smartphones. This human-machine interaction tools offer information in a form of audio, visual, video or any other channel that allow users to explore and experience the real world at the same time as the virtual imagery unlike the immersive virtual reality (VR). One of the common AR application software available is HP Reveal. The affordances of the AR application is that it is very convenient, portable and inexpensive to use as the users only need to have handheld devices such as tablets and smartphones to download the AR application. In addition, there are many educational based AR activities are readily available on AR platforms for instructors to use.
References and links to tutorials (YouTube etc) on use of tool should be included.
Make your Own Augmented Reality: https://www.youtube.com/watch?v=pEVKtPcQg&t=23s
How to use HP Reveal Studio - create an aura for beginners: https://www.youtube.com/watch?v=nZKQEa7HZY

### Instructional Strategies for using Augmented Reality (AR)

Instructors may use AR application to assist students in learning abstract concepts and difficult content through visual models which is hard to understand through books, visualization in the classroom, via computer devices and the human mind. When using AR application instructors can design learning task with digital content- Aura in a form of (animation, video, audio, images) that will be displayed on the screen when the camera is able to track the real object.

Another instructional strategy for using AR is for student-develop AR generated content that allow students to work collaboratively by creating new knowledge rather than learning become just transmission of knowledge.

References and links to best practices on use of tool can be included.
AR with Dr Dorothy: https://www.youtube.com/watch?v=ZABzL4vbzac
Implementing Augmented Reality in the Classroom: https://journals.uair.arizona.edu/index.php/itet/article/view/18601/18526

1. **Introduction**

It was noticed that first semester undergraduate students still struggling to understand facts, concepts on topic such as Cybercrime and to apply it to solve the real-world problem. Even though, there are empirical evidence that shows traditional teaching method via memorization and recitation techniques yield successful results for many centuries, students are still not acquiring knowledge and skills for in-depth
learning, problem solving and collaboration skills. Therefore, when the students face challenges in understanding the fact and concepts, it led to misconceptions about topic learned.

As understanding the basic facts and concepts seems to be an issue, one way to address this problem is for instructors to identify the appropriate pedagogy to help minimize students’ misconceptions because learning factual knowledge and concepts referred to basic information that students must master pertaining to a subject which includes terminologies and definitions of a topic. Then, after mastering the basic concepts, students will be able to proceed to next stage of learning principles, rules, discrimination and problem solving (Endo, Yasuda, Mouri, Urata, & Tian, 2014; Yen, Tsai, & Wu, 2013). Hence, as a solution to this problem to learn factual knowledge and concepts is through visualization that allow the students to explore the images. Instructors can design a learning task incorporate technologies that support visualization such as augmented reality (AR). By learning with AR application, many students able to relate with the content taught in the class when the traditional learning task activities such as practice and drill seems to very boring and dull that leads to students having short attention span and lack of motivation towards learning.

What is Augmented Reality (AR) in Higher Education?

Teaching and learning in twenty-first century can be more successful with innovative pedagogy because teaching in higher education is more than just delivering knowledge as content and facts (Dewitt, Alias, & Siraj, 2015). Due to that, the focus on teaching and learning should be on acquiring skills for interacting, applying, evaluating and creating new knowledge as well as problem solving (Martin, 2006; Ronen & Pasher, 2011). In order to achieve that, higher education institutions are moving away from didactic and traditional pedagogies such as direct instruction (lecture) and focusing more on improving student’s learning experience by developing their thinking skills through the use of emerging technology such as AR to meet the demands of learning among the new generation of students (Wang, Callaghan, Bernhardt, White, & Peña-Ríos, 2018).

AR is a human-machine interaction tool that combines the real and virtual world that may appear in the form of 3 dimensional (3D) overlays. With AR users could have interaction with these virtual objects using handheld devices such as tablets and smartphones.
Innovative Practices of Technology-Enhanced Learning

(Elmy Mat-Jizat, Osman, Abidin, Yahaya, & Samsudin, 2016; Majid, Mohammed, & Sulaiman, 2015; Ng, Oon, Lee, & Teoh, 2016). This rapidly emerging field of AR allow instructors to design and develop educational content in a form of audio, visual, video or any other channel that allow users to explore and experience the real world at the same time as the virtual imagery unlike the immersive virtual reality (VR) (Manuri & Sanna, 2016; Martín-Gutiérrez, Fabiani, Benesova, Meneses, & Mora, 2015).

With content created with AR application, allows the students to move around the 3D virtual image like the real object form any point of view and the students also are able to integrate new knowledge learned from the virtual objects to perform the real-world tasks. This is because, learning abstract concepts and difficult content through visual models can be very difficult and frustrating to understand through books, visualization in the classroom, via computer devices and the human mind. Due to that AR offers a new educational approach in assisting students to learn difficult content in more interesting and effective way beyond static experiences (Kesim & Ozarslan, 2012; Sural, 2018; Yen et al., 2013).

In the end of the day, students are not only going to learn facts and concepts but using AR tool as also create opportunities for students to build content with what they studied or understood (Sural, 2018; Wang et al., 2018). Studies shows that, students perceive listening to their lecturer talking continuously is very dull and fails to engage them but technology integration such as AR would help in-depth learning process which allow them to develop thinking skills and problem solving. AR also promote the culture of working collaboratively with peers to complete certain task either face-to-face or remotely through the merging of the virtual world and the real world (Kesim & Ozarslan, 2012; Wang et al., 2018).

There are many justifications for using AR technology in this study since AR can be considered as one of the educational technologies for future. First of all, AR application is a very simple and friendly tools that student can explore. Moreover, all the students in this study had not been exposed or used AR before for learning. Hence, students will be more interested and in high enthusiasm to learn via AR. The free software offered by HP Reveal allow the students to download and learn with AR anytime and anywhere also contribute to learning without boundaries among the students.
2. Purpose of the Study

Although there are many researchers worked on the mobile AR that focus on field of medicine, engineering, chemistry, mathematics, physics, biology, astronomy and history but there does not seem to be much research to investigate the learners’ experiences using AR application as tool to enhance conceptual understanding in the area of educational counselling. In addition, this research is unique as there does not seem to be any studies incorporating AR among undergraduate counsellors. Hence, in this chapter, an AR application was developed to support undergraduate students in the Faculty of Education learning on an unexciting topic such cybercrimes. The aim of the research was to investigate the students’ experiences and perceptions of the AR application integrated in teaching and learning. The following are the research questions:

1. What is the students’ perception on the technical usability of the AR application developed for “Cybercrime” topic?
2. Is AR application effective in promoting learning “Cybercrime” topic?

3. Methodology

This is a design-based research in an undergraduate course from the Faculty of Education in a public university. The course participants were enrolled in a Bachelor of Counselling Programme Semester 1, Year 1. Thirty-five students were selected for the study based on voluntary participation who are willing to participate in the survey and interview sessions. The course was selected because the undergraduates are digital natives who are active users of technologies for socialization and entertainment but less using it for learning purposes. At the same time the course included theoretical knowledge that students need to master before moving on to the practical component.

In order to answer the first research question, a usability survey instrument was used for data collection which adapted from (Martín-gutiérrez, Contero, & Alcañiz, 2010). The instruments consist of twenty-three items with four main sections that focus on 1) students’ demographic and background information; 2) students’ perception on the effectiveness of AR application as a learning tool; 3) students’
perception on the efficiency of AR application as a learning tool and; 4) students’ satisfaction using AR application as a learning tool. The instruments used a Likert Scale with five responses options, “Strong Agree, “Agree”, “Neither Agree nor Disagree” “Disagree” and “Strongly Disagree and the responses were analysed using SPSS software version 23. Descriptive statistical analysis was carried out to explore students’ perception on the technical usability of the AR application developed for “Cybercrime” topic and the findings were described by mean and percentages. For the second research questions, based on the survey feedback seven voluntary students take part in the semi structured interview share their experiences using AR application developed for “Cybercrime” topic.

Development of the AR application for “Cybercrime” Topic

The learning application was designed using the HP Reveal platform which is a free application available for iOS and Android devices allow users to create Aura (3D overlays) and also support multimedia elements such as video and images that will triggered based on an image. There are four main components involved when developing an AR application which are camera to capture the real object (target information), secondly is the real object which contain the target information, thirdly is a handheld device such as tablets and smartphones to store the real object and forth is the Aura or overlay the digital content (animation, video, audio, images) that will be displayed on the screen when the camera is able to track the real object.

First download the HP Reveal application and register for a free account (see Figure 9.1). Secondly, use a handheld device such as tablets and smartphones create the Aura. In this study, the Aura was developed based on the elements of self-recorded video on Cybercrime (see Figure 9.2). Third, after registering for an account, capture the real object. The real object used in this study are infographic posters based on cybercrime (see Figure 9.3). Next, choose the aura or the overlay from the device (tablets and smartphones) (see Figure 9.4). If using existing aura or the overlay from the HP Reveal, step 2 can be skipped. After that position your aura or the overlay accordingly and save the work to the “public channel” (see Figure 9.5). Finally, the aura is ready to be shared with the students to allow them to “follow” in order to access the AR created (see Figure 9.6). Figure 9.7 shows the summary of creating the AR application with HP reveal.
Augmented Reality (AR) Experiences...

Figure 9.1. Download the HP Reveal Application and Register for a Free Account

Figure 9.2. Aura was Developed based on the Elements of Self-recorded Video on Cybercrime

Figure 9.3. Capture the Real Object (Infographic Posters based on Cybercrime)
Figure 9.4. Select the Aura or the Overlay from the Device (Left) or Library (HP Reveal)

Figure 9.5. Position the Aura or the Overlay Accordingly and Save the Work to the “Public Channel”
Figure 9.6. Students Must “Follow” The Instructor Account to Access the AR Created

Figure 9.7. Summary of Procedure in Creating AR Application with HP Reveal

Procedure of the Activities

The study was conducted for two weeks in the beginning of the course where students were informed of the final project related to the course which had to be completed by Week 12 of the semester. Throughout the two weeks, the students were exposed to the theoretical component of the course content through different supporting collaborative learning tools such as QR Code, Padlet and Wikis besides AR as the major tool used for teaching and learning. In the learning activities, students were given three tasks to complete. Students completed Task 1 and 2 during the face to face session. However, task 3 was the progress work for final project that was submitted on Week 12.
Task 1:
Students were requested to download a QR code reader, then to scan the QR code posted at the classroom walls to access an interactive wall, Padlet. In order to recall student’s prior knowledge and basic understanding on topic they about to explore, they participated in a discussion topic on ‘advantages and disadvantages of ICT’ by posting their opinion in the brainstorming wall, Padlet.

Task 2:
Students were asked to scan two posters with AR layered on them using HP Reveal application to explore related content. From the poster’s students were exposed to basic conceptual related to Cybercrime such as definition, examples and practical application.

Task 3:
Students integrate new knowledge by creating their own Wikis to illustrate their learning by conducting mini research on Cybercrime.

At the end of the second week, the students were participated in the usability survey and selected students was interviewed to determine the impact of AR application on their learning. All the survey data was collected for descriptive analysis and focus group interviews was implemented and recorded for purpose of transcribing for analysis.

4. Findings and Discussion

The findings are reported according to the research questions based on the students’ experiences and perceptions of the AR application integrated in teaching and learning.

*Students’ Perception on the Technical Usability of the AR Application Developed for “Cybercrime” Topic*

Descriptive analysis was conducted to provide understanding on the students’ perception on the technical usability of the AR application as
a learning tool developed for “Cybercrime” topic based on the mean value and standard deviation, as presented in Table 9.1

Table 9.1: Mean and Standard Deviation of the Sections of the Questionnaire

<table>
<thead>
<tr>
<th>Effectiveness of the AR application</th>
<th>Efficiency the AR application</th>
<th>Satisfaction using the AR application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean 4.32</td>
<td>4.64</td>
<td>4.32</td>
</tr>
<tr>
<td>Std. Deviation .55</td>
<td>.59</td>
<td>.56</td>
</tr>
</tbody>
</table>

The usability of the AR application developed was focused by looking at to which extent do the user are able to work effectively, efficiently and with satisfaction using AR in learning. The usability was measured after use of the AR application in week 2.

According to (De Paiva Guimarães & Martins, 2014) the variable effectiveness measure how accurately and the learning goals can be achieved by integrating AR application in learning the topic. The efficiency variable is referred to the good use of time students invest in learning Cybercrime topic using the AR application. Finally, satisfaction measures the degree to which students find AR application meet their expectation and their attitude toward the use of the AR application for learning.

The findings indicate that students strongly agreed that AR application developed for “Cybercrime” topic are usable as a learning tool. The mean value of 4.32 (SD=.55) under the effectiveness show that the AR application is stable as the image and short video are clear with language and easy to understand as the measure of effectiveness has obtained a good result. For the efficiency section, the mean value of 4.64 (SD=.59) shows that the AR application is efficient for learning because they able to complete the subsequent learning task by creating a Wiki pages based on selected topic on Cybercrime after using AR application without difficulty. Under the satisfaction section, the mean of 4.32 (SD=.56) shows that students were satisfied with the use of the AR based application in learning about cybercrime. Overall, it can be concluded that students have high perception of the AR application on the technical usability of the AR application developed for “Cybercrime” topic as learning tool.
Effectiveness of AR Application in Promoting Learning “Cybercrime” Topic

The analysis of students’ interview showed that there were several advantages in using AR application to learn “Cybercrime” topic. Students indicated that, AR application very effective in promoting their learning because AR engaged students in learning, increase learning motivation; promote peer collaboration; helps students learn to control their learning and AR leads to longer retention of information. Despite the advantages of using AR application in learning but students perceived some obstacles that become a barrier to the use of this technology due to technical obstacles related to the speed of the Internet and some students were facing technology anxiety while working with AR application.

AR Engaged Students in Learning

The first theme that emerged from the data was the AR application provides different educational experiences to students to learn mundane content as such “Cybercrime”. All this while, learning happened via traditional way by instructor providing direct instructions by using a simple presentation slide. By integrating AR, students were given an opportunity to learn in a more interactive way rather than one-way lecture. Students discovered that AR application help them to engage in learning difficult content through visualization models to get better and deeper understanding about the lesson. This also evidenced in the survey responded by S1 and S2 that: AR technology engaging me to learn about lesson topic deeper. During the interview, S1 said, “I found that AR application is interesting because learning is more fun compared to lengthy and tiring lectures”. P2 also expressed her happiness that “I didn’t know about AR application before. However, after joining this course, I learn new way of learning. I wish more lecturers will use AR to teach us because it’s totally fascinating”. Students feedback evident that, teaching and learning processes become fun and beneficial to both parties (students and instructors) when instructors able to design learning activities appropriately using technology. Thus, this increased the engagement level among the students to learn.
**Increased Learning Motivation**

Second theme that emerged shows that students were highly enthusiastic when AR application was implemented in learning the topic. AR application seems motivating the students to continue to discover and learn more about “Cybercrime”. In the survey S3 stated that: I believe AR technology has improved my learning motivation. The reason was made clear during the interview; “When I saw the video of my lecturer in the posters, I was amazed. I was thinking and want to discover more on how to use AR in my other subjects”. Another participant S4, shared in the interview that, “I’m a visual learner due to that I find AR is very interesting compared to reading slides and textbook that have length information. So, through AR its quite interesting to learn about definition and concept of “Cybercrime” because it provides relevant information quickly”. These comments indicated that, student want to re-experience AR application in other subjects and they very satisfied and keen to learn difficult content in a more fun way.

**Promote Peer Collaboration**

The next theme that emerged was the AR application develop collaborative skills among the students. The collaboration happened among students and peers, students and material as well as between students and the instructors. This was stated by S5 in the survey: AR technology allows me to work collaboratively with others. S5 also expressed in the interview that “AR application create opportunity for students to interact with the virtual objects in non-traditional environment through entertaining way”. During the interview S1 shared that, “In a group of four, we already started to design our Wiki page. The AR application allow us to learn the basic before we proceed with the final project”. Another participant S3 stated that, “During the AR session, we work individually by collecting as much information and after that we sat as a group to make sense the information we learned before the final project”. In addition, S4 also indicated that the instructor was readily available to guide them when students need assistance during the AR activities. This indicated that, AR application allow students to perform task together as well as increase communication among the students and instructors throughout the session.
Helps Students Learn to Control their Learning

Next, from the AR application used in learning, students also found out that they able to take charge of their learning throughout the session. This also evidenced in the survey responded by S6 and S7 that: AR application allow me to take control of my own learning. During the interview, S6 said, “The AR application spurs my creativity and imagination to grasp the facts and concepts because I can start, repeat and stop the application at any point of time. This allow me to learn according to my level of understanding”. S7 also shared that, “The session was very amazing because I was able to complete certain task by myself and I only ask clarification from my lecturer if am facing any difficulty. She already gave us some guidelines before the class”. From students’ feedback, it shows that the lecturer designed the AR learning task so that the students will take responsibility which allow them to make their own decisions and judgement in completing the project at the end of the day.

AR Leads to Longer Retention of Information

The last theme that emerged was AR promote long retention of information among students compared to the learning through traditional way of using slides presentation, books or articles. In the survey S1 stated that: AR allow me to remember information deeply. The reason was made clear during the interview, “I was having difficulty to understand the definition and concepts in “Cybercrime” but through AR, the posters gave me more visualization to remember for longer time so that I don’t have to memorize!”. These comments show that AR has the high impact on students learning since students able to understand and make sense of information gathered from AR deeply rooted in their memory rather than repetition and memorization.

Technical Issue: Internet Speed

Though AR provides many advantages in this study, one of the challenges imposed by AR technology is the technical problem related to poor internet connection. In the interview, S4 responded, “I was unable to view the aura since the Internet speed (WiFi) in the class very poor”. Another participant, S7 shared that, “Since the WiFi is pretty slow, I decided to use my own mobile data so that I will be able
to download the HP Reveal”. This shows that, AR application requires a stable internet connection because poor connectivity meant the instructor need to spend lot of time in providing assistance to fix the technical issue. Even though, AR application was an interesting tool for learning, but technical issues need to be taken into consideration before implementing it for teaching and learning.

**Technical Issue: Technology Anxiety**

Another drawback discovered from this study was, small number of students were battling with technical issues while using AR in the classroom. Even though they are familiar using smartphones, tablet, software for purpose of socialization, they tend to have anxiety incorporating technology for education purpose. Interview with S2 revealed that, “I’m totally unfamiliar with AR so I need more time to learn how to operate the software. But am glad my instructor and classmates are very helpful”. Another response from S5 shows that “I got lost in between because I unable to see the Aura even though I scanned the posters many times. Am also having difficulty to follow the instruction because am scared I will do something wrong”. This indicated some common sign of anxiety exhibited by the students while using AR application. Hence, working collaboratively with peers and instructors continues guidance will promote and increase confidence level to use new technology for learning, thus AR can be inclusive for all the students.

![Figure 9.8. Composite of AR Activities in the Classroom](image)
4. Implications and Conclusion

Based upon the outcomes of the current study indicating that AR application developed for “Cybercrime” topic contribute practical implication for the students as well as the instructors. From the instructor’s point of view, this study promotes the culture of innovation pedagogy by designing learning task using emerging technology as such AR rather than the usual direct- instructors to teach facts and concepts to the students. Besides that, this study also provides best practices of integrating AR into content because to integrate AR effectively into instruction, the instructor needs to have a good understanding of how AR can be incorporated together with pedagogy and content. Teaching meaningfully with technology is beyond using a device. This is because appropriate use of technology requires strategic lesson planning to incorporating AR that will encourage students to learn factual knowledge and concepts in a fun was through visualization rather than memorizing and recitation techniques.

Students will benefit AR when instructors design the learning task that will require them to interact with each other, work in a team by applying, creating new knowledge and problem solving since students need to have collaborative skill before they step into working environment. The findings of the study also show that students were satisfied learning the topic since AR application developed is very effective and efficient in learning factual knowledge and concepts an interactive way. Using AR also stimulate students deep understanding through social interactions and cognitive process during learning with AR application. When instructors are moving away from didactic teaching approach towards technology enhanced learning, students will benefit by becoming learners who are responsible for their learning.

This study also has identified certain limitations which are; 1) time limitation, as the study was conducted only for two weeks and its suggested that longer duration can yield better results in measuring students learning outcome; 2) sample limitation, as the study only focuses on one undergraduate course offered in the Faculty of Education. Therefore, the finding of this study only can be generalized to this context and population of this study; 3) spatial limitation, as the study is confined one public higher education institution. However, the finding of this study maybe applicable and pertinent to instructors in higher education institution from various faculties.
Among the drawbacks discussed in this study, nonetheless the benefits outweighed the perceived drawbacks. The findings of this study provide remarkable impact to greater audiences because this AR is not limited to certain field of study and research has shown that the applications of AR have been used in many disciplines for education, such as in Engineering, medical, computer science as well as in social sciences from the aspect of training and teaching. If the instructors are having difficulty in developing AR application, there are many AR activities are readily available on AR platforms for instructors to use. Instructors can also work with the specialists and experts in the field of AR and educational technology to design learning activities for AR. This study will enable other instructors to develop and implement learning designs which can incorporate the use of AR for education.

In summary, AR technology has the potential to engage and motivate students to learning new knowledge and skills in an interactive way the brick-and-mortar classrooms. Information can now be layered on existing objects rather than just enabling students to listen to lectures. However, this is only possible when instructors are well equipped with skills and knowledge of using technology appropriately in providing best learning experience for students because there are possibilities that AR might not constitute an effective teaching and learning strategy for some students.

REFERENCES


D2L (Desire to Learn)
D2L (Desire to Learn) is a product of “Brightspace”, which is the learning management system (LMS) for Higher Education that helps you spend less time managing, so you can spend more time teaching and learning. (https://www.d2l.com/higher-education/products/)

References and links to tutorials (YouTube etc) on use of tool should be included. https://www.d2l.com

https://www.youtube.com/watch?v=BWFqCrRhYws

Instructional Strategies for using D2L (Desire to Learn)
Multimedia lecture recordings and fully-searchable video content make courses more engaging for online, blended, and flipped classrooms. D2L is a “Faculty tool that enhances teaching success”.

BLENDED-LEARNING APPLIED IN A JOINT MASTER PROGRAM IN VIETNAM–VOICES FROM PROFESSIONALS

Le Hoang Dung
It is “Built by educators for educators”. “Brightspace” makes it easy for educators to teach the way YOU want to teach.

Engagement Plus for Brightspace

https://www.youtube.com/watch?v=UwT-iiXgpwk

1. Introduction

The spreading of education industry 4.0 has exerted a great influence on Vietnamese higher education in the recent years, which is typically seen in the national project with the same name being implemented nationwide. In 2017, Vietnamese Government promulgated the Decision 117/QĐ-TTg on Project “Enhancing application of information and technology in academic and administrative services, scientific research and quality assurance of education in 2016-2020, vision 2025”, highlighting the important role of education industry in the new era. Several targets are presented, say it is expected in the project that “70% of the further training courses held for teachers and educational administrators should be conducted via blended learning”. A number of public institutions are expected to propose plans for applying educational technological advancements at their institution. During 2017 and 2018, almost every institution, both public and private, holds at least one or two seminars and scientific conferences on the impact of education industry 4.0 on their institution as well as the Vietnamese educational system.

Among such advancements, e-learning or online-learning has long been widely applied in different institutions, even much long before the national project in 2017. Though much has been discussed related to macro level of technologies in terms of quality assurance, curriculum innovation, policy improvement, management behaviours, etc. that may have affected or may affect the national education, the impact of e-learning at the micro level, especially at the grass root level like teaching and learning receives less attention. Blended learning, which blends online learning with more traditional methods of learning and development (Adams et al., 2018 & 2020; Thorne, 2003), receives little attention in Vietnam, though a few institutions have made relatively good use of such. Local literature records limited scholarly
publications on blend-learning, which are mainly in a few disciplines like medical study, engineering, information technology, teaching English, etc. Situated in such a context of teaching and learning in Vietnam, the chapter aims to report reflections by ELT professionals on how blended learning (BL) is actually applied in a joint master program (between a Vietnamese university and an American one), identify key benefits and difficulties (if any) in such application of BL in Vietnamese higher education and propose some pedagogical implications for better utilisation of BL.

2. Theoretical Framework on Blended Learning

What is Blended Learning?

The ubiquitous use of BL in different forms the recent decades have profoundly affected the student life and school life in different ways depending on how it is applied and interpreted. The term “blended learning”, as found by Norberg (2017), the most frequent occurrences in the internet (with 4690000 occurrences), has been widely used as a trendy term and relatively new, inclusive and up to date. This shows a rampant role of the term. In a very simple way, Thorne (2003) defines “blended learning which, like its name suggests, blends online learning with more traditional methods of learning and development”. In other terms, “a course is blended if ICTs (Information and Communication Technologies) are at all used in a course, in addition to traditional tools and methods (Allen & Seaman, 2003, p. 6). In the same manner, but Norberg (2017) puts it differently, “blended learning uses ICTs for integration into that which is existing, mainstream or traditional.”

Meanwhile, Garrison and Kanuka (2004) write that “at its simplest, BL is the thoughtful integration of classroom face-to-face learning experiences with online experiences” (p. 96). The definition emphasizes “thoughtful integration” as deliberate intention of the designer or instructor of the course. Likewise, Lim and Wang (2016) further expounds the definition in details, saying that “BL is the deliberate fusion of the on-line (asynchronous and/or synchronous) and face-to-face contact time between teaching staff and students and/or between students in a course”. In a nutshell, while definitions may vary, the commonest one focuses on the combination and infusion of traditional forms of teaching and learning with any technology-
enhanced devices, resources or applications for maximal learning potential and efficiency.

**Major Models of e-Learning and Blended Learning**

A discussion of BL will not be sufficient without mentioning e-learning since the latter is indispensable to the former. As soon as the global information medium called world wide web came into existence in 1989, technologically innovative applications have been continuously changed the world. A wide range of application of electronic technologies such as radio, TV, cell-phone, internet, massive online open courses (MOOCs), integrated or virtual learning environment (i.e. Blackboard, IVLE, D2L, MOODLE, etc.), smart phone, or cloud-based apps, etc. have profoundly been changing the world of education.

Among the applications, e-learning, which is an example of educational paradigm change is defined as “an innovative approach for delivering learner-centred, interactive and facilitated learning environment to anyone, anyplace, anytime by utilizing the attributes and resources of various digital technologies along with other forms of learning materials suited for an open, flexible and distributed learning environment” (Khan, 2005, p. 33). Khan’s definition and model of e-learning plays an important role in education. The appearance of e-learning makes a big change in delivery methods and functions of education, tentatively shifting education to become a life-long learning process of any person, giving one endless opportunity to enrich their knowledge. Khan comes up with a revised octagonal E-learning framework (Khan, 2010) with eight dimensions as shown in Table 10.1 to help educational stakeholders think through every aspect of what they are doing during the steps of the e-learning design process.

<table>
<thead>
<tr>
<th>Dimensions of E-Learning</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutional</td>
<td>Concerned with issues of administrative affairs, academic affairs and student services related to e-learning</td>
</tr>
<tr>
<td>Management</td>
<td>Refers to the maintenance of learning environment and distribution of information</td>
</tr>
</tbody>
</table>
At the institutional level, Lim and Wang (2016) present a framework developed from a holistic view of building institutional capacity to drive, sustain, and scale up BL. Eight strategic dimensions included within the framework are vision and philosophy; curriculum; professional development; learning support; infrastructure, facilities, resources and support; policy and institutional structure; partnerships; and research and evaluation. The framework outlines a holistic approach to the implementation of BL, including a self-assessment tool to help guide HEIs in their reflection on the existing institutional BL strategies (if any), identify gaps and issues in these strategies, and plan how these gaps and issues could be addressed.

Arguably, it can be said that BL may be applied at different levels, depending on who the learners are, what their level of expertise is, in what context the learning is happening, what content coverage is, how the traditional and the technology-enhanced forms of teaching and learning can be combined, and so on. Among the said dimensions of e-learning and blended learning, curriculum plays a crucial role in the designing. “Curriculum”, as defined by UNESCO (2016), “is a

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technological</td>
<td>Examines issues of technology infrastructure in e-learning environments, including infrastructure planning, hardware and software</td>
</tr>
<tr>
<td>Pedagogical</td>
<td>Refers to teaching and learning &amp; addresses issues concerning content analysis, audience analysis, goal analysis, medium analysis, design approach, organization, and learning strategies</td>
</tr>
<tr>
<td>Ethical</td>
<td>Relates to social and political influence, cultural diversity, bias, geographical diversity, learner diversity, digital divide, etiquette, and the legal issues</td>
</tr>
<tr>
<td>Interface design</td>
<td>Refers to the overall look and feel of e-learning programs, encompassing page and site design, content design, navigation, accessibility and usability testing</td>
</tr>
<tr>
<td>Resource support</td>
<td>Examines the online support and resources required to foster meaningful learning.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Includes both assessment of learners and evaluation of the instruction and learning environment</td>
</tr>
</tbody>
</table>
systematic and intended packaging of competencies (i.e. knowledge, skills and attitudes that are underpinned by values) that learners should acquire through organised learning experiences both in formal and non-formal settings”. The curriculum guides what will be learned, and why, and how this learning is facilitated. In relation to this, curriculum is an important dimension in the above frameworks of both e-learning and blended learning.

In its narrow scope of study, this chapter specifically addresses the pedagogical dimension in those models, putting more emphasis on “constructive alignment” in the design of syllabus and planning of teaching-learning activities (i.e. part of the curriculum dimension) as well as “evaluation of learning”. This single qualitative case study, which will be later described in more details, stresses on both pedagogical and evaluation dimensions of blended learning, as well as how the combination of face-to-face component and online one should do for more success and for higher level of satisfaction from the learners.

**Benefits of Blended Learning**

It would be difficult to fully evaluate the effectiveness and benefits of BL because “the effectiveness of BL depends highly on the context in which it is adopted and how it is implemented” (Garrison & Kanuka, 2004). Different benefits can be recorded in terms of provision of enriching resources, high accessibility of the course contents, high flexibility of class format and structure, etc. However, a number of limitations have been well identified such as time constraints, course preparation, technical issues, design philosophy underpinned in the learning modules, etc. As an example, in a single qualitative case study, Cloete (2014) investigates how the perceptions and attitudes of a teacher in the programme towards BL echoed the strategic plan of one institution to use the BL approach. The study showed that this teacher’s perceptions and attitudes reflected a positive disposition towards the implementation of BL but that the perceived barriers placed the individual’s potential of achieving the institutional goals for incorporating BL at risk. Cloete also suggests the need for effective change management and for institutional leadership in order to facilitate a more unified vision of what BL means to the institution and to provide the necessary support to ensure teachers make a successful by transition into a defined BL role. Another case study is carried out
by Yousef (2015) in his doctoral dissertation that explored the “new design paradigm of blended MOOCs” (bMOOCs) that aim at bringing in-class (i.e. face-to-face) interactions and online learning components together as a blended environment.

In order to achieve ultimate success in BL, Thorne (2003, p.35) proposes 8 key strategies including (i) identifying the core learning need, (ii) establishing the level of demand or timescale, (iii) recognizing the different learning styles, (iv) looking creatively at the potential of using different forms of learning, i.e. matching the learning need to different delivery methods and identifying the best fit, (v) working with the current providers, internal and external, to identify the learning objectives and to ensure that the provision meets the current need, (vi) undertaking an education process and developing a user-friendly demonstration to illustrate the potential of BL, (vii) being prepared to offer follow-up coaching support, and (viii) setting up a monitoring process to evaluate the effectiveness of the delivery.

By and large, an extensive number of studies on BL in other contexts can be found in the extant literature. Each situates itself in a certain setting of its own, given a number of variables and factors that may affect the effectiveness and efficiency of BL. Arguably, benefits of blended learning is therefore highly contextualized.

**Studies Related to Blended Learning**

A simple search from Google shows a relatively good number of papers or writing related to the issue of BL in Vietnam, conducted in Vietnam or related to Vietnamese nationalities abroad. Although several types of LMS may have been done and applied in Vietnam such as Blackboard, MOODLE, Schoology, D2L, or the like, the use of such BL needs more investigation from different angles.

Vu, H. N. (2014) did a qualitative case study on 13 sophomores participating in one of 4 blended courses (Accounting, Finance and Banking, Business Management or Applied Information Technology) at Hanoi Open University to understand the students’ expectations and experiences of BL. The findings reveal participants had very positive expectations of BL and these related to timing (flexibility and convenience), usefulness, (for work and future qualifications) interaction, experiencing new technology, quality of course, and accreditation. Also, in 2015 Hoang’s qualitative study, EFL teachers’ perceptions and practices of BL in a Vietnamese university and
Innovative Practices of Technology-Enhanced Learning

Influencing factors were investigated. The study found that teachers have limited understandings and use of BL due to three primary influential factors: (i) the traditional teacher-centred pedagogy, (ii) institutional management and leadership styles, and (iii) fragmented knowledge of technological, pedagogical, and content knowledge (TPACK) for BL (Hoang, 2015).

In another qualitative case study done by Vu, X. H. (2015), the author examines the development of hybrid active learning practices among Vietnamese international students in an ICT-enhanced BL environment at an Australian University and finds that the participants experienced a number of difficulties “while becoming more active in their learning in the new ICT-based setting”. The study concludes that “in order to develop active learning characteristics, students need to be facilitated and supported by an educational environment in which knowledge content, learning environment, teaching approaches and assessments are carefully designed with a thoughtful integration of ICT to engage students in more effective study.” This highlights the vital role of course planning and curriculum design in BL. Recently, Nguyen (2017) conducted a sequential explanatory mixed method study to explore tertiary level EFL Vietnamese teachers’ view in their blended language classes. The study finds that the Vietnamese teachers welcomed BL. However, their narrow interpretation of BL and the challenges in their teaching practices hindered them from fully realizing its potential. The study suggests more provision of technology training in pre-service teacher education, and enhancement of teacher autonomy.

While several other local studies can be cited here, it is noted that each study explores certain facets or dimensions of blended learning from a certain context. This chapter bases itself on a case study that examines voices from ELT professionals when they were participating as learners in a blended course of the master joint program. Seriously considering the suggestion by Vu, X. H. (2015) on pivotal role of course planning in BL, the current study further extends the local practice in BL in particular or technology-based education in general as well as contributes to the extant literature another case for reference. The design of the blended course is explained in the next section.
3. Methodology

The chapter reports results from a qualitative case study that investigates experience and reflections by 19 ELT professionals (i.e. teachers of English) participating in a joint master program in Linguistics with TESOL concentration (Teaching English to Speakers of Other Languages) between an American university and a Vietnamese counterpart in Ho Chi Minh City. This exploratory case study was based on while-teaching class observation by the researcher, final reflections by all 19 class members, who have from 3 to 10 years of teaching English at different foreign language centres and universities (the average number of teaching years is 5.10 years), and an open interviews with five of them in the same cohort.

It is noted that the class depends largely on a course syllabus designed in details of 10 pages, describing all the requirements of the course, of which the most important is a well-stated “constructive alignment” (Biggs & Tang, 2007, pp. 50-62) amongst the course expected outcomes, course assessment tasks and teaching-learning activities to be done in both face-to-face and online sessions. A brief description of the course schedule (i.e., LING503+LING513, namely Methods and Materials for Language Teaching) is presented in Table 2 below. From curriculum designer’s perspective, planning of the lesson and of the course whereby both face-to-face and online sessions are alternatively arranged is critical to the success of the course. Such planning helps the learners be better informed, prepared and get ready for every session of the course. Table 10.2 highlights what assessment tasks (which are abbreviated as A1, A2, A3, A4, A5 for the 3-credit face-to-face component and B1, B2, B3 for the 1-credit hybrid or online component) are, when they take place during the course, and how such assessment tasks are ordered and constructively aligned in order to ensure learning happen.
### Table 10.2: An Extract of Detailed Course Schedule for LING503+LING513

<table>
<thead>
<tr>
<th>Session</th>
<th>Topics/Contents to be discussed in</th>
<th>Major teaching and learning activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (13/10/2018, Sat. Mor. Face-to-face)</td>
<td>Introduction to the course; Historical overview of language teaching approaches for ESL Context of teaching and learning today</td>
<td>Assignment of group work Group discussion (A4) Q&amp;A, Lecture notes</td>
</tr>
<tr>
<td>2 (13/10/2018, Sat. Aft., Face-to-face)</td>
<td>Learning theories and methods Importance of materials development for language learning</td>
<td>Group activity (A4) Group discussion (A4) Q&amp;A, Lecture notes</td>
</tr>
<tr>
<td>3 (20/10/2018, Mor. Sat. Hybrid, DL2)</td>
<td>Guides on class observations (B1, for LING513) Ss reporting of preliminary class observations Ss preparing for class observations (B1, B2)</td>
<td>All class member are expected to access D2L for guidelines and instruction Readings to be posted to D2L, discussion by all participants is expected (A1) Individual reflection 1: “Teaching and learning philosophy” (for LING503)</td>
</tr>
<tr>
<td>4 (27/10/2018, Sat. Mor. Face-to-face)</td>
<td>The ESL/EFL curriculum: a comparison of models Basic concepts and principles in materials development</td>
<td>Group activity (A4): Conducting a need analysis Q&amp;A, Lecture notes Supplementary materials (to be shared via email/ provided prior to the next class)</td>
</tr>
<tr>
<td>Date</td>
<td>Session Details</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
</tbody>
</table>
| 5 (27/10/2018, Sat. Aft. Face-to-face) | Planning learning activities and managing classroom interaction **(Group 1)**  
Types of syllabi and Syllabus design  
Presentation by Group 1  
(A3)  
Group activity (A4)  
Discussion (A4)  
Q&A, Lecture notes  
Supplementary materials (to be shared via email/provided prior to the next class) |
| 6 (3/11/2018, Sat. Mor. Hybrid, DL2) | Guides on writing a Reflection of Class Observations **(B2, for LING513)**  
Readings to be posted to D2L, group and individual discussion is expected.  
Presentation by Group 1  
(A3)  
Group activity (A4)  
Discussion (A4)  
Q&A, Lecture notes  
Due: Submission of one-page printout outline of individual project **(A5) (for instructor’s comments)** |
| 7 (10/11/2018, Sat. Mor. Face-to-face) | Principles in analysis and evaluation of materials **(Group 2)**  
Materials adaptation & implication for teaching & learning  
Students self-working on their class observations **(B2)** | Presentation by Group 2  
(A3)  
Group activity (A4); Discussion (A4)  
Q&A; Lecture notes  
Due: Submission of one-page printout outline of individual project **(A5) (for instructor’s comments)** |
Teaching speaking and listening: principles and practices **(Group 4)**  
Presentation by Group 3  
(A3)  
Presentation by Group 4  
(A3)  
Discussion (A4)  
Q&A, Lecture notes |
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Teaching grammar and vocabulary: principles and practices Critique on posted research articles (A2)</td>
<td>Comments on peer posting (A2) Individual critique: Writing a critique; Group discussion is expected on D2L</td>
</tr>
<tr>
<td>10</td>
<td>Methods and principles for integrating the four skills (A case of teaching writing) Ss self-working on their class observations (B2)</td>
<td>Group activity Discussion Q&amp;A, Lecture notes Due: Submission of printout Individual Project (A5) for comments</td>
</tr>
<tr>
<td>11</td>
<td>Adapting instruction and materials for different learning contexts</td>
<td>Group activity &amp; practice (A4) Discussion Q&amp;A, Lecture notes</td>
</tr>
<tr>
<td>12</td>
<td>Guides on Lesson Planning (B3) Preparing your lesson plan</td>
<td>All class members are expected to access D2L for guidelines and instruction Students prepare their own lesson plan and submit their lesson plan</td>
</tr>
<tr>
<td>13</td>
<td>Sharing of observation results and reflection (B2 &amp; B3) Individual posting and discussion via D2L Discussion forum (D2L)</td>
<td>All class members are expected to access D2L for guidelines and instruction Comments and feedback sharing by all class members and the instructor</td>
</tr>
</tbody>
</table>
This detailed course schedule is also accompanied by the expected list of readings and references for class discussion per session, though they are not mentioned here, and detailed guidelines on every assessment task, giving the learners a clearer understanding of what the course expected them to do, to be and to become throughout the course. The online component (which is indicated “in sessions 3,6,9 &12 in Table 10.2) was carried out mainly via DL2 (Desire to Learn, a type of learning management system officially run by the joint institution offering the said offshore MA program) as well as via individual emails of the instructor and the class participants.

One important source of data collected in this case study is the final reflection distributed to the 19 participants in the cohort, including five
open questions that aim to seek (i) their belief and perception of how useful the BL applied in the course, (ii) their thoughts on transformative reflection and one-to-one conference applied in the course, (iii) their thoughts on the use of BL in assessing their learning taken place during the course, (iv) their suggestions for improvement of “blended-learning”, and (v) other open reflections in their learning. Interviews with five selected participants also based on the five concerns above.

4. Findings and Discussion

Following is a brief presentation of the collected qualitative data, including the direct observation, the interview and analysis of all 19 reflections by the participants based on the five main open questions above. Some extracts from the respondents as anonymously encoded as R1, R2, ..., to R19 in the analysis and discussion. In some cases, findings from this study are also discussed in light of extant literature. The major findings can be presented as below:

**Professionals’ Responses on the Benefits of Blended Learning**

Responses to the first question showed that all respondents (19 out of 19) totally acknowledge the benefits of BL in the class. In their words, BL is “convenient and suitable to their schedule” because the class participants have “at least a week to prepare the lesson discuss with my classmates and complete the assignments” (R2) or “it saves time and can be flexible for me to arrange my schedule properly to self-study and accomplish the assignments when I do not have to attend classes” (R5), or “effective and convenient because we can share and ask questions when studying face-to-face and submit the assignments online” (R4). As one respondent further elaborates, “BL or the combination of both traditional face-to-face sessions and E-learning is useful to me.

In the former format, face-to-face sessions, which are indispensable, can increase students’ sense of disciplines, enhance the motivation for students’ progress, whereas, online-sessions help students more active and proactive. They have time to surf the internet to download materials, to update the program, etc. This is also the chance for students to show their small ideas or questions that they do not dare to expose in class. They can also ask in details some special points that may waste much of the class time if we deal with them directly
in class” (R6). Meanwhile, another respondent enjoyed blended learning, because “it is not boring as a traditional method; I (R1) founded that blended learning seemingly made my course length become shorter and more interesting” (R1). The majority of respondents agreed that they have time for further reading, reflecting and practicing with online sessions. Respondent numbered 16 said that “BL is extremely useful for me, is a way more effective for students at higher levels than purely face-to-face or purely online sessions. With BL, students can work on their own with new concepts which frees teachers up to circulate and support individual students who may need individualized attention and that’s what we need the most. It will be some issues that are problematic to one student but not all, that’s when we need BL in helping that student individually. Moreover, BL can also help to reduce the educational expenses. With online sessions, it essentially replaces the pricey textbooks and electronic devices, instead, e-textbooks will be a big help to students in learning and drive down textbook budget” (R16).

Despite that BL receives good satisfaction by all professionals in ELT, five respondents (R2, R4, R5, R8, and R14) preferred face-to-face sessions to online ones since in the former, the class can turn to be “a real small workshop where everyone can share their ideas about each other’s concerns on teaching”, which means the discussion and Q&A (Question and Answer) sessions tend to be “more effective” (R2, R5) in face-to-face sessions. They also prefer the “fun” that we have in face-to-face classes.

The analysis of responses by 19 respondents so far confirms the significant contribution of BL, making it “a reasonable combination between face-to-face and online sessions are tremendously useful and convenient for students”, as revealed by R15. While different opinions were shared, the class observation and respondents’ answers indicated the usefulness of BL in the current context of Vietnam. Firstly, it is useful for someone who need to balance between their full-time jobs and taking courses only at weekends. Secondly, it is convenient for students to attend online-session mainly for assignment completion with high flexibility of submission due. They integrate and synthesize what they’ve learned in the face-to-face session to apply in the assignments, attended in the online group chatting and/or discussing with other classmates and professors without necessarily attending the face-to-face sessions.”
Professionals’ Thoughts on Transformative Reflection and One-to-One Conference

As part of the teaching and learning activities constructively planned and aligned in the syllabus (as shown in Table 10.2 above), in both face-to-face and online sessions, the instructor of this course (i.e. the author of this chapter) applied transformative reflection (four times out of 15 sessions) and one-to-one face-to-face conference at the end. Results shows that all 19 respondents’ wholeheartedly “enjoyed” both practices with serious appreciation because, as commonly revealed by the respondents, “they offered valuable chances to share my own questions, or even to let the instructor know and help me with my shortcomings and issues” (R1), and “receive appropriate advise from my teacher for those issues that cannot be discussed in front of the class” (R2).

Especially, as reflected by R3, “reflective practice help me (R3) be responsible for what I have learned because I need to review, to remember, to think of what is new to me and useful for me most as well as what I look for further explanation”. As shared by R6, “reflective practice gives me chances to practice applying what I have learnt in some situations; and one-to-one conference gives me chances to reconsider whether I apply theories appropriately or I should change any after realizing problems that I have.” Surprisingly, it was the reflective practice that transformed the learners from within, like what R16 disclosed “I really am nervous because I haven’t learned anything about teaching methods and materials before so I don’t think I can study this course well. But, thanks to you and your professional techniques, I was able to work things out without any hesitations. .... You cater the need to become a good teacher in me and I want to be someone like you in the near future. I was also amazed by you at the very first day of the course, you asked us about our teaching philosophy. That was when I began to think about it seriously.”

For the one-to-one conference, though it required the instructor’s harder work and more time, as realized by the majority respondents (16 out of 19), the one-to-one conference did individualize the learners’ learning and concerns, allowing them to raise their own problems for better advice, given the fact that learners’ strengths and weaknesses are diversified. As revealed by R7, “it is much easier for student to accept when using one-to-one conference. Hence, the relationship and interaction between students and teacher is also
open.” In addition, instructor’s summary of feedback (anonymously) right after the one-to-one conference “help remind the whole class of important points and therefore, students can learn from each other’s mistakes or problems”, as identified by R11, R18 and R19. In terms of effectiveness, R10 “considered one-to-one conference effective since we can have a deeper reflection on our own writing and seriously find a way to develop ourselves for a better piece of writing”. Noticeably, 9 out 19 respondents (R7, R9, R12, R14, R15, R16, R18 and R19) explicitly stated their intention to actually apply similar one-to-one conferences to their students when they get back to be teachers of English in their respective classes.

In a nutshell, there were rich data to advocate that both written individual reflective practice (both face-to-face and on-line) and one-to-one conference (face-to-face) applied in the course were highly valued and favoured by all respondents for their benefits. It was such a good practice that gradually “transform” the learners become (i) more responsible for their learning in terms of reviewing what they have learned and identifying both their own strengths and weaknesses, thus improving their knowledge retention (as shared by R15), (ii) more reflective on what and how to improve their logical arguments and to update their writing assignment with more input, in order to “continuously adapt themselves to the requirements of the course” (R7), and (iii) more proactive to their own shortcomings for critical self-improvement.

Professionals’ Thoughts on the Use of Blended Learning in Assessing their Learning

As earlier discussed in the literature, one important component of BL is how learning is assessed. The results showed that 17 out of 19 respondents were able to identify the value of using variety of “evaluation system via online discussion, face-to-face discussion as well as individual and group presentations, assignments and final projects” (R1), which “helped effectively evaluate the learners’ performance” (R1) and “created for us (i.e. the respondents) various opportunities to learn and to be assessed” (R2, R16). Answers from the interview with five selected participants also confirmed the value of assessment methods being constructively aligned and applied in the course. It was commonly found in answers by the five interviewees that constructive alignment between learning outcomes, teaching-
learning activities and assessment tasks (as indicated by A1, A2, A3, A4, A5, B1, B2, and B3 in Table 10.2 above).

As some of the respondents said it was the diversifying evaluative techniques that pushed “me” (R2, R5, R9, and R16) to seriously “read through”, digest and fulfil the abundant required readings and assignments. Though the value of evaluation techniques was well reported by the respondents, it does not mean that they did not encounter any difficulties. Some respondents felt overwhelmed sometimes keeping up with the set deadlines for papers and assignments, which were parts of the assessment tasks. In short, no matter how overwhelmed the respondents may feel with the assessment tasks constructively planned in BL, there was enough evidence to ascertain the positive impact of BL on monitoring the learners’ progress and assessing their learning and performance.

**Professionals’ Suggestions for Improvement of Blended Learning**

In order to seek for the ELT professionals’ suggestions on how BL, the fourth focus in the reflection and interview opens up their sharing. The respondents’ answers were categorized into some major suggestions including (i) a need for more and other evaluation techniques to be applied (e.g. more quizzes, peer evaluation of each other’s assignment, more small assignment of about 300-350 words each (R1, R8, R7), (ii) more one-to-one conference needed so that they can receive more guidance from the instructor (R3), (iii) more guided readings to be provided prior to online discussion (R2, R4), (iv) an increase of chat or online discussion for the instructor to timely address immediate concerns by the learners, expectedly from 30 minutes per day or once for 120 minutes per week (R4, R7, R18, R15), or expectedly synchronous online sessions other than asynchronous ones currently done, (v) and a clearer communication of purpose of on-line activities (though this might not be totally true because the course syllabus was well-explained at the beginning of the course when two out of 19 students were absent).

Interestingly, it was found that some (5 out of 19) respondents longed for a “real and authentic” online session like a face-to-face one. This coincides with the finding that face-to-face sessions were better favoured by several respondents as shared earlier for their
convenience of direct discussion, ease of understanding, and natural communication with “full fun and creativity” (R3, R5, R12, & R13).

However, some of the respondents’ suggestions may be quite different from the nature of online sessions. While many don’t find reading materials a real challenge, a few (three out of 19) respondents (R9, R10, & R11) expect the materials to be posted all-at-once rather than selected chapters session by session. This is in fact not always good in terms of schedule planning in the course syllabus and copyright issues. In contrast, R19 was fully aware of the copyright issue by not expecting the whole textbook or all materials to be uploaded at once. It should be noted that these suggestions by R9, R10 and R11 may originate from the belief that everything in class, even at graduate level, should be “spoon fed”, which is likely deeply rooted in the traditional way of learning pertinent to a good number of Vietnamese learners like those mentioned.

Likewise, another important suggestion is the idea of using “flipped class” instead of “blended learning”. R14 suggested that “the 5 online-sessions should come first and 10 face-to-face sessions later; because by doing this, we already have all ideas, or at least some knowledge of the course before really attending it, so we get ready ourselves with questions of the course in mind to discuss in the face-to-face class time. Moreover, I also expect the instructors to be there in the 5 online sessions because I may have some urgent questions”. This sounds good but, arguably, it can be seen that, again, the respondent “still expects” the presence of the instructor to soon address his/her concern like face-to-face ones, which might not be always easy for the learners may have not have fully aware of all requirements prior to at least the first face-to-face session.

Other Sharing and Reflections

The last focus in the open written reflection is an open space for more thoughts and sharing from the respondents. Despite some suggestions for further improvement above, all of the 19 respondents shared the same idea that they would love to “continue to improve their teaching in their own class in the way that they will effectively combine both face-to-face sessions and online sessions”. As R3 wrote “I always want to create a fun and active learning environment to encourage my students learn best”, echoing the idea of applying “blended learning” into their respective teaching.
Inspiration by the instructor is another significant idea commonly found in reflections by all of the 19 respondents, who expressed their appreciation and “promised” themselves to extend such inspiration to their own students ever after the course. As revealed by R2, “I think teacher has done the perfect method to inspire us to study, especially for us who have concurrently our own jobs to fulfil. I really impressed by the way we were taught. We were inspired, were encouraged, were guided, were shared and were awaked the study potentiality.” Admittedly, inspiration is dependent of blended learning; still, it is important especially in face-to-face sessions whereby the learners would be better exposed to and more naturally interacting with each other and with the instructor. It is certain to say that the face-to-face sessions were preferred to on-line ones since the latter were believed to and should be used as an effective support to any class dealing with real human beings.

“Self-transformation” is another key term “embedded” in the respondents’ open answers, as they were changing while taking the course or would potentially change after the course. Such transformation can be seen in detailed reflections as follows:

“I found that these [i.e. the course knowledge and activities] help me a lot in reviewing the ways I have taught my students before and I have also changed my methods recently to improve the outcomes of the students. All in all, I feel satisfied and motivated to become a better teacher after this course” (R3),

“I truly appreciate what the Professor has offered in terms of knowledge and inspiration. I often wonder that if this job suits me because I feel I am not as good as other people. However, after this course, I feel much confident about myself and I want to try my best to become a great teacher. I wish I could be as great as my Professor to motivate the students to be the best version of themselves” (R4),

“I have realized that there is one great change happening to me after this course: the improvement of my metacognition. I see that I start to look at things from different aspects and angles, and always question what I used to believe. Thus, the writing projects become more interesting compared with being stressful in the past.” (R9)

“Being able to study with you is the best experience I have ever had. Through this final reflection, I want to express my gratitude towards you.
Thank you for bringing this Master course to Vietnam, you have created a wonderful opportunity for people like me who are struggling in finding their true colours. I am really appreciated your contributions,” (R16).
“What I am really impressed most by the course is the professor’s effective teaching methods. [...] To be honest, If I had a chance to be his students, although I may face with many pressure, challenges from his course, I can accept it completely.” (R17)

“This course was challenging yet productive as I learnt a lot through practical practices.” (R19)

It should be noted that these words from the respondents, no matter how “nice” or “unique” they sound, did not affect their scores, which was guaranteed prior to the reflections and interviews. The respondents, who themselves are English teachers, were fully aware of such code of ethics. All in all, some sort of “self-change” namely “transformation” was happening within the ELT professionals.

5. Pedagogical Implications

Technology is important to education today, however, how it is used that can actually enhance the learning is more important. BL, as voiced by the ELT professionals in the above analysis has proven to be beneficial to both teachers and learners alike, especially those who are more digitally literate. There was sufficient evidence to confirm the positive impact and value of BL at higher education, at least to the studied joint master’s program in particular, or to those cases similar to this one, i.e. whereby the learners are working ones who need to balance their work and study. The aforementioned analysis and discussion lay a good foundation for the following pedagogical implications for more successful application of BL.

Balancing the Structure of Face-to-Face and Online Sessions in Blended Learning

Not mentioning different meanings and interpretations of BL as extensively used in literature, BL taken in this study so far mainly focuses on the planned and harmonious combination of both 10 face-to-face sessions and 5 online sessions. Despite the fact that several
other technological resources (like e-books, e-reading materials, videos, YouTube links, etc.) were also fully utilized in the course, they are not discussed so far because they were considered indispensable in most classes in today context of education industry 4.0. It is however withdrawn from the data analysed that balancing the work for the learners for both face-to-face and on-line sessions is a must. As R9’s sharing can be reiterated here, “the blended-learning is actually effective since we have time to work on our progress. Given the fact that offline learning lessons are reduced and mixed with online-sessions, we can have more time to complete our papers and anything that we have not clearly understood without getting too overwhelmed” (R9). While the studied respondents still preferred face-to-face sessions to online ones, they do not negate the benefits of such a combination, i.e. BL. However, it is suggested that a ratio of 2:1 for face-to-face sessions against online ones respectively is likely appropriate as designed in the course, especially for working adult learners in Vietnam.

**Planning Teaching and Learning Activities in Blended Learning for**

*a Well-Communicated Constructive Alignment of the Course*

In order to be effective, the teacher is expected to be a key planner and designer of learning activities not only in the face-to-face but also online sessions in BL. The researcher’s observation of class behaviours and the analysis of reflection indicate that a good and timely communication and explanation of the WHAT, WHY and HOW constructive alignment is established in the course syllabus (as illustrated in Table 10.2) contributes to success of the class behaviours, i.e. HOW the learners and teacher successfully cooperate in the course. It is the teacher’s appropriate planning of learning experience, not the technology alone, is more important to the success of BL. Although there were recommendations by the respondents for more synchronous online sessions, the analysis showed that face-to-face sessions were better favoured for their direct and natural interaction. In this regard, technology enhanced LMS like D2L or other supporting technological materials and applications are simply expanding the possibility of how well the constructive alignment is achieved.

In relation to this, it can be said that the planning stage in BL is vitally significant to the effectiveness and success of the course. Both theory and practice are harmonized in this case study, which is well supported by Peachey’s (2013) belief on designing of a course in
which the participants are given opportunities to experience blended learning, via which hopefully their learners in the teacher trainees’ respective class. Such experiential learning aims at challenging the teacher learners to actually engage in the class activities, give them deeper insight and feel the real benefits and problems encountered in such a blended course.

**Engaging the Learners and Enhancing their Autonomy as Another Key Driver for Success of Blended Learning**

On the basis of established constructive alignment of the course in this study, the author strongly proposes that BL, however carefully designed, needs to provide a “real agenda” that fully engages the learners. Any course would not be a success if the learners are not fully participating and not actually learning. It will also be a complete failure if the students cannot really change their mindset in determining their own learning route as guided. Active engagement by the learners is significantly important to the success of BL, which is also confirmed by Griffin (2015) in his dissertation done in a case study in Ireland to adult learners’ engagement in BL. This is because BL requires “seriousness” in learning attitude that really drives their intrinsic motivation to interact with each other face-to-face and online.

**Aligning the Assessment Tasks in Blended Learning for Effective Learning**

As part of the constructive alignment needed to be achieved in BL, assessment tasks that are well-aligned with both expected learning outcomes of the course and teaching-learning activities are significantly important. The learners, no matter how active they are, tend to be busy and oftentimes get stuck in a number of distractions, including their work, their personal life matters, their academic hindrances, among others. They therefore need a certain degree of “pushing force” to drive their class-based behaviours in both face-to-face and online-sessions. It is the strict deadline and principled disciplines in the assessment tasks and scheduled that were well-communicated to the learners on the very first session of the course during the first hour of course orientation and well-complied with by the learners that indeed help them fully aware of their roles and sense of punctuality and deadline. The learners’ behaviour thus has been positively changed
as analysed in details above. It is the digital accuracy and disciplined punctuality in the BL module that contributed to the learners’ success. Given the context of Vietnam, this is far critical in positively shaping and transforming the learners’ behaviours for better. As seen in the analysis, especially where learners come from Confucius-dominated cultures like Vietnam, monitoring of blended learning is a must, and it can be effectively done via a constructively aligned assessment scheme as presented earlier in the chapter (Table 10.2).

**Cultivating Transformative Reflection in Blended Learning**

Intertwined in the rich data and reflections are the good value and priceless lessons from reflective practices and a one-to-one conference applied in the study, which entailed an important inner change or self-transformation among the ELT professionals who pledged themselves to change the way they teach, in a more or less similar manner, for more positive impact on their respective students. Even though in BL context, a real human interaction is expectedly essential to promote the actual explanation and encounters. One-to-one conference applied in one of the face-to-face sessions was highly appreciated by the respondents. This is considered as “transformative reflection” (Biggs & Tang, 2003), letting the respondents, who are also ELT professionals in the said cohort, experience a “deep-approach” practice (a term from Biggs & Tang, 2003) so that in their turns, they will continue to infuse such experience to their students, hopefully to gradually transform their learning as well. In other words, it is strongly suggested a better cultivation of transformative reflection and practice in teaching and learning, no matter how “blended” the course is, no matter how many face-to-face or online sessions are alternatively planned.

**Providing Sufficient Technical and Pedagogical Training for Both Teachers and Learners when Applying Blended Learning**

Last but not least, success of BL cannot be possible without proper training for both the course instructor and the learners, preparing them to work well with the new course format. The analysis indicates that several respondents encountered difficulties though thoroughly introduced about the new format of BL applied to class at the beginning of the course. While the curriculum and syllabus designing are important, both the teachers and learners alike need pedagogical
and technical training for use of BL and how to successfully explore such technology for maximal efficiency. Lack of appropriate training, as indicated, sometimes resulted in difficulties in terms of expectation discrepancies between the instructor and the learners since each may have different assumptions from their own perspective. In this relation, administrative policies related such as payment policy, minimum online hours required to be covered in the course, are also expected to change accordingly. This again requires serious consideration from the instructor’s role as a key planner and designer of learning in both face-to-face and online sessions, assuggested in 5.2 and supported by literature.

These six suggested implications are also the key strategies applicable to any context similar to this case study. A good combination of such strategies would further enhance the usefulness of blended learning, a type of technology-enhanced application, in education in general and in ELT in particular.

6. Conclusion

As Thorne (2003) said “the story of blended learning will never be finished; like all learning journeys, it is a continual process of discovery” (p.6). This tends to be truly reflecting the context of today technology-enabled education. More than ever, the potential of blended learning is almost limitless since it embodies a natural evolution “from traditional forms of learning to a personalized and focused development path”. Conclusively, the chapter so far implicates that a constructively aligned and well-planned “blended learning” well-balanced between face-to-face and online sessions will reach high potential of success for maximal learning. As Norberg (2017) poses a dilemma, “If one does not know clearly what one is blending, the result will continue to carry such uncertainties”. The key issue remains here is the question of how and how effectively BL can be applied and optimized, given the profoundly changing technological innovations. Depending on the types of learning that we have, what to be “blended” at what “ratio” has always been a wise choice of the class designer and planner, i.e. the instructor. Situated in the current context of the joint program between a Vietnamese university and an American one, the so-called passive Vietnamese style of learning of the old days have changed. What are chosen to be “blended” therefore must be changing
accordingly, challenging the learning process to better suit with the Vietnamese learners of today.

Learning cannot happen if the learners themselves do not wish to or at least do not act for it. It is confirmed in this chapter that BL, if appropriately applied, would enhance the learners’ performance for maximal efficiency. As ELT professionals voiced up in this study, it is the reflective practices intentionally planned in the BL that have positively transformed to be both better learners and teachers in returns. Just as Ralph W. Tyler (1949) once states, “learning takes place through the active behaviour of the student: it is what he does that he learns, not what the teacher does”, the study has successfully transformed the ELT professionals from within. It is the transformative reflections and carefully planned syllabus for class behaviours in a constructively aligned blended learning course that have made the course a memorable learning experience among the ELT professionals, thus foster a culture of student-centred learning for sustainability in the context of technology-enhanced higher education.

REFERENCES


Vietnamese Government (2017). Quyết định số 117/QĐ-TTg của Thủ tướng Chính phủ, về Đề án “Tăng cường ứng dụng công nghệ thông


Moodle

Moodle is used as a software used as a platform in teaching and learning. It involves a lot of features which aid in learning, content uploading and downloading as well as interactive features between the teacher and the learner on the other side. It is a learning management system used to increase learner engagement and enhances collaborative learning and knowledge construction in learners away from a teacher centered approach to teaching and learning. It is widely used to conduct online courses and trainings in addition to supporting face-to-face instruction in educational institutions. It comprises of an interface with a variety of functionalities which enable users to conduct business of teaching and learning through giving assignments, quizzes, grading of learners as well as for social and collaborative learning. Its adoption by users requires computer and general ICT competency and some training for proper usage. It provides good avenues for reaching out to a larger number of...
Innovative Practices of Technology-Enhanced Learning

knowledge seekers who, in the circumstances of being in the four walls of the classroom, would be unable to acquire the necessary skills in training.

<table>
<thead>
<tr>
<th>Strategies and Activities for TEL using Moodle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learners should be registered on the system and they get their log-in details for continued access to the system. Thereafter, teachers go ahead to upload content on the Moodle system. The students should be able to access the content once they log in from wherever they may be. Groups of learners may be established by creating them on the system and these can be made to connect and interact with each other through Moodle. Evaluation activities for the learners can also be designed and administered through the system and in the end, they can submit their work by the same means. Evaluation results are in turn uploaded on the system for learners to receive once they log in. These practices have an element of students doing it by themselves because they should be able to receive work and navigate through it on their own. The teacher chooses appropriate methods which elicit high levels of thinking among learners.</td>
</tr>
</tbody>
</table>

1. Introduction

Evaluation of learning environments should consider the major aspects involved in teaching and learning such as the teachers and learners, the learning environment and materials. In blended learning, which combines the traditional face-to-face encounters and online aspects, understanding of issues such as instructor characteristics, blended learning aspects and instructor satisfaction is necessary. In our previous research, we have delved into issues of student characteristics/backgrounds, blended learning aspects and learning outcomes to explain the possibility and effectiveness of blended learning in a Ugandan university. This process is incomplete without an examination of the instructor variables that make blended learning possible for implementation. Many studies have reported findings in view of critical success factors for e-learning. Our study points out these factors for a blended learning environment being taken on as
Instructors play critical roles in the implementation of innovative pedagogies such as blended learning. Blended learning includes the instructors’ roles in face-to-face sessions as well as online and therefore becomes a double-edged role for implementation of such a learning process. Our focus in this study is to examine the instructor characteristics such as computer competences, motivation, attitude, age and gender on the one hand and blended learning aspects such as internet quality, learning management system tools and resources, interactions with learners and face-to-face experiences on the other hand. These two sets of independent variables are examined in view of blended learning implementation at a Ugandan university. In our study, we examine instructor characteristics necessary for blended learning implementation, levels of use of blended learning aspects by instructors and the significant predictors of instructors’ satisfaction.

So far, the design of learning environments has so much dealt with instructors and technology in e-learning. However, such aspects in a blended learning context require an examination for successful designs and implementation of innovative pedagogies involving technology use in teaching and learning. Further investigations can examine characteristics and features not tackled in prior research to inform planning for blended learning practices.

**Literature Review**

This review considers instructor characteristics that are pertinent to blended learning implementation as well as their ability to apply blended learning aspects to their satisfaction. The significant predictors of instructor satisfaction in blended learning will be reviewed from practices elsewhere in the literature.

**Instructor Characteristics**

Instructors play important roles in every educational undertaking for successful processes of teaching and learning. Selim (2007) noted that instructor characteristics are very critical in e-learning success and these are investigated in this research to understand which characteristics are crucial for blended learning implementation.

an innovative pedagogical approach to teaching and learning in a Ugandan context.
blended learning, instructors take on additional roles and therefore a blended learning venture should examine several instructor characteristics. A good control over IT is for instance essential (Selim, 2007) in terms of competence as well as confidence regarding online content preparation and delivery and using tools such as publishing content online. Computer literacy is noted as a pre-requisite to use e-learning and blended learning technology and lack of it results into anxiety (Liu, 2005). Wu & Lee (1999) noted that computer literacy is a major success factor for any computer mediated communication program, and this goes along with competence and confidence.

It is noted by Volery and Lord (2000) that positive attitudes towards distributed learning and instructors’ promotion of technology in class is likely to lead to positive learning outcomes. Instructors need to show a good command of technology in cases of need for including learners’ names on the LMS and making necessary adjustments on course settings. Instructor attitude towards learners also matters in blended learning environments especially their ability to motivate learners while in face-to-face or online.

Marzili, et al (2004), using a mixed methods research found out that instructors had positive attitudes to technology regarding its enhancement of learning, improving teaching and making it convenient. The study also indicated positive attitudes towards blackboard as a learning management system especially for its facilitation to send messages to learners, assigning and collecting homework as well as disseminating materials. Attitude towards computer use in teaching can be a factor in accepting and adopting technology in education (Harrison & Rainer, 1992) and Albirini (2004), using qualitative and quantitative methodology found that teachers had positive attitudes to technology use in education and were likely to apply it. Christensen (1998) noted that teacher attitude towards ICT affect both the teachers’ and learners’ experiences.

The Attitudes of instructors are important motivational aspects in applying e-learning and blended learning in their practices. It has been found out that instructors’ negative attitudes towards technology use can impact negatively on learner use of technology, (Rosen & Weil, 1995). For our case in this research, it could result into failure of blended learning initiatives. It has been noted that instructors who feel that computers/ IT in education are useful and have interest in them usually show stronger beliefs in IT instruction. The instructor
intention to use ICT in education is highly dependent on their computer knowledge (Liu, 2005).

A lot of research has delved into teacher attitudes towards e-learning particularly on the use of technology. What is generally missing are attitudes towards the combination of both online learning and face-to-face aspects i.e. blended learning and this is our focus in this study. Mahdizadeh, et al (2008) using descriptive statistics noted that instructors’ aspects like presentation of course materials and literature as well as course information to the learners added value in the online environment. In a qualitative study by Bijeikiené, Rasinkiene and Zutkiene (2011), it was noted that instructors using blended learning for English as a second language expressed positive attitudes with self-check exercises though they still preferred the face-to-face aspects of the blended learning due to its levels of interactivity necessary for language teaching.

The qualitative research by Benson, Anderson and Ooms (2011) noted that instructors felt barrier with blended teaching would only be in developing ICT-based aspects which take relatively more time. They showed that in the event of technology positively responding, blended teaching and learning is the way to go as it caters for many learning styles and offers exciting teaching opportunities. Paraskakis and Levy, (2012) held that the e-learning and blended learning practices of uploading materials helped to make learners become self-centered in their learning. Blended learning further leads to learner knowledge construction as it helps to engage them in activities to lead to high level learning experiences (Herman, et al, 2004). Instructors also viewed blended learning with perceived advantages of allowing the accomplishment of learning objectives, increasing interaction, providing flexibility and accommodating more student learning (Garnham & Kaleta, 2002).

We note in this study that the adoption of blended learning cannot be possible without establishing the motivational drives instructors have if they should engage in this learning environment. The primary motivational factors involved in the use and application of new technologies are grounded in the Technology Acceptance Model and particularly perceived usefulness and perceived ease of use (Davis, 1989). In this research, if course instructors confirm that the use of ICT in teaching is good and will improve their performance, they will be considered as motivated. Instructor motivation is dealt with here
Innovative Practices of Technology-Enhanced Learning

in the light of adopting technology use in blended learning involving computers, internet and learning management software. It can be a challenge in adopting blended learning if instructors do not possess a motivation to apply new technologies in teaching. Research shows that instructors do value ICT applications as useful in supporting meaningful learning (Varank & Tozoglu, 2006) and are therefore ready to apply them.

Napier, Dekhame & Smith (2011) noted in the qualitative part of their study that instructors enjoyed blended learning especially regarding more evidence of interactions resulting into formation of an online community. They also show that learning management system tools played right into learner preferences regarding instant messaging, online chat and e-mail notifications. They also noted that learners had opportunity to go through posted material in a more prepared approach than when they follow the instructors’ timetable. Regarding intrinsic motivation in experimental research settings, Soong, et al (1999) noted that instructors had to put a lot of effort in the use of facilities offered in an online learning environment.

As noted, instructor characteristics in blended learning have not been extensively studied because emphasis has mostly been placed on learners. Our search for literature has therefore not found relevant literature regarding instructor age and gender characteristics as factors in blended learning possibility and implementation of innovative pedagogical approaches. Research including these factors is needed in order to better understand their roles in blended learning and instructor satisfaction for implementation of such learning environments.

Blended Learning Aspects

McGill & Klobas, (2009) noted in their study that it is important to understand instructor perceptions of learning management systems and, more specifically their levels of use and application to examine potential success of LMS utilization for blended learning implementation. Selim (2007, p.399) noted that the IT tools for e-learning and blended learning include ‘network bandwidth, network security, network accessibility, audio and video plug-ins, courseware authoring applications, Internet availability, instructional multimedia services, videoconferencing, course management systems, and user interface’. Some of these tools are possible with average internet
strength and speed while others are relatively difficult to apply due to low bandwidth and speed.

In this study, we are especially interested in studying tools such as authoring tool, course management system, user interface and network strength related to the implementation of blended learning. Hanson and Robson (2004) noted that the use of various tools of the learning management system by course instructors had strong learning benefits. West, et al, (2007) however noted that most course instructors make use of the interactive features after they get quite familiar with the respective technology. Lonn and Teasley (2009) noted that tools such as content sharing, assignment, announcements, calendar and syllabus were heavily used (95%) and were valuable to instructors while the more interactive tools such as the chat, discussion forum and wiki were not used as much (5%) in addition to not being considered as valuable.

It is noted by Soong, et al (1999) that once learners are exposed to interactions by course instructors in learning environments, blended inclusive, they get more opportunities to learn and this could lead to better learning outcomes and satisfaction by both learners and instructors. Instructor interaction with learners is considered as the educational transaction in learning (Hillman, Willis & Gunawardena, 1994). Instructor-learner interaction is in form of content delivery, learner encouragement as well as giving feedback to learners for effective learning. It is therefore a desirable aspect for instructors to interact with learners in online (Moore & Kearsley, 2012) and face-to-face environments. High levels of interaction between instructors and learners lead to instructor satisfaction (Wasilik & Bolliger, 2009) in online and face to-face-learning. Whereas some faculty staff miss out on interactions with learners (Fish & Gill, 2009), others usually have more interactions with learners (Hiltz, et al., 2007).
This part of our research seeks to examine the instructors’ satisfaction in their practices regarding delivery of online and face-to-face content, encouraging learners and giving them feedback in a blended learning intervention as the means through which instructor-learner interaction is affected. Interaction has been dealt with from various perspectives especially in online settings. Learner-instructor interaction in blended learning lacks literature and, more so, the satisfaction of instructors. A case in point is the study about the quality of interaction in web-
Instructor Characteristics and Satisfaction

Based courses (Jarveia & Hakkinen, 2002) and Sher (2009) who dealt with learner-instructor interaction being associated with perceived student learning and satisfaction. Hartman et al., (2000) and Thompson (2002b) noted that in online environments, faculty are satisfied in areas of high-quality student-instructor interactions. Almeda and Rose, (2000) however noted the disadvantage of online environments being in the absence of face-to-face contact and group interaction; which our study addresses in this part through a blended learning environment by measuring instructor satisfaction in online and face-to-face interactions.

An important part of blended learning is the time for face-to-face between course instructors and learners. In blended learning implementation, we consider the satisfaction of instructors in their face-to-face experiences in the same way we do with their satisfaction in online experiences. Course instructors may show satisfaction or dissatisfaction in aspects like introduction of course outlines with objectives, giving homework, face-to-face lectures, reviewing online work and conducting examinations as typical of the face-to-face phase of blended learning. Hislop and Atwood (2000) reported in a descriptive study that up to 75% of instructors considered face-to-face teaching to be a more satisfying experience though they did the study to examine faculty teaching in a purely online learning environment not in a blended context as our study seeks to establish. Studies like that of Summers, et al., (2005) and Mentzer, et al., (2007) reported learner satisfaction in face-to-face aspects of blended learning but few studies have dealt with instructor satisfaction in face-to-face sessions in a blended learning context.

Success in blended learning comes with a reliable internet connection which should have relatively good speed and strength, especially for developing countries like Uganda. From an instructor point of view, successful teaching in a blended learning environment requires that they get satisfied regarding the internet quality to some level. Internet speed and strength can be a challenge and a study by Ward, Peters and Shelley (2010), noted significant challenges in the implementation of synchronous interactive online instruction in technical aspects especially internet access and connectivity.
Significant Predictors of Instructor Satisfaction

Any learning environment is expected to lead to satisfaction for it to yield desirable results. It has been shown that online or blended learning for our case, allows a lot of flexibility (Green, Alejandro & Brown, 2009). Fredericksen, et al, (2000) and Shea, et al, (2002) noted in a descriptive study that there were high levels of instructor satisfaction regarding their motivation to teach online courses and that their satisfaction in online learning was in the areas of learner performance, interactions, interest in online teaching and technological effects. It was further noted by Fredericksen, et al (2000) that high levels of interaction between instructors and students were 48% higher than traditional classrooms and this predicted the high satisfaction levels of the instructors. Their study also found out that instructors with a higher motivation to teach online had higher satisfaction out of the whole experience. Learning management system usage was found to be a contributor to instructor satisfaction due to its effectiveness and respondents in the study agreed to a tune of 91% in the descriptive study.

The fact that technical difficulties did not affect teaching in the online environment made instructors satisfied in the whole experience of online teaching. The higher degrees of student-instructor interaction were found to be a strong predictor of instructor satisfaction in the online learning environment.

Instructors’ feelings that they can contribute to positive student outcomes was noted as a satisfying factor for instructors (Kashy, et al, 2000). Fredericksen, et al, (2000) further noted that the flexibility and accessibility of the online learning environment was another factor for instructor satisfaction among the blended learning aspects of online learning more especially the internet quality and learning management system features and tools. More of the instructor satisfaction is predicted by their ability to acquire new skills and knowledge of online teaching using new technologies. Therefore, their confidence with and competence in ICT and its application in teaching/learning by instructors was a predictor of instructor satisfaction.

Objectives

1. To examine the instructor characteristics that are crucial for blended learning implementation in a Ugandan context.
2. To investigate the instructors’ levels of use and satisfaction regarding the blended learning aspects in blended learning in a Ugandan context.
3. To analyse which instructor characteristics and blended learning aspects significantly affect instructor satisfaction in a blended learning environment in a Ugandan context.

4. Research Questions

1. What are the crucial instructor characteristics for blended learning implementation in a Ugandan context?
2. What is the instructors’ level of use and satisfaction regarding blended learning aspects in blended learning in a Ugandan context?
3. Which instructor characteristics and blended learning aspects significantly affect instructor satisfaction in a blended learning environment in a Ugandan context?

![Figure 11.2. Conceptual Model of the Current Study](image-url)
5. Method

Research Design

The research philosophy for this study was taken from Selim (2007) critical success factors and Volery and Lord (2000) critical success factors in online education. Quantitative research methods have been used to examine the instructor variables for blended learning implementation. A cross-sectional research design is applied for the study. We apply a quantitative methodology where descriptive statistics are used for the instructor variables and blended learning aspects data, t-tests for the gender variable to determine the satisfaction of male and female instructors and one-way ANOVA to determine the satisfaction of instructors by age group. Regression analysis is used to determine significant predictors of instructor satisfaction taking instructor characteristics and blended learning aspects as predictor variables and satisfaction as a criterion variable.

This study is based on an experiment in which course instructors participated during their teaching using face-to-face sessions and an on-line session of a blended learning design. A learning management system (Moodle) was used and instructor characteristics and blended learning aspects were measured in relation to instructor satisfaction. It is therefore a planning evaluation research design as noted by Guskey (2000) since the outcomes are aimed at blended learning design and implementation at a Ugandan university. The plan under which the various variables were tested involved face-to-face study at the beginning of a seventeen-week semester which was followed by online teaching and learning in the second half of the semester. The last part of the semester was for another face-to-face to review work done during the online sessions and final semester examinations. A questionnaire with items on instructor characteristics, blended learning aspects and satisfaction as an outcome was distributed among instructors from all the five schools of the university and the directorate of postgraduate studies.

Participants

We used university staff teaching the sophomore and finalist students. The finalist classes were selected due to their initial training in computer applications as is the university policy to equip all students
Instructor Characteristics and Satisfaction

joining in year one in such competences. The staff members who were trained and can make use of computers were selected purposively to participate in the blended learning experiment. Each staff member was requested to teach parts of his/her course unit online and face-to-face in the first semester of 2016/2017 academic year. It was first face-to-face teaching in the month of September 2016 and each one went online for the month of October 2016. The month of November was again done face-to-face for reviewing the online content and preparation for final examinations in December 2016. The study population comprised of 57 male instructors representing 76% and 18 females representing 24% with an average age of 37 years.

Instruments

We made use of the intrinsic motivation inventory (Deci & Ryan, 1982) to measure the constructs on teacher motivation to engage in blended learning and adjusted to reflect teacher experiences, the online instructor satisfaction measure (Bolliger, Inan & Wasilik, 2014) for the instructor-student interaction, student-student interaction and instructor satisfaction with online learning scales. We used the function descriptions within the Moodle system especially the one of adding activity or resource icons as a measure to test the use of the learning management system features for teaching and learning. The face-to-face scale was developed out of the reviewed blended learning models (Kintu & Zhu, 2016) citing various activities carried out in blended learning phases. Some items in the scales were modified to the context of a blended learning environment. The computer self-efficacy scale by De Paul and Thangarasu, (2014) was used for the computer competences scale in our study while the modified version of the instrument created by Liaw, Huang and Chen, (2007) was used for the teacher attitudes scale.

Instrument Reliability

Cronbach’s alpha was used to test reliability and the table below gives the results. All the scales and sub-scales had acceptable internal consistency reliabilities as shown in Table 11.1 below: Some items from the Intrinsic Motivation Inventory were deleted due to low reliability results and were not included for further analysis while others were re-written to raise internal consistency.
Table 11.1: Reliability Results for the Instrument

<table>
<thead>
<tr>
<th>Scale</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructor characteristics</td>
<td></td>
</tr>
<tr>
<td>Computer competences</td>
<td>.889</td>
</tr>
<tr>
<td>Instructor motivation</td>
<td></td>
</tr>
<tr>
<td>Perceived competence</td>
<td>.841</td>
</tr>
<tr>
<td>Value/usefulness</td>
<td>.811</td>
</tr>
<tr>
<td>Instructor attitude and behavior</td>
<td></td>
</tr>
<tr>
<td>Perceived advantages</td>
<td>.735</td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>.738</td>
</tr>
<tr>
<td>Perceived effectiveness</td>
<td>.712</td>
</tr>
<tr>
<td>Willingness/interest</td>
<td>.929</td>
</tr>
<tr>
<td>Design features</td>
<td></td>
</tr>
<tr>
<td>Learning Management System usage</td>
<td></td>
</tr>
<tr>
<td>Usage</td>
<td>.738</td>
</tr>
<tr>
<td>Learning Management System Effectiveness</td>
<td></td>
</tr>
<tr>
<td>Effectiveness of the Assignment module</td>
<td>.704</td>
</tr>
<tr>
<td>Effectiveness of the Forum module</td>
<td>.739</td>
</tr>
<tr>
<td>Effectiveness of the Folder module</td>
<td>.891</td>
</tr>
<tr>
<td>Interactions</td>
<td></td>
</tr>
<tr>
<td>Instructor-learner interactions</td>
<td>.784</td>
</tr>
<tr>
<td>Learner-learner interactions</td>
<td>.684</td>
</tr>
<tr>
<td>Learner-content interaction</td>
<td>.851</td>
</tr>
<tr>
<td>Internet quality</td>
<td>.659</td>
</tr>
<tr>
<td>Face-to-face experiences</td>
<td>.832</td>
</tr>
<tr>
<td>Outcomes</td>
<td></td>
</tr>
<tr>
<td>Satisfaction</td>
<td>.801</td>
</tr>
</tbody>
</table>

Data Analysis

First, descriptive statistics was conducted to establish percentages regarding male and female respondents and their average age. In addition, we established the instructor characteristics, levels of use and satisfaction with blended learning aspects using descriptive statistics. Regression analysis was done to find out the significant predictors of instructor satisfaction in blended learning. Proof of data suitability for
regression analysis was done by running the multiple regression in SPSS version 20.

6. Results

_**Instructor Characteristics for Blended Learning Implementation (RQ1)**_

Implementation of blended learning requires that instructors exhibit a good command of ICT in terms of knowledge and capacity to use ICT applications. Results from our study show that instructors were competent to use Microsoft word (M=4.6, SD=.58), power point (M=4.5, SD=.56), excel M=4.2, SD=.76), Moodle aspects (M=3.8, SD=.71), publishing and authoring tools (M=3.5, SD=.85), web browsers (M=4.1, SD=.93) and email packages (M=4.3, SD=.67). They also show capacity in starting and shutting down a computer (M=4.9, SD=.39), creating a new folder (M=4.9, SD=.50), changing file names (M=4.7, SD=.53), adding an icon to the desk top (M=4.5, SD=.77), copying a file to a flash disk (M=4.8, SD=.46), searching for a file on the hard disk (M=4.7, SD=.55), installing printers and scanners (M=4.3, SD=.81), designing a course to upload on Moodle (M=4.2, SD=.66) and using search engines such as google, yahoo, etc. (M=4.5, SD=.71).

**Gender and Age**

A t-test was carried out to establish the differences in male and female instructor satisfaction in blended learning. It was found that female instructors were more satisfied (M=4.5) than their male counterparts (M=4.4). An independent samples t-test showed that the difference in satisfaction was not statistically significant (t=0.77, df=73, p=.22, one tailed). The magnitude of the difference in the means (mean difference =-0.103, 95% CI: -0.37 to 0.16) was small (d=0.2). A one-way between subjects’ ANOVA was conducted on the satisfaction of different age groups to establish the satisfaction of instructors in the different age groups (26-35, 36-45, 46-55, 56-65, 66 and above). This revealed no statistically significant differences in satisfaction in blended learning between the different age groups (F(4,70) =1.672, p=0.166).
Innovative Practices of Technology-Enhanced Learning

Instructor Motivation for Blended Learning

Instructor motivation was measured in view of perceived competence and value. Results show that instructors showed high competence levels and regarded blended learning to be of value in their teaching. Instructors reported that they are good at teaching in a blended learning environment (M=3.9, SD=.72) and they did well in the activities of blended learning (M=3.8, SD=.73). They reported that they felt competent after working through blended learning activities (M=4.1, SD=.83) and were satisfied with their performance in teaching using this type of technology (M=3.8, SD=.84). They reported that blended learning could improve teaching and learning (M=4.5, SD=.53) and can lead to knowledge construction by learners (M=4.4, SD=.70). Instructors further reported that blended learning can help them to teach independent of time and space (M=4.7, SD.53).

Instructor Attitude to Blended Learning

Instructors showed positive attitudes in the use of technology to teach in their responses to questions on perceived advantages, perceived usefulness, perceived effectiveness and their readiness to adopt a blended learning approach. In the perceived advantages, they reported that blended learning is flexible in time for teaching and learning (M=4.5; SD=.55), can increase flexibility in time and space (M=4.6; SD=.58), can enable learners to access learning material more easily (M=4.3; SD=.79) and offers a great opportunity for working students (M=4.6; SD=.67). Instructors did not agree to a reversed question that blended learning is time consuming (M=2.2; SD=1) but instead reported that blended learning offers more opportunity for contacts and interactions among instructors and learners (M=3.8; SD=.94).

Instructors reported that the online learning platform is very useful to support student learning besides lectures (M=4.2; SD=.75) and that blended learning brings the desired goals of incorporating technology in education (M=4.3; SD=.86), fosters knowledge construction practices through learner involvement (M=4.0; SD=.74) and increases communication with learners (M=3.9; SD=.77). Results from descriptive statistics about instructor readiness to adopt blended learning show that they are willing to teach blended learning courses (M=4.3; SD=.72, interested in learning how to implement blended
Instructor Characteristics and Satisfaction  

Instructor use of the learning management system was measured to find out if they often made use of its features, rarely used it or never used the features at all. The results of the usage are shown in table 11.2 below.

**Table 11.2: Use of the Learning Management System**

<table>
<thead>
<tr>
<th>LM function</th>
<th>Rarely used (%)</th>
<th>Often used (%)</th>
<th>Never used (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment</td>
<td>29.3</td>
<td>61.3</td>
<td>9.3</td>
</tr>
<tr>
<td>Forum</td>
<td>36</td>
<td>48</td>
<td>16</td>
</tr>
<tr>
<td>Chat</td>
<td>48</td>
<td>37.3</td>
<td>14.7</td>
</tr>
<tr>
<td>Lesson</td>
<td>30.7</td>
<td>54.6</td>
<td>14.7</td>
</tr>
<tr>
<td>Quiz</td>
<td>34.7</td>
<td>46.7</td>
<td>18.7</td>
</tr>
<tr>
<td>Folder</td>
<td>36</td>
<td>42.7</td>
<td>21.3</td>
</tr>
<tr>
<td>URL</td>
<td>37.3</td>
<td>36</td>
<td>26.7</td>
</tr>
<tr>
<td>Book</td>
<td>34.7</td>
<td>37.3</td>
<td>28</td>
</tr>
</tbody>
</table>

The assignment module was used to communicate tasks to learners (M=3.93; SD=.83), collect students’ work (M=3.55; SD=1.1) and to provide grades and feedback to learners (M=3.19; SD=1.1). Instructors used the forum to have synchronous discussions with learners (M=3.49; SD=1.02) and for question and answer sessions with learners for course announcements (M=3.33; SD=1.03). The forum was also used to discuss issues raised during face-to-face sessions online (M=3.45; SD=1.11), as a help center to give advice to learners (M=3.40; SD=1.04) and for brainteasers for learners to ponder and suggest solutions (M=3.13; SD=1.17). Instructors used the folder to display several related files (M=3.52; SD=1.07) as well as displaying images, graphs and other resources for learners to use (M=3.24; SD=1.15).
Innovative Practices of Technology-Enhanced Learning

Instructor-Learner Interactions

Instructor-learner interactions were exhibited in blended learning as instructors were pleased with the quality of students’ work (M=3.51; SD=.91) and were satisfied regarding learner motivation to study the blended course units (M=3.35; SD=1.02). Instructors reported that their interactions with blended learning students were satisfying (M=3.27; SD=.99) as the students participated enthusiastically in the course units (M=3.20; SD=1.1). The instructor-learner interactions led the former to get to know their learners well through the interactions as shown by their responses to a reversed question that they did not get to know their blended learning students well (M=2.63; SD=1.1).

Learner-Learner Interactions

From the instructors’ perspective, students actively collaborated in their blended learning experiences (M=3.51; SD=.88) and shared resources with each other (M=3.47; SD=.94). The students were part of an online community in the course units (M=3.64; SD=.86) and every student had an opportunity to contribute to the discussions in their blended learning course units (M=3.80; SD=.89).

Learner-Content Interactions

Students had interactions with content through reading it after being posted by course instructors on the learning management system (M=3.83; SD=.84) and exchanging knowledge through the system (M=3.52; SD=.95). The students participated in discussions through the discussion forum (M=3.53; SD=.96) and got course objectives and the course structures during the face-to-face sessions (M=4.08; SD=.77).

Internet Quality

Instructors reported that internet speed was averagely good to facilitate the online activities during the blended learning experiences (M=3.69; SD=1.2) and they could complete their online programs while the connection was still on (M=3.92, SD=.95). It was also easy for the instructors to upload the necessary materials for the students on the learning management system (M=3.89; SD=.97).
Face-To-Face Experiences

The face-to-face sessions of the blended learning environment had difficult tasks discussed by course instructors before going online (M=4.20; SD=.75) in addition to introducing course objectives to learners (M=4.35; SD=.65). The course outline procedure was explained to learners during face-to-face sessions (4.29; SD=.69), self-introductions done (M=4.23, SD=.75) as well as explanation of the learning management system features to the learners (M=4.17; SD=.76). There were adequate teacher-learner interactions during the face-to-face sessions (M=3.96; SD=.91) and instructors were generally satisfied regarding the face-to-face sessions in blended learning (M=4.13; SD=.76). In the instructors’ view, face-to-face sessions should take place in the middle of the blended learning session such that learners begin and end online (30.7%).

Instructor Satisfaction

Instructors reported that blended learning offers an active teaching-learning environment (M=4.23; SD=.67), is a convenient method of course delivery (M=4.28; SD.67) and it offers a flexible teaching-learning environment (M=4.33; SD=.58). They further reported that the online parts allow learners to access a wide range of resources (M=4.32; SD=.72), allows instructors to teach a more diverse student population (M=4.47; SD=.68) and that the online parts allow learners to access the courses from anywhere (M=4.63; SD=.54).

Significant Predictors of Instructor Satisfaction (RQ3)

A standard multiple regression analysis was done taking instructor characteristics and blended learning aspects as predictor variables and instructor satisfaction as a criterion variable. Our data was first analysed to fulfill the regression assumptions and we found that it fulfilled the assumptions since the independent variables (instructor characteristics and blended learning aspects) showed a good relationship with the dependent variable (satisfaction) and were above 0.3 while the correlations between each of the independent variables was less than 0.7 (Pallant, 2011). The multicollinearity assumption was not violated since the tolerance value for each independent variable is less than .10 (0.51, 0.33, 0.54, 0.57, 0.54, 0.83 and 0.66). All the variance inflation
factor values are well below 10 (i.e. 1.9, 3.0, 1.8, 1.7, 1.8, 1.1 and 1.5) indicating absence of multicollinearity. Our normal P-P plot had points lying in a reasonably straight diagonal from bottom left to top right suggesting no major deviations from normality. Outliers on the scatter plot lay within 3.3 and -3.3 which is standard enough (Pallant, 2011). R-square is 0.567 explaining 56.7% of the variance in overall instructor satisfaction and ANOVA statistics (F=12.559, p=0.000) thus a statistically significant model at the 0.001 probability level, (Gray, 2014).

Table 11.3: Regression Analysis Results

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>$\beta$</th>
<th>$t$</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer competence</td>
<td>-.032</td>
<td>-.234</td>
<td>.816</td>
</tr>
<tr>
<td>Instructor motivation</td>
<td>.225</td>
<td>1.605</td>
<td>.113</td>
</tr>
<tr>
<td>Instructor attitude towards blended learning</td>
<td>.431</td>
<td>3.958</td>
<td>.000</td>
</tr>
<tr>
<td>Moodle tools and features</td>
<td>-.037</td>
<td>-.347</td>
<td>.730</td>
</tr>
<tr>
<td>Internet quality</td>
<td>.222</td>
<td>2.035</td>
<td>.130</td>
</tr>
<tr>
<td>Interactions</td>
<td>.135</td>
<td>1.533</td>
<td>.046</td>
</tr>
<tr>
<td>Face-to-face experiences</td>
<td>.034</td>
<td>.340</td>
<td>.735</td>
</tr>
</tbody>
</table>

From the table above, only instructor attitude towards blended learning is a significant predictor of instructor satisfaction among the instructor characteristics while interaction is the only predictor of satisfaction among the blended learning aspects.

7. Discussion

In this study, we have investigated instructor characteristics and blended learning aspects as independent variables to establish if they are crucial factors for blended learning implementation as well as instructor use of blended learning aspects and satisfaction in blended learning. We also aimed at establishing the instructor characteristics and blended learning aspects which significantly affect instructor satisfaction. We used instructors from five schools and those of the directorate of post-graduate studies at a ten-year old Ugandan university. The study suggests that instructor motivation, attitude, computer competence and blended learning aspects such as internet
quality, tools in Moodle, interactions and face-to-face experiences are crucial factors for blended learning implementation. It also suggests that only attitudes (among instructor characteristics) and interactions (among the blended learning aspects) are significant predictors of instructor satisfaction.

**Instructor Characteristics for Blended Learning Implementation**

The instructor characteristics that are crucial for blended learning implementation include computer competences, motivation and attitude towards blended learning. The knowledge and capacity to use ICT is demonstrated by instructors in this study with mean results between 3.8 and 4.9 in the various ICT applications and some aspects of blended learning like knowledge of authoring and publishing tools as well as designing a course to upload on the learning management system. In this planning evaluation research, this sets a good ground for implementing blended learning with such competences and capacity. The good control of ICT applications shown in our findings agrees with Selim (2007) who noted it as essential for blended learning and our findings extend this idea. As a computer-mediated learning practice, blended learning can be implemented according to our study since instructors show the requisite literacies in computer applications in agreement with Wu and Lee (1999). In terms of gender and age, instructors show satisfaction in blended learning irrespective of gender and different age groups. We however note that female instructors show more satisfaction although the difference is not statistically significant (p=0.22) and the magnitude of the difference in the means is small (0.2). We note that instructor attitude to blended learning is positive. Our result adds on to Volery and Lord (2000) who noted positive instructor attitude to distributed learning leading to positive outcomes (satisfaction in our case). A positive attitude to technology use in blended learning is also noted by Marzili, et al, (2004), Harrison and Rainer, (1992) and Albrini, (2004). Our results show that instructor motivation to engage in blended learning is high and this extends the ideas of Mahdizadeh, et al, (2008) who found that blended learning adds value to the online environment.

This is in addition to Benson, Anderson and Ooms (2011) findings that blended learning is the way to go as it offers exciting teaching opportunities like offering an active learning environment as well
Innovative Practices of Technology-Enhanced Learning

as a flexible teaching-learning environment and allows learners to access courses from anywhere. Our results also add knowledge to Paraskakis and Levy’s (2012) idea that learners become self-centred and that it leads to knowledge construction, Herman, et al, (2004) through learner involvement. Our study also supplements Garnham and Kaleta, (2002) that blended learning provides flexibility as also noted by Green, Alejandro and Brown, (2009) and accommodating more student learning in addition to accomplishment of learning objectives. We have discovered that instructors enjoy blended learning and are willing to teach blended learning courses in addition to spending time to learn how to design a blended learning course as developed by Napier, Dekhame and Smith, (2011), and supplemented by our findings.

The Use of the Learning Management System

Learning management system usage shows mixed use and therefore presents challenges in our planning evaluation research which aims at using the outcomes to implement blended learning in Uganda. The assignment feature is the most often used followed by the lesson, forum, quiz, folder, chat, book and URL. The features that are not used or not so often used are book 28%, URL 26%, folder 21%, quiz 18%, forum 16%, chat and lesson (14.9%) and the assignment (9%). The interactive features such as the chat and discussion forum were used at 37% and 48% respectively and ours is relatively different from the findings of Lonn and Teasley, (2009) at 5%. In our results, the assignment feature was used to the tune of 61% compared to 95% from Lonn and Teasley’s (2009) findings.

Instructors exhibited interactions with learners to satisfactory levels and do monitor learner to learner interactions as well as learner-content interactions. Internet quality is noted to be averagely good to facilitate blended learning activities especially online activities with uploading and downloading relevant work. This is potentially prospective especially with the University being connected to the national grid and becomes a strength for Ugandan universities which experience a similar connection. Face-to-face experiences are adequately utilized by instructors through discussion of topics, course objectives, self-introductions and follow-up of online work to the satisfaction of the instructors.
Significant Predictors of Instructor Satisfaction

Our study shows that instructor attitude towards blended learning significantly predicts instructor satisfaction among the instructor characteristics at the .000 significance level while interactions significantly predict satisfaction among the blended learning aspects at the 0.05 level of significance. This adds on to the results of the study by Wasilik and Bollinger (2009) showing that learner interactions between instructors and students led to instructor satisfaction. Shea, et al, (2002) found high levels of instructor satisfaction in areas of interactions but their findings differ from our results in technological effects predicting satisfaction; which failed in our case.

Our findings also add to Fredericksen, et al, (2000), about instructor motivation resulting into instructor satisfaction. Computer competences and motivation (instructor characteristics) and internet quality, learning management system tools and features and face-to-face experiences (blended learning aspects) are not predictors of instructor satisfaction in blended learning from our findings. Ours is however contrary to Fredericksen et al, (2000) who discovered that internet quality, learning management system features and tools as well as computer competences predicted instructor satisfaction.

8. Limitations and Contributions of this Research

This study has dealt with instructor characteristics and blended learning design features to establish their strength in blended learning implementation. The list of such variables has not been exhausted because there are quite a number of other instructor characteristics and design features not tackled here and therefore knowledge gaps remain. Our study dealt with instructors in one university in Uganda who were purposively selected. It can therefore be extended to other universities in Uganda and the developing world to help fill the gaps in blended learning implementation plans.

Blended learning implementation in developing countries has got many variables to be addressed and our study contributes in view of instructor characteristics whose strength can translate into positive results in implementation. Blended learning implementers can use this research as a checklist for successful implementation. The readiness of course instructors given their characteristics gives a green light to
venture into blended learning approaches. The variables examined in this study have been examined elsewhere in the context of the traditional face-to-face approach or purely online approaches. Our study dealt with them in a hybrid arrangement where instructors have roles in both face-to-face and online sessions. The research also demonstrated that instructor characteristics and design features are indeed crucial for blended learning implementation. However, only attitude among the characteristics and interactions among design features were the only predictors of instructor satisfaction with blended learning. The study therefore paves the way for future inquiry into those characteristics and design features predicting instructor satisfaction with blended learning for successful implementation.

9. Conclusion and Recommendations

Instructor characteristics and blended learning aspects are worth analysing in planning for implementation of innovative pedagogy through blended learning. Where instructors exhibit satisfaction, there can be potential for implementation. In our study, instructors exhibited motivation to engage in blended learning with positive attitude and were competent in their computer and other ICT applications necessary for blended learning. They showed that they can use the learning management system tools and resources, interact with learners as well as monitor learner interactions with each other and the content. Internet quality was found to be averagely suitable and can enable blended learning activities to be carried out. Instructors fulfilled the face-to-face expectations during blended learning and these findings augur well for blended learning implementation. The positive attitudes translated into instructor satisfaction though motivation and computer competences failed. The high levels of learner-learner, instructor-learner and learner-content interactions were significant factors for instructor satisfaction but the internet quality, Moodle tools and resources and face-to-face experiences could not predict satisfaction. The findings about these independent variables pave the way for future inquiry in view of their failure to predict instructor satisfaction.

Universities in Uganda can take it from the positive attitude and interactions as predictors of satisfaction to engage in innovative pedagogies through blended learning to enhance technology in teaching and learning. From our study, instructors show readiness to
Instructor Characteristics and Satisfaction

take on this innovative pedagogical approach to enhance their skills in the use of technology for teaching. Challenges remain however in the use of learning management system tools to effect learning and this calls for further training of academic staff in universities in Uganda to apply the learning management system tools for blended learning to achieve success. The universities that are not yet connected to the national internet grid need to invest in this venture to access improved internet quality for blended learning implementation. Universities in Uganda need to emphasize face-to-face encounters between learners and instructors especially the instructor-learner interactions to ensure instructors’ satisfaction with the components of face-to-face moments and online processes in blended learning. The challenge of keeping instructors motivated for blended learning remains however, it can be addressed by tackling the issues involved in blended learning implementation especially training on how to implement blended learning, improving technology quality paying attention to instructors’ positive attitudes to technology and the learner-instructor interactions.

REFERENCES


Building a Creative School Environment

An environment that encourages creativity helps schools to have creative teachers and innovative educational products. The Technology Enhanced Learning (TEL) will create adaptive learners highly in a volatile environment. They will be the citizens who know how to work effectively to create new values, contribute positively to the sustainable development of society and the country in the future. The school environment encourages the creation of conditions for TEL, which is a democratic and collaborative working environment for people to freely share, formulate ideas, ensure material and rich basic of the spirit for teachers to be assured of labour and dedication. Innovation should be considered as the core value of the school toward TEL. Principals also need to implement some of the following methods: Building a “bottom-up” management model...
by sharing power, respecting the opinions of officials and teachers; Appreciate the role of intermediary managers; Building a culture of sharing, learning, respecting each other and respecting differences in schools; Take care of material and spiritual life for teachers to find meaning, joy in work and enthusiasm for the job; Create a working environment with green, clean, convenient, lively ... to support both teachers and students in the school.

### Instructional Strategies for Building a Creative School Environment

The school environment is a place where teachers’ pedagogical activities and students’ activities take place in an interactive and collaborative relationship to realize the school’s educational goals. The requirements for educational innovation in Vietnam, the context of 4.0 technology revolution and the development of society require an educational environment that needs to ensure creativity and encouragement of Technology Enhanced Learning (TEL). Principals should take the lead in creating an environment for teachers to actively apply science, including elements of the physical and mental environment. The physical environment includes creative workspaces for teachers. Mental environment is the ways to motivate teachers to participate in building schools, promoting the sense of responsibility of the members. The ultimate goal is that Technology Enhanced Learning (TEL) will contribute to the school’s educational efficiency. Research can be used as a reference for improving the leadership of school principals and educational institutions.

### 1. Introduction

Technology is more and more popular and in a constant state of effectiveness; we have improved from slates to calculators and other useful tools. On one hand, it is said that technology has worked well to reduce the time spent in carrying out multiple tasks. On the other hand, it increased efficiency in the home with the use of vacuum cleaners, microwave ovens, online banking and bill payment options and other modern facilities. In this trend, technology is paying more
important in schools and applying widely. Technology is encouraged to use in schools have so the number of expectations for its success in the education system.

Technology has a lot of benefits to the education process. It is not only focuses on improving the quality of the education system, but is useful for the change of learners and all people involved in the education system. However, school leaders and school managers should consider that technology tools have really managed to take learning to the next level. These tools are capable of assisting learners in the collection and analysis of data. They help learners release unlimited potentials that they may not have known that they possess. The process has only begun, but as more people interact with the technology and become aware of its inescapable liberating and inspiring potential, they will be forced to deregulate their current practice, eradicate their inhibitions and incorporate technological tools and devices.

Kim and Hannafin (2011) express that a student-centered TELE to be recorded if the teacher has deep knowledge of the different types of technology tools. They pointed out that, teachers lacking an awareness of technology resources will struggle to “promote student-centered learning to use technology”. Therefore, the need for teacher training using technologies in the classroom are important in order to support the technology-enhanced learning environment infrastructure. To make the process, each school has to build a creative environment to push apply technology in learning.

Hannafin, and Land (2004) determined that A Technology Enhanced Learning Environment (TELE), which focuses on a student center model of education, integrates themes that are given real-life applicability through technologically supported delivery methods. TELEs are educational environments in which students are immersed in “learning by doing” with an emphasis on learning, and less on the delivery.

A creative school environment pushes technology enhanced learning is only a vital if it results in a better academic performance by students. This research has been conducted in order to look thoroughly at how the school’s environment, increase the adaptation of technology in teaching of teachers.

According to Cohen (2012:88), teachers will create good performance for their students if they have a positive learning environment that serves as the second home for students and teachers have the authority to ask students if they are not performing well
or meeting the requirements. Therefore, it is imperative to look at the relationship that creative school environment effect directly on promoting the technology in the school.

According to Henson (2012:75), school environment also consists of the relationship between teachers and through the teamwork. The school programs and policies must allow or promote a better school environment for creating. Furthermore, if the school is safe, students can successfully achieve their goals regardless of their background (Cohen, Thapa & Ice, 2013).

Michele Jacobsen, Barbara Brown, and Deborah Lambert (2013) expressed that virtual learning environments support learning experiences to enable with technology and can be offered entirely online or using a blended approach. School have to create a culture of expectation around innovative teaching practices, along with providing ongoing, continuous and collaborative professional learning opportunities for faculty that focuses on current learning technologies coupled with signature pedagogies that are informed by the latest research on learning.

2. Literature Review

Environment and Environment Push Technology Enhanced Learning

Marcia Håkansson Lindqvist (2010) according to Luckin, R. (2010) expressed that Environment is the first resource element. Environment comprises the location and the environment, or “the location and surrounding environment with which the learner interacts” (Luckin, 2010, p. 91). The environment refers to things that the learning takes place. Marcia Håkansson Lindqvist (2010) determines that school environment could be a workplace, a museum, the home or another environment in which the learner interacts.

Environment pushes technology enhanced learning is in these contexts that the teaching and learning activities related to the uptake and use of digital technologies take place along with the conditions for TEL and educational change. In this environment, students are working to install a new network.

Erik Duval, Mike Sharples, and Rosamund Sutherland (2017) said about the origins of Technology Enhanced Learning. It lies in
the experiments of Sidney Pressey in the early 1930s to develop an adaptive teaching machine. During the 1950s, B.F. Skinner again explored the design of teaching machines, based on a theory of "programmed learning" that would allow a learner to progress through teaching materials in small steps, designed to assist correct learning. Thus, some important elements of TEL were established by the late 1950s: learning through technology; design of learning materials; individualized learning; enhancing rather than replacing human teaching. They also concern recent research in TEL that has extended beyond the classroom to explore learning in differing physical and virtual environments.

Salio (1979, p. 19) proposed that there are five categories of conception of learning as follows:

1. Learning as the increase of knowledge;
2. Learning as memorizing;
3. Learning as the acquisition of facts, procedures, etc., which can be retained and/or utilized in practice;
4. Learning as the abstraction of meaning; and
5. Learning as an interpretative process aimed at the understating of the reality.

Technology-enhanced Learning

Technology-enhanced learning refers to the employment of technology in the educational contexts, to assist the learning process and facilitate the communication between peers and teachers. Different from conventional face-to-face classroom lecturing, technology-enhanced learning not only facilitates the showcasing of multimedia teaching materials, but also encourages students to take initiative to research on their own, and to share with peers about their personal insights in online forums. It is hypothesized that students can cultivate more sophisticated conceptions of learning with the aid of technology in the process (Tsai, 2009). Various approaches of technology-enhanced learning have been developed, such as internet-assisted learning, ubiquitous learning, mobile learning, and online education.

Patrick Schweighofer, and Martin Ebner (2015) wrote the term technology-enhanced learning itself is the most widespread term in this field and combines all approaches in which technology is used to
support the learning or teaching process. Thus, terms like e-learning and online learning, as well as more specialized fields such as game-based learning, web-based learning, and others, are part of the research field of technology-enhanced learning.

They analysed Technical Infrastructure Aspects In 18 publications that are identified to address technical infrastructure aspects. The accessibility of the technical infrastructure, reliability, and aspects regarding the learning environment, such as usability, among other things, are addressed. According to Patrick Schweighofer, and Martin Ebner (2015), regarding the technical infrastructure, Seufert, Schütze, and Brünken observe in two experimental studies the impact of different presentation possibilities in a multimedia learning environment. Furthermore, Lehman, D’Mello, and Graesser claim that confusion can increase learning outcomes because confusion can provide opportunities for deep learning. They investigate here four computer learning environments that cause confusion in learners’ minds. Patrick Schweighofer, and Martin Ebner (2015) quoted that Liang and Sedig also address aspects concerning the learning environment. In their study, they observe the navigation process in interactive learning environments and propose a framework that helps with designing an interactive learning environment in order to avoid difficulties with searching for information in the learning environment.

**Creative School Environment**

Vietnamese dictionary definition: Environment includes natural elements and artificial material elements, close relations with each other, surrounding people, affecting life, production, existence, the development of people and nature. The environment is the place where human phenomena and activities occur in interaction with each other. It is a place with physical and mental conditions for creative activities take place and form new products (Pham Thanh Nghi, 2008).

Many studies show the link between the working environment and the creativity of individuals in the organization. The school environment encourages creativity as an environment that fosters creative thinking, a free and safe environment for society and safety for students. It is a punishing school environment that develops good relationships between students and teachers, with special attention to extracurricular activities that lead to innovation through encouraging learners to promote my abilities. People who study at that school
are not afraid to make mistakes. It is an environment that facilitates freedom in expressing ideas, experiences, developing imagination and promoting curiosity of learners (Alfuhaigi, 2015). Into new products (Pham Thanh Nghi, 2008).

A number of other studies on the school environment that encourage creativity have also shown that the working environment encourages creativity that consists of two components: close element (daily work) and distant element (organizational policies). In which close elements have a stronger, more direct effect, encouraging greater creativity. The close elements of the environment will be structured to create a context appropriate for creative behavior. This element requires work to be solved with autonomy, which is an environment that emphasizes increasing autonomy for teachers, stimulating personal positivity, putting pressure on time and public challenging. The distant element requires the leaders of the school to create an organizational system and policies to support creativity. Here, emphasis is placed on a supportive environment, not in control (Shalley, Gilson, Blum, 2000).

Agyei and Voogt (2014) said that the factor of creative school environment consist of Availability of resources Reward or incentives Participation School Culture. The importance of factors relating to learner characteristics, existing school environment characteristics and characteristics of a professional development program influencing transfer directly or indirectly. This study will seek to attain an understanding of the extent to which beginning teachers’ transfer of learning of ICT-ABL in their teaching practice is influenced by these factors.

The school environment encourages creativity as an environment in which all members feel comfortable expressing their ideas and receiving support from other members of the organization for analysis and development. These ideas are the most optimal.

![Figure 12.1. Understanding Creative School Environment](image-url)
Factors of Creative School Environment Push Technology Enhanced Learning

For teachers, the school environment encourages creativity that will create challenges and high pressures, especially pressure on time and environment that also facilitates teachers to apply techniques in teaching and learning. (Oldham; Cummings, 1996; Woodman, 1989; 1990). The environment that motivates teachers to actively apply technology should motivate the enthusiastic participation of teachers and staff in the process of operation to achieve goals. This is an environment that facilitates the autonomy of professionals and the positiveness of individuals, giving teachers and staff the opportunity to find and solve challenging issues while facilitating Each one solves the problems that arise, and then pays attention to recognizing the achievements and giving them worthy rewards for their achievements. (Sari Salem Alfuhaigi 2015; Michael F. Shaughnessy 1991; Greg R. Oldham; Anne Cummings 1996; Richard W. Woodman; et al., 1993).

This is the environment of trust and openness, thereby creating a sense of security in the relationship between people in the organization, helping to encourage all members to dare to give new ideas and ideas of the village. Close in mutual understanding and at a high level of trust.

Thus, the creative school environment promotes the application of science and technology in teaching to improve quality of education is the environment in which teachers create conditions to express their teaching ideas through technology and receiving the support from other members to analyse and develop these ideas in the most optimal way. In that environment, the following basic elements are needed:

- Have time and space to create
- Encourage learning and experience in a realistic environment.
- Encourage a sense of responsibility, creative ideas, and take responsibility at both teachers and students
- Nurturing cooperation, relationships and mutual understanding
- Use methods to encourage and develop higher-order forms of thinking, develop general knowledge for students.
- Assess students’ progress with work results in a real context.
- It is an environment that encourages learning and practice
- Self-control, initiative and motivation, strongly encouraging teachers and learners
Applying technology in learning is a complex design work that plays a small role in internal motivation and creativity in work especially teaching efficiency. The results of the work require feedback because when high-demand and complex jobs are always accompanied by high requirements on output standards, then people need to focus more on the instructions complexity. With these characteristics, implements will feel interesting with the activities, excited to complete the work. The second is the monitoring method. Monitoring will focus on people’s needs and emotions, encourage teachers and staff to express their aspirations, views, give positive, timely and accurate feedback, and encourage the development of vocational skills, career of teachers and staff. The third is to focus on personal development and personal characteristics of individual teachers (Oldham; Cummings, 1996).

The school environment creates / encourages the application of technology in learning that is the school in which individuals have their own capacity, generosity, benefit sharing, always interested in the complexity of work, energetic, independent, self-reliant, intuitive, responsive, confident, capable of solving difficulties, barriers, overcoming pressure and resolving conflicts in certain contexts, copper times know how to show an attractive, creative way (Barron and Harrington, 1981). That environment emphasizes culture that encourages change ideas and breakthroughs; limit conflict, promote the participation of many different components, acknowledging the achievements (Woodman, Schoenfieldt. 1989, 1990).
3. Method

Purpose

The research finds the reality of management solution of principals to promote teachers applying technology enhanced learning through establishing the creative school environment.

Survey Content

- The state of the environment encourages creativity in schools.
- The actual situation of environmental construction measures to encourage creativity of school principals

Survey Method

This study used a combination of methods such as:

Questionnaires

This is a key method to understand the situation of research issues. The study uses a baseline survey form to investigate the state of the innovative school environment, promoting technology - enhanced learning and the reality of innovative ways to build the environment to push technology - enhanced learning.

Interview

Interview with managers and teachers of schools to clarify issues related to research issues.

Statistics

Use the average calculation formula and rankings to calculate the average score and process the research results obtained from the questionnaire, from which to draw comments.
**Processing Survey Results**

The following indicators are used in the descriptive statistical analysis:

- The average grade is used to calculate the score achieved by each opinion and each factor;
- Statistical analysis of inferences using statistical methods

**Objects**

In the survey, there are 41 managers and teachers who create the source of some schools in Ha Nam province.

**Findings**

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>Level</th>
<th>Mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rest assured about the job position</td>
<td>Good: 17</td>
<td>2.26</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean: 18</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not Good: 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Safe and security environment</td>
<td>Good: 24</td>
<td>2.46</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean: 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not Good: 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Friendly colleague</td>
<td>Good: 18</td>
<td>2.36</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean: 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not Good: 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Good relationship with superiors</td>
<td>Good: 12</td>
<td>2.19</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean: 25</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not Good: 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Believed by students, parents</td>
<td>Good: 18</td>
<td>2.31</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean: 18</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not Good: 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Psychological comfort at work</td>
<td>Good: 7</td>
<td>2.12</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean: 32</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not Good: 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Superiors trust</td>
<td>Good: 11</td>
<td>2.09</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean: 23</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not Good: 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Acknowledged merits and achievements</td>
<td>Good: 21</td>
<td>2.41</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean: 16</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not Good: 4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Looking at the table above, the measures that Principals take to build an environment encourage creativity in many different ways. The highest rated content, meaning having the most powerful impact on the creativity of the members of the school, is: “Safe security environment; “Acknowledged merits and achievements”; “Friendly colleague “.

Group of the content has not created many conditions for creativity, including: “Collaborative colleagues and cooperation”; “Staffs are asked by the leader “; “New ideas are easily accepted”; “Having the opportunity of promotion.”

Table 12.2: The Solutions of Principals Build School Environment to Push Technology - Enhanced Learning

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>Level</th>
<th>Mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Good</td>
<td>Medium</td>
<td>Not Good</td>
</tr>
<tr>
<td>1</td>
<td>Teachers have space for creativity</td>
<td>17</td>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Teachers are facilitated on time for creativity</td>
<td>5</td>
<td>27</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Welfare regime (bonus, sightseeing, health care) good</td>
<td>6</td>
<td>26</td>
<td>9</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------------</td>
<td>---</td>
<td>----</td>
<td>---</td>
</tr>
<tr>
<td>4</td>
<td>Expressed views and opinions</td>
<td>10</td>
<td>24</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>Be involved in decision making</td>
<td>8</td>
<td>22</td>
<td>11</td>
</tr>
<tr>
<td>6</td>
<td>Be provided with transparent information</td>
<td>19</td>
<td>19</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Learning to improve your professional and professional development</td>
<td>17</td>
<td>18</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>Challenges in new work</td>
<td>10</td>
<td>20</td>
<td>11</td>
</tr>
<tr>
<td>9</td>
<td>There is space to experience, practice</td>
<td>10</td>
<td>19</td>
<td>12</td>
</tr>
<tr>
<td>10</td>
<td>Encouraging self-control and self-responsibility</td>
<td>3</td>
<td>24</td>
<td>14</td>
</tr>
<tr>
<td>11</td>
<td>Access to capacity and progress in human assessment</td>
<td>11</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>
Looking at the table above, the measures that Principals take to build an environment encourage creativity in many different ways. The highest rated content, meaning having the most powerful impact on the creativity of the members of the school, is: “Being provided with transparent information; “Teachers have space for creativity”; “Learning to improve your professional and professional development”.

Group of the content has not created many conditions for creativity, including: “Encouraging self-control and self-responsibility”; “Access to capacity and progress in human assessment”; “Teachers are facilitated on time for creativity.”

Through exchanges on the side-lines of the poll, many principals expressed, they still do not have a full view of the creative environment to push applying technology in teaching and learning, they also lack the basic skills to create an environment that encourages practicing technology in teaching and learning of their teachers and students; that is why the work they do is mostly experienced and personal accumulation. Some principals also informed about the operation mechanism of public high schools, creating barriers for officials and teachers, and from low autonomy, so open thinking is still limited, accepting new things and failing to innovate is not really common.

In order to have an environment push technology enhanced learning, each school leader needs to clearly define the elements of a creative environment and which factors are characteristics and characteristics of the educational institutions where teachers work, arrange the elements. This is an important basis from which, the principal makes appropriate solutions, develops innovation in school.

4. Discussion

From the above studies, it can be said that the school environment encourages creativity and innovation concentrating on technology practices as a democratic and collaborative working environment for people to freely share, form ideas, apply techniques and ensure copies of material and rich in spirit for teachers to be assured of dedication, all for learners. In order to build and create this preeminent environment, the organization leader or the school principal should implement some of the following measures:
Firstly, building a “bottom-up” management model by sharing power, respecting the opinions of officials and teachers. The regular and open communication between the organizational divisions is the main condition that facilitates organizational innovations. This creates a fundamental difference with the organizational structure commonly used in ever-present organizations that Smith and Weber (According to Pham Thanh Nghi, 2008), they suggested that rigid coherence with only rules and principles. Rigid structure is the basis for the existence of conservative thinking, which tends to impede the free flow of information to solve problems effectively. This structured environment creates rigid one-way thinking, rejecting new ideas with creative potential. That’s why the top-down management makes creative ideas less likely to appear.

Today, leaders need to encourage creative thinking through facilitating the type of thinking that leads to creative products. Teachers in schools need to be encouraged instead of being criticized or punished for ideas that apply creative thinking even if the idea does not lead to success. Moreover, leaders may need to look at evidence of successful creative ideas in the past and tend to look at creative thinking at the present time, when making recruitment decisions and promotion. A must-have element when implementing process innovation, management is a leader who needs to focus on training to increase creativity for employees in their schools by placing trust in the team the trust and delivery of challenging, demanding jobs. The replication of members with creative ideas will be the basis to increase the staff and teachers who are capable of being autonomous and responsible in their activities.

Thus, in the process of creating working lips, encouraging the application of technology in schools for staff, teachers and students, the managers need to change the management model, encourage the participation of Different parties in the decision-making process. Leaders organize discussion and get ideas on important decisions and issues of the school with officials, teachers and learners. Furthermore, they also build a friendly, harmonious and equal atmosphere in the school.

Secondly, Highlight the role of intermediary managers (professional leaders) in connecting the Principal with teachers, staff and learners. Professional teams in schools with positions, roles, functions and tasks are very important to the quality and effectiveness of the teaching and learning process in schools, which is part of the
structure directly established by the principal and decide. The role of the team leader is fundamental to the quality and effectiveness of the professional activities of the team as well as creating cohesion in the school. The team is the closest unit to teachers and staffs, where the teacher participates in professional and fostering activities.

Therefore, the team leader must be deeply aware, correct, have a high sense of responsibility, have full quality and capacities in the management of a scientific team, create a democratic atmosphere, connect with other parts of the school into a unified system to support the spirit of innovation and creativity of team members. Strengthening the role of the team leader in the activities of the school to create the bond between teachers and school leaders. Thus, removing barriers to promoting academic freedom, autonomy in implementing tasks and implementing democratic rights. The network between officials and employees in the school increases and ideas are exploited more seriously when the barriers between the parts of the organization are removed. Removing barriers mean that everyone has the opportunity to contribute and test new ideas. Open debate should be encouraged, the inner motivation is strengthened and mutual support among workers is established with the goal of replacing traditional exogenous motivations such as career advancement and safe at work.

Thirdly, Leaders and Managers should Build a shared culture, learn, respect each other and respect the differences in schools. School leaders need to bring culture that respects difference into a highlight in organizational culture. The process of accepting new ideas is considered an activity to increase trust. An individual who wants to make innovation with ideas that are unknown, first needs to create a social position first, through the acceptance of group norms, just like that, then new individuals able to try to convince others to accept major changes in their creative ideas. Although using position in this way can put individuals at risk of losing position at the same time.

Under this model, only those with the respect of members or leaders can use the influence needed to convince other members to accept their innovative ideas. Building a shared culture is the fact that school leaders understand and share with teachers; Encouraging, encouraging and recognizing the achievements of cadres and teachers, even the smallest; Facilitate them to have opportunities to study, improve their qualifications and advance in their careers; Accepting the failure of the institute and staff to implement innovation and innovative ideas have not been successful, helping them to see the value of the efforts.
Fourthly, they could take care of material and spiritual for teachers to find meaning, joy in work and enthusiasm for the job. The society is growing, the need to take care of the material and spiritual life for workers are becoming more and more necessary, which not only helps to restore labour but also enhance the creativity and enthusiasm of workers. Leaders of the school must determine the task of caring and protecting the rights of workers is one of the key tasks, it is necessary to ensure the insurance regime for officials and teachers; actively organize many practical and useful activities for officials and teachers to feel assured of working and sticking to their work. Promulgate and well implement democratic regulations and policies related to employees, coordinate well with professional teams to promptly and accurately handle regimes and policies for laborers. Always paying attention to the spiritual life of employees, regularly encouraging visits, well organizing fun activities, giving gifts and giving rewards in combination with exchanging, studying and visiting to contribute to motivate person’s spirit. Labor, create motivation to improve quality and efficiency in work. Find ways to improve material life for staff and teachers. These activities help teachers find meaning and joy in their work.

Finally, the school should create a friendly landscape, clean, convenient and lively working and studying environment ... to support the creative work of both teachers and students in the school. One of the factors that promotes creativity in schools is that schools need space for creativity. That space needs to be equipped with convenient, complete and modern. It is necessary to ensure harmony between the common space and the private space of individuals in the school.

The school environment encourages creativity to be developed including: (1) Physical environment: visible elements such as light, colour, sound, vivid bright spaces for fish creative freedom; Technical facilities ensure modernity, suitable with practical needs and development trend of society; (2) External environment includes: Mobilizing the use of local resources, such as family-school-social relations; freedom of exploring environment; environment with appropriate space for educational activities, creative experience activities of collectives and individual learners; (3) Pedagogical environment includes: providing diverse opportunities to choose and participate in activities; balance work in plans and arising work; create creative and discovery opportunities; create experience, work environment without pressure, have many recreational activities
(Daviesa, 2013). Thus, leaders need to pay attention to improving working conditions for officials, teachers and students; Help them to be acknowledged when applying new techniques.

6. Conclusion

This study has provided a theoretical framework for building a school environment that encourages innovation towards the application of science and technology, thereby understanding those contents in the management situation of high school principals. Future research may enhance qualitative research, focusing more on interpersonal interactions in the school, further characterizing the work characteristics and organizational structure of the school so that Classification of environmental factors encouraging the application of science and technology.

The environment that encourages innovation, application of technology in learning helps the school to have creative teachers, thereby creating innovative educational products, which are capable learners. High response in fluctuating environments. They will be effectively working citizens to create many new values, contributing positively to the sustainable development of society and the country in the future.

REFERENCES


Innovative Practices of Technology-Enhanced Learning


Virtual Reality

Virtual Reality headset: A Stand-alone Oculus Go, A Samsung Gear, and some Google Cardboards.

Affordances:
An immersive experience which allows user to feel the presence of being in a real environment. Sensations of speed, heights may help address phobias, while being in a soothing and relaxing environment may have calming effects.

The Rollercoaster apps from the Oculus store was used for the Oculus Go and Samsung Gear. The InMind app from Google Playstore was used with mobile devices and fitted into the Google Cardboards.

Epic Rollercoaster Apps from Oculus store: https://www.oculus.com/experiences/gear-vr/1644126292264565/

**Instructional Strategies for using Virtual Reality**

The ARCS (Keller, 1987) model of instructional design is used in the design of instruction. The activities for using the Virtual Reality headset and apps were designed for the following sequence of ARCS: Attention, Relevance, Confidence and Satisfaction. The VR apps we used to gain attention, show relevance in their future work as counsellors, and to gain confidence and satisfaction in their use.

### 1. Introduction

The topic of “Mobile applications used for counselling” could be taught in a traditional instructivist approach for undergraduate students, where the mobile applications (apps) were identified and their use for counselling was explained. This would enable the undergraduate students to acquire the understanding and realise the potential of mobile apps for counselling. However, this approach addresses only the cognitive domain of learning and neglects the affective and psychomotor domains. In order to experience the emotional aspect of immersion in the use of mobile apps for counselling, virtual reality (VR) was selected as it could evoke the affective and psychomotor domains of learning. For this purpose, a motivational model of instructional design, the ARCS model (Keller, 1987) was selected to design the learning experiences. Hence, the purpose of this study was to investigate the learner’s reaction towards the use of VR and whether they would use VR as counsellors in the future.

### 2. Virtual Reality

Virtual reality (VR) is a computer-generated simulation in which users can interact synchronously in real-time (DeWitt, 2018; Innocenti, 2017; Yang, Chen, & Jeng, 2010). Originally used for the gaming industry, VR has the potential to engage users in synchronous situations. As the users’ actions are tracked and displayed through an interface, this
Virtual Reality for Evoking Emotions gives rise to a sense of presence in the virtual environment (Innocenti, 2017). This sense of Presence is dependent on the context and the psychological response of the user towards VR (Dalgarno & Lee, 2010). As the sense of presence is an illusion, it is dependent on the interactions in the virtual world which may contribute to the sense of immersion (Tussyadiah, Wang, Jung, & tom Dieck, 2018). The sense of immersion may be sensory, conceptual and motivational (Dalgano & Lee, 2010).

In VR, the user can assume an identity and be seen as an avatar or an alternative self within the virtual environment. The embodied actions and interactions of the user contributes to a rich psychological immersion, experienced in the virtual world. Hence, the sense of presence in the virtual environment, the effects of the immersion and the creation of an identity, occurs as a result of the representational fidelity and the interactive capabilities of the virtual environment (DeWitt, 2018). The higher the fidelity and interactive capabilities of the device and the application, the more realistic the environment. Hence, in this study, an application and device which can provide a reasonably good representational fidelity would be selected to enable the users to experience the immersive VR environment.

The affordances of presence and immersion has made VR apps suitable for use in counselling. The computer-generated simulations of VR can be used to mimic real-world situations with fairly accurate representational fidelity and interactivity. This allows users within their own avatar, to create an identity and be immersed in an alternative environment. Thus, the potential is for counsellors to use VR to administer cognitive behavioural therapy (CBT) and exposure therapy (ET) to address mental health problems and social issues such as avoidance of social situations and fear of heights. Virtual reality exposure therapy (VRET) can provide a safe virtual environment and in a controlled manner for users (Senson, 2016).

There has been research on VR in treatment of trauma patients, in particular for post-traumatic stress disorders (PTSD) among soldiers and war veterans. The application, Bravemind, was developed at the University of Southern California for the Medical Virtual Reality center for the use in prolonged exposure therapy (PET) for PTSD victims to be immersed in war zones in virtual Iraq and Afghanistan (Senson, 2016; US National Library of Medicine, 2017). A study comparing the use of VRET alone, and a combination of VRET with drugs, showed that VRET alone was as good as the combination
Innovative Practices of Technology-Enhanced Learning

for reducing PTSD due to military trauma (Rothbaum, Price, Jovanovic, Norrholm, Gerardi, Dunlop, Davis, Bradley, Duncan, Rizzo, Ressler, 2014). Further, patients undergoing VRET performed better on behavioural assessments after the treatment, and there was no significant difference in assessment scores when compared with patients using the traditional method (Morina, Ijntema, Meyerbröker & Emmelkamp, 2015). These studies indicate that VRET could be used for behavior change in real-life situations and to support treating specific phobias. Morina, Ijntema, Meyerbröker & Emmelkamp, 2015).

VR has been used for addressing phobias. At the VR Medical Centre, a system for treating phobias related to flying, has not only the VR software and hardware, but also the airplane seats and a subwoofer system to mimic the sights, sounds and feeling of flying (Senson, 2016). There has also be applications which can assist in addressing the fear of heights (https://www.realitytechnologies.com/vr-helps-people-conquer-a-fear-of-heights/). Providing sufficient exposure gradually and in a controlled manner in VR, helps to reduce the traumatic effects of the phobia.

VR can be used to curb anxieties and provide stress relief through mood-improving strategies such as meditation. The potential of presence in a relaxing and soothing immersive environment, makes it possible for meditating in a virtual environment. Meditation and relaxation using VR need not be only to treat stress or anxiety disorders but can be used to for positive health benefits for everyone (Senson, 2016). The Guided Meditation VR team works on providing accessible VR experiences, such as being in a virtual Zen garden, for patients with disabilities and limited mobility (Senson, 2016). Besides that, there are numerous apps for the mobile phone. Relax VR is an iPhone app that provides the calming visuals and sounds of beaches, oceans, stream and crickets for users to relax in (Levski, ud.). Breathe2Relax is another app which provides guidance on breathing techniques to relax and reduce stress. Other than for relaxation, VR has been used to train breathing for reduction and management of pain (See Applied VR’s Pain Education at https://appliedvr.io/), and also to address depression and panic disorder among teenagers (See products by Limbix at https://www.limbix.com/pipeline).

VR has the potential to be used for cognitive behavioural therapy (CBT). Some psychiatric conditions such as childhood developmental disorders and autism have been investigated using VR for CBT
Virtual Reality for Evoking Emotions... | 257

(Senson, 2016). Floreo is a mobile app which uses VR to help children with autism (see https://floreotech.com/). There are also VR apps which help people empathize with autistic people by letting them experience the world through the eyes of an autistic person in VR (See https://360creators.com/autism-vr/).

Hence, in order for the trainee counsellor appreciate that the sense of presence and identity allows for an immersive experience, which could be harnessed for therapies and exposure, is to allow the trainees to experience the immersive nature of VR. Hence, the VR application that is selected should allow for sensory, conceptual and motivational immersion, so that the embodied action of the user could contribute to a rich psychological immersion. The application selected is a rollercoaster ride experience in VR. Coupled with a motivational model of instructional design, it is believed it will be effective for learning on the selected topic of mobile apps for counselling.

3. Motivational Model of Instructional Design

Motivation is related to a person’s actions in response to the desire to pursue a goal or perform a task (Keller, 2007). Motivation has been defined as the internal determinant of the force and direction of effort that drives a student to learn (Keller, 1983), and comprises of affective and cognitive components (Keller, 2007). When motivation is intrinsic, the pleasure involved in performing the activity takes precedence, even when there is no apparent reward (Deci, 1975). On the other hand, extrinsic motivation is when the rewards associated with successful accomplishment influence individuals. However, it is uncertain how extrinsic motivation can influence intrinsic motivation, or whether they would be any conflict between these motivations (Keller, 2007).

There are psychological factors that empower one to take action to achieve their goals. These motivational characteristics have been conceptualised as traits and states (Brophy, 1983; Keller, 1983). A trait is a stable psychological need or drive, while a state is influenced by a situational stimulus, or process (Keller, 2007). Some characteristics, such as curiosity, may be both a trait and a state, are there are some situations when the state of curiosity is awaken (Berlyne, 1965). Hence, ID should identify traits and design motivational tactics to accommodate these traits (Keller, 2007). As many elements of
motivation are at the state level, they are influenced by situational factors, and hence will change from time to time during the period of instruction. Instruction should then provide opportunities to change the situation during instruction.

Motivation has affective and cognitive components. The emotional aspect, or affective component, is important for influencing behaviour as we would pursue goals which appeal to us and avoid those which do not (Astleitner, 2000). Cognitively, attributional theories of motivation propose that we interpret causes of outcomes, and are motivated based on the value attached to the outcomes (Weiner, 1974). Hence, considerations need to be made to determine whether a particular tactic is motivating to a particular group of learners. So, learner and context analysis are important in a motivational design so as to understand the affective and cognitive needs of the learner in a particular situation for suitable tactics to be prescribed (Keller, 2007). A content analysis could then be done to determine the content which may be motivating for the learner.

Research on motivational has seemed to focus on four elements (attention, relevance, confidence and satisfaction [ARCS]), which can be subdivided further into 12 subcategories which are based on principles of behaviour analysis and management (Chang, Chang & Shih, 2016; Li & Keller, 2018; Keller, 1993). These theories may be influenced by expectancy-value theory (Keller, 2007) which assumes that human beings are motivated to achieve a goal if they have a positive expectancy for success, and the goal has a positive value for them. As people have multiple needs, the goal at the highest resultant motivation are the ones which will receive the most effort. These four elements and 12 subcategories have been used to elaborate the ARCS model, and will be used to describe the processes in the learning environment (Table 13.1).

ARCS motivational model has been used in many countries and in different contexts (Li & Keller, 2018). It has been used to design learning environments as well as instructional materials using the four elements: attention, relevance, confidence and satisfaction (Keller, 1987). Attention is the prerequisite to learning and to obtain and sustain students’ attention (Keller, 1987; Li & Keller, 2018). This means that the lesson should be design first to respond to the learners’ sensation-seeking need, and then the knowledge-seeking curiosity can be activated (Keller, 1987). For the second element, relevance to express
the reason why the learner should learn the content should be shown (Li & Keller, 2018). Relevance would refer to the content as well as the teaching method (Keller, 1987). The third element, confidence is to convince the learner that by making the effort, there was possibility of success. If learners do not succeed with sufficient effort, there may be a need to redesign the instruction or provide more scaffolds (Keller, 1987). Finally, satisfaction relates to the reinforcement theory, where the learner would feel more motivated if there was either extrinsic or intrinsic reward. This can be in the form of a well-defined assignment with a suitable reinforcement schedule provided (Keller, 1987). Hence, these elements would be used to design the instruction.

**Designing the Instruction**

As Keller (2007) has noted, the capability of the learner can influence the motivation for learning. Hence, before the learning environment is designed, the analysis of the learner and the content needs to be conducted in order to understand the needs of the learner and prescribe suitable tactics.

Firstly, the learner analysis was done to determine whether the undergraduates in the context of the study had the knowledge, skills and aptitudes to use VR and mobile applications for counselling and the perceived value of using VR. Although, none of the participants seemed to have used VR headsets, as generation Z, they seemed to have the aptitude and the motivation in using the such equipment. This was determined by the researcher who interacted with the participants who noted the excitement and willingness to volunteer using the headset. In addition, studies have shown that undergraduates who enrolled in the university had the basic skills in using computers and other technology applications for communication (DeWitt, Naimie & Siraj, 2013).

Next for content analysis, the goal of the lesson was analysed. As the goal was to explore the mobile apps for use in counselling, suitable apps would be selected to immerse the learner and enable the experience of the possible effects of these apps in VR. The apps selected should have an impact on the psychological aspect and show the potential of use to evoke emotions. For this purpose, a roller coaster VR experience was selected from the Oculus Store and a rollercoaster shooting game in the mind at the cellular level was selected, InMind
Innovative Practices of Technology-Enhanced Learning

for the Google Playstore. Psychological effects as the experience of speed, acceleration and sensation of falling could be experienced with VR.

In addition to determining the goals of the lesson, consideration should be given to the time be allotted for achieving this goal, the availability of tools and equipment, as well as guidelines for performing the job (Keller, 2007).

The other limitations in the ID to consider are the opportunities due to the availability of resources and information necessary to perform the task. This could be addressed by sharing VR headsets and having facilitators who were trained to use the related app to be in charge of the devices and guide the participants who were using the VR headsets for the apps. Only 2 stand-alone headsets were available: 1-unit Oculus Go and 1-unit Samsung Gear, and these were used with the Rollercoaster ride application. In addition, two mobile devices were used with Google Cardboard and the InMind application (downloaded from Google Playstore). Each headset has a facilitator, who was a student trained to use the device, assigned to assist and guide his peers. The motivational design is outlined in Table 13.1 before the content was presented.

<table>
<thead>
<tr>
<th>Table 13.1: ARCS Model Categories and Subcategories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Categories</td>
</tr>
<tr>
<td>Attention</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Categories</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td>Variability</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Relevance</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Categories</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Confidence</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Success opportunities</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Personal Control</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Categories</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>Satisfaction</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Extrinsic rewards</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Equity</td>
</tr>
</tbody>
</table>

4. Methodology

The research is a design-based research in which previous findings of the learner analysis had been used to design the lesson using a motivational instructional design, the ARCS model. The lesson was implemented with a class of 53 undergraduates in a Bachelor of Counselling programme. After the lesson, four volunteers were invited to be interviewed on their opinions in order to investigate their reactions on the use of VR and whether the experience would influence them in using VR for their future career as counsellors. The interviews were transcribed and analysed according to emergent themes. Data was triangulated from the observations during the implementation.
5. Findings

The analysis of the data indicated that there were several themes emerging such as an exciting experience when using VR, enabling an attitude of inquiry, meeting their expectations of the lesson and the possibilities of using VR for counselling. However, most participants needed more skills to be confident in using VR and were less certain that VR could be used in the Malaysian counselling scene currently. There were recommendations to use VR for counselling as reported below.

**Exciting Experience**

The participants seemed to have had a fun experience when using the VR. J noted about the class activity: “I got to use the VR set, watching hilarious reactions of my friends”, while Z agreed “Yes, a lot as the class as started by playing a game!” It was the first time for all of the participants but R added, “Yes, I was able to make my dreams come true by using VR for the first time”. Three of the participants seemed to be really amazed by the experience. R said it was “thrilling, interesting and fun,” while Z said “Amazing! The fact that VR allowed me to experience things like in real life.” J said, “I had seen games being played through online streaming but never used it to play before.” See Figure 1.

The fun experience may have correlated with the difficulties experienced. This was because, H, who was not so enthusiastic about the VR experience admitted that she had a bit of difficulties. “I have difficulties because I don’t know much about it. I don’t really know how to start, but I think it will be easy to find out if I did the wrong thing.”

![Figure 13.1. Students with the VR Sets](image-url)
Inquiry Method of Learning

On whether the participants were allowed to have an attitude of inquiry, three of them agreed it was encouraged, as R said “I was able to ask anything if I did not understand or needed extra clarification.” According to H, although this attitude was encouraged, she was “honestly, I was a bit scared in asking the facilitator questions.” However, H managed to explore things on her own as she explored the InMind app: “I was exploring how the nerves in the brain moves around.”

When inquired whether there were different tactics used in the class, all of them agreed that there was a variety of tactics. However, H preferred that this lesson and use of VR should be done in small groups “so that we can understand better.”

Meeting Expectations

As to their needs and expectations, all of them had the expectation that they would be looking at the use of VR for counselling. R said “I would expect to understand more about the future of VR advancements in technology for counselling.” For R, the lesson met her expectations as “I can further understand the concept of VR hands-on and theoretically as well as knowing the applications used in counselling.” Only J felt that “although the lesson was fun, it was mostly surface knowledge, but good enough to learn. And more importantly, we got to play and it was not boring at all.”

As to having sufficient opportunity to explore the VR, three of them agreed. Only Z stated. “I don’t think it is enough because we had to share the VR sets among 53 students and time was limited.” As for H, although she agreed she had sufficient opportunity, she also noted that she did not have opportunity to try all the VR apps.

Possibilities of Using VR for Counselling

As to whether they were able to contemplate the use of VR for counselling, three of the participants agreed that it could be used. R had said that “I think that VR can be used for counselling as it would give a realistic environment for counsellors and clients to solve a problem which has not happened.” However, R thinks that it is not a bad idea to introduce VR for counselling in Malaysia, but “it still
depends on the situation of the counselling session.” H agrees that it will pick up as “people now a days are busy with their work but at the same time they need effective counselling, so I think the potential of VR for counselling is big.”

On the other hand, J was sceptical as “I think VR right now is not suitable for online counselling, because of the unstable internet connection and no face to face make the session ‘cheatable’. However, J noted that it was possible in the future, “when the technology becomes more advanced.” Further J also felt that it was not possible in Malaysia yet “because the VR tech is very low and the price factor, and internet is not good enough, and simply too expensive.”

**Improving Skills in Using VR**

Three of the participants felt they needed a VR set to practice. R, had very confidently said all she needed was the “extra money to purchase the VR set.” J added to the requirements of “having a safe and quiet room for testing out and more time.” On the other hand, H focused on the need for more training. She wanted to have small group sessions to “learn how to use VR from A to Z.” This was because she felt she could learn better doing work in small groups.

**Less Possibilities on Current Use of VR in the Malaysian Counselling Scene**

There were mixed feelings on the possibilities of using VR in counselling in Malaysia. As H says, it is “a new technology and need to learn more and improve their skills before starting to use it with their clients.” Z also admits she has never heard of any Malaysian counsellor using VR, but is sure that they will be “more prepared to use VR in the future.” J also agrees that they are not ready yet in Malaysia, but anticipates, “in the future yes, if these technologies are taught in school or uni, with practices and a set of ethics planned out just for VR online counselling.” R was quite practical in her approach. She felt that Malaysian counsellors were partially ready, as they would “need the ICT skill to handle the VR set, and communication skills to try to engage clients to this approach.”

Similarly, R felt that the Malaysian client were partially ready as “they would probably think that it as a game or a joke to play with the VR set, but with the proper insight on the benefits of VR for
counselling, I think they might soon accept it.” J and H both felt that the high cost of the VR sets might be a factor that will affect its use as it was “pricey.” In addition, J felt that “the mindset that VR is for games” may discourage clients to use it. On the other hand, Z was confident that VR would attract clients as they would be “excited to get help with different techniques and tools.”

**Recommendations**

As for recommendations to peers and juniors, three of the participants were agreeable to doing so. Z had no qualms about recommending VR to be used and says that “as in the future everything will be high tech, and it requires more techniques and tools rather than just assessment.” R would also recommend as she felt that “VR definitely helps to make one immerse in the world of the troubled and learn ways to help them through experience.” Only J had mixed feelings as firstly, he pointed that it was good to expose them to VR as “they are more comfortable with digital stuff.” However, it was bad because youngsters may be “emotional when using VR and rage or quit using the VR during the session when they felt uncomfortable.” Hence, engaging in face-to-face sessions would be more beneficial.

6. **Discussion and Conclusion**

Integrating the use of VR apps in the lesson seemed to have engaged all participants in the learning. When using VR, the three domains of learning: cognitive, affective and psychomotor domains, were addressed as learners had to understand the environment, develop certain emotions in the environment, and interact within the environment. The ARCS model of motivational design was used as a guide to ensure that the elements of attention, relevance, confidence and satisfaction was addressed (see Table 13.1). The participants seem to find the experience of using VR exciting, thrilling, and fun, and related the use of VR to a “gaming experience”.

The excitement on being on a rollercoaster or flying through the neuron in the brain was enhanced as the participants seemed to be sensory, conceptual and motivational immersed (Dalhano & Lee, 2010). Although the sensory immersion was related to what they saw on the ride and their movements as they interacted in the virtual
environment, this led them to experience a psychological sense of presence in the world (Dalgano & Lee, 2010). Hence, conceptually they were immersed in their rollercoaster ride as they “avoided rockfalls and sharp turns” and interacted with “deadly neurons to shoot them in the brain.” Such interactions in the virtual environment heightened the sense of presence and contributed to the motivational immersion (Tussyadiah et al., 2018). Hence, the motivation drove the participant to complete the “ride” and to even ask for more.

The lesson was designed to attract the participants’ attention first, before showing relevance and building confidence in using the VR (see Table 13.1). For that purpose, the lesson started with the VR experience, and that seemed to motivate students who used it very much. However, there were still others who did not have the opportunity to use the VR apps. In showing relevance to the content, the participants seem to agree that the teaching method seemed to be varied and allowed for inquiry (Keller, 1987). More importantly, when asked on whether it could be used for counsellors in Malaysia, there was mixed opinions. Most felt that currently, counsellors and their clients were not ready to use VR.

Building confidence both for counsellors to use VR and clients to accept the use of VR in counselling was required. Participants felt that developing experience and skills among counsellors in using VR could promote its use. In addition, showing more cases of the affordances of VR for therapies and safe, controlled exposure to reduce phobias and anxieties, might promote the use (Senson, 2016; Levski, ud). On the other hand, it seemed more likely that clients might accept the use of VR as it was non-threatening and seemed to be a gaming experience. This was similar to the use of VR for PTSD for soldiers and war veterans, where a seemingly game-like experience was used as exposure therapy and was more likely to engage the user (Rothbaum et al., 2014; Morina et al., 2015). In addition, the clients who were digital natives were more likely to accept the use of VR for therapy as they would have already had the skills and experience in using mobile applications.

During the lesson, not all participants had an opportunity to use the VR. Hence, not all were satisfied with the experience. Some were unsure and might have been afraid to ask how to use. Hence future implementation could take into account suggestions such as having more small group interactions and providing more scaffolding. Some
also claimed that there was only surface knowledge on the subject but countered that it was more important to play, indicating that the intrinsic motivation of using VR was important (Deci, 1975).

The lesson was planned using the motivational design of the ARCS model (see Table 13.1). There is a possibility of using this model for other lessons and with resources other than VR. However, a more empirical study to take into account perceptions of all students enrolled for the course could be considered for future studies. This may provide a better cross-sectional view of the needs and expectations of students enrolled for the course.

In conclusion, VR can be used to provide an immersive experience for instructional design when exploring an environment as the psychological effects of the immersion can be felt by the user. It is a powerful tool to gain attention of the learners. VR as a resource can be used in other subjects such as environmental sciences, cultural studies and historical studies, where virtual environments are already available on the Oculus store or Google playstore. However, the relevance of the use of the VR app to the learning outcome should be discussed after the VR experience to reinforce the potential for use. In addition, scaffolding and guidance to build confidence in using VR for learning should be provided during the lesson. VR has the potential to engage the digital natives who have the skills and intrinsic motivation to explore virtual environments for learning. Motivation has been shown to have a powerful and lasting effect on learning and hence teachers and lecturers should consider harnessing its effects for impactful learning.

REFERENCES


Innovative Practices of Technology-Enhanced Learning

About the Editors and Contributors

Editors

Donnie Adams, PhD is a senior lecturer in the Department of Educational Management, Planning and Policy, University of Malaya. He obtained his PhD in Educational Leadership from the University of Malaya. He is a recipient of the University of Malaya’s Bright Sparks scholarship and a recipient of University of Malaya’s Excellence Award 2016: PhD Completion in Less than 3 Years. He is an author and reviewer of Web of Science ISI (Social Science Citation Index) and SCOPUS journals and the Editor-in-chief for the International Online Journal of Educational Leadership (IOJEL).

Dorothy DeWitt, PhD is an Associate Professor in the Department of Curriculum and Teaching Technology, Faculty of Education, University of Malaya, and recipient of the Australian Government's Endeavor Executive Fellowship. Her research and publication are on new pedagogies, collaborative mobile learning and problem solving in teaching and learning. She has been a consultant through the University of Malaya Consultative Unit for the Ministry of Human Resources and National Institute of Education, Sri Lanka, and has facilitated workshops on 21st-century learning. Her many awards include the Second prize for the Minister of Education Malaysia Special Award 2019 for the Immersive Learning Experience category.

Contributors

Balakrishnan Muniandy, PhD is a Professor at the School of Education, Languages and Communication, Wawasan Open University. He was previously a Professor at the Centre for Instructional Technology and Multimedia, Universiti Sains Malaysia, Penang. His research interests spans across a wide area that includes
Innovative Practices of Technology-Enhanced Learning

Instructional Technology, Instructional Design, Teacher Education, Project-Based Learning, Pedagogy, Andragogy, Life-Long Learning, Social Media, and Digital Wisdom. Dr. Balakrishnan has published more than 100 publications which included books, monographs, book chapters, journal articles and conference proceedings. He has served and currently continue to serve as Editorial Board Member and reviewer for local and international journals.

Chang Zhu, PhD is a professor in Educational Sciences at Vrije Universiteit Brussel. Her research mainly focuses on the implementation of educational innovations in schools and higher education and the examination of cultural, contextual and individual variables that are related to the implementation of educational innovations. Her work includes ICT integration in education, e-learning and blended learning, CSCL, innovative teaching, creativity, and cultural comparative studies related to these themes. She has experience with projects and is the current project leader in VLIR-UOS concerned with institutional strengthening and running at Mountains of the Moon University, Uganda.

Chuah Kee Man is a lecturer at Universiti Malaysia Sarawak, majoring in the areas of e-learning, cognitive and computational linguistics, learning sciences and English language teaching. He has won several awards at national and international levels for various innovations in teaching and learning. His research interest revolves mainly in the realms of cognitive linguistics, technology-enhanced learning, assistive technology and learning analytics.

Fitri Suraya Mohamad, PhD is an Associate Professor at the Faculty of Cognitive Sciences and Human Development, Universiti Malaysia Sarawak. In over twenty years of teaching, she has supervised thousands of undergraduates and hundreds of postgraduate students on various scholarly inquiry related to teaching and learning, particularly in the use of technology to support and enhance learning. She has presented and published regularly locally and abroad on topics related to educational technology. Fitri is currently involved in teaching and training Masters students and local Sarawak teachers to use Gamification as an alternate approach for engaging young school children to learn and focus in class.
Kagambe Edmond, PhD is the Deputy Vice Chancellor of Mountains of the Moon University in Uganda. He holds a PhD in Educational Administration and Policy Studies from Moi University, Kenya. Seasoned Professor of Education Administration with over 15 years of experience teaching undergraduate and graduate courses in Education Administration, Planning and Policy Studies. He worked as lecturer in Nairobi University and Moi University, Kenya in the Faculties of Education. Currently, the Programme Coordinator of Mountains of the Moon University Institutional University Cooperation Partner Programme under the Flemish Interuniversity Council (VLIR) – University Cooperation for Development (UOS), Belgium. He actively participates in continued learning through conferences and professional research.

Kintu Mugenyi Justice, PhD graduated from Vrije Universiteit Brussel in 2017 with a Doctor of Educational Sciences and currently works as the Dean of the School of Education at Mountains of the Moon University in Uganda. He specializes in e-learning, distance education, education innovations and blended learning. He has published and presented papers at international conferences and in reputable peer-reviewed journals. He has had a wide experience in teaching at higher education levels and in secondary schools. He is currently the project leader in the VLIR-UOS program of the Flemish Inter-University Cooperation of the Flemish Government in Belgium.

Kristina Francis is a PhD student at Universiti Malaya and currently, a lecturer at Universiti Tunku Abdul Rahman (UTAR). Her core interests are on ELT methodologies and the Issues and Trends in Teacher Education. Her current research interests focus on the Flipped Classroom as she is actively involved in research and development work towards the area of blended learning, gamification, virtual learning and etc. She is currently designing and developing a flipped Professional Development MOOC for University Educators in her PhD study and she is also a PSMB certified trainer.

Kenny Cheah, PhD is an academic staff based in the Faculty of Education, University of Malaya. He teaches, writes, and trains in aspects of Qualitative Research in educational contexts. He is also a Certified Senior Professional Trainer for ATLAS.ti Qualitative Software, and Tech-Educator for Google Education.
Le Hoang Dung, PhD is Dean of the Faculty of English Linguistics & Literature (USSH, VNUHCM). Le obtained his BA in English Linguistics and Literature in 1998, MA in TESOL in 2004 from USSH and PhD in Education from De La Salle University under full scholarship by the UBCHEA in 2008. With his 22 years of teaching and eight years of deanship, he has substantial experience in TESOL pedagogy; curriculum development; quality assurance; internationalization of HE, as well as organizing seminars and conferences on the same fields. Dr. Le is also the trainer for workshops on QA, assessment, curriculum and internationalization.

Malathi Letchumanan, PhD has a degree in Information Technology and Master’s in Computer Science from the University of Malaya. She completed her PhD in the field of ICT in Education from Universiti Sains Malaysia. She had been working as a lecturer in Tunku Abdul Rahman University College, Mara Technology University and Selangor University from 2004-2008. Currently, she is working as a Research Officer in the Institute for Mathematical Research, Universiti Putra Malaysia. Her area of specialization is ICT in Education, Adult Learning and Programming.

Mariam Mohamad, PhD is the Senior Lecturer at Universiti Sains Malaysia, Penang Malaysia. Her research interest is in the field of mobile learning and mobile assistive technology. Dr. Mariam was acknowledged as one of the pioneers from Malaysia in mobile learning research. She has shown her capability in her area as invited speakers Dr. Mariam has extensive experience in disseminating her work internationally; with over 50 publication and presentations. She actively involves presenting her work in international conferences with ISI Web of Science and SCOPUS indexed status.

Maslawati Mohamad is a Senior Lecturer of Teaching English as a Second Language at the Faculty of Education, The National University of Malaysia. Her areas of expertise are on innovation in Teaching English as a Second Language, TESL and reading skills. She is also a trainer at both government and private institutions.

Norlidah Alias, PhD is an Associate Professor and Deputy Dean (Higher Degree) in the Faculty of Education, University of Malaya. Her expertise is in Curriculum Design and Evaluation. In her current
research on technical and vocational education and training, she has been a Consultant through the University of Malaya Consultative Unit (UPUM) for the Ministry of Human Resources and the National Institute of Education, Sri Lanka. She is an active member of JKPTVET-Technical (Industrial Cluster) committee 2019, and was Editor of the Malaysia Online Journal of Educational Technology and the Asia Pacific Curriculum and Teaching Journal. She has published books and both ISI and SCOPUS journals.

Nurul ‘Izzati Md Fuad is a lecturer in IPG Kampus Bahasa Antarabangsa (Teacher Training Institute) in Malaysia. Her areas of expertise are on TESL, ICT in education, English drama and literature. She has presented in both international and national conferences and published papers in SCOPUS journals.

Parilah Mohd Shah, PhD is a Senior Lecturer of Teaching English as a Second Language at the Faculty of Education, The National University of Malaysia. Her areas of expertise are on TESL, and innovation in Teaching English as a Second Language. She has been involved in both national and international conferences and publications throughout her career.

Prabal Bhargava (MBBS, DNB) is currently the Discipline Coordinator- Ophthalmology at the School of Medicine, Faculty of Health and Medical Sciences, Taylor’s University, Malaysia where he was recently conferred with the EMAS (Exemplary Meritorious Academic Staff) Award. A clinical ophthalmologist, he has been actively teaching and training medical students in the specialty for almost 20 years. Assessments, Blended models and Competence based learning have been the ABCs of his work as a medical educator. He takes pride in his passion for the specialty and the drive to evolve a better teaching-learning philosophy.

Vinothini Vasodavan, PhD was working with LeapEd Services Sdn Bhd project of facilitating education transformation in Malaysian schools through a Public-Private Partnership with MOE. Her research interest is in the field of (TPACK) has driven her to design learning task for innovative teaching and learning. She won Gold medal award for project on Space Matters: The Impact of Mobile Augmented Reality (AR) From Student’s Perspective for Learning Improvement
Innovative Practices of Technology-Enhanced Learning


Vu Thi Mai Huong, PhD is a lecturer in the Department of Educational Management, Hanoi National University of Education, Vietnam. She holds master’s degrees and doctoral degrees of Education from Hanoi National University of Education. Her research focuses on educational management and teacher training in the context of educational innovation in Vietnam.
INNOVATIVE PRACTICES
of TECHNOLOGY-ENHANCED LEARNING

The process of transforming teaching and learning is a complex process which may involve changes in teachers’ beliefs and conception of teaching and learning. In Malaysia, the Malaysian Education Blueprint 2015 – 2025 (Higher Education) lists transformation of the delivery of higher education as one of the shifts in the aspiration to deliver a world-class higher education system. For this purpose, change is required in the processes of learning so as to develop students with enhanced capabilities to be future-ready Malaysians, as well academics who could perform this task (Ministry of Education, 2015). Hence, academics and students alike may need to unlearn and relearn concepts of teaching and learning.

This book is an effort to achieve the aim of transforming education through technology-enhanced learning (TEL) and to showcase practices from Malaysia and surrounding regions. The task of transforming education is not limited to Malaysia, as the concept of education is evolving. Hence, in order to be competitive, all higher education institutions need to consider transformative practices. Traditional practices of teaching may not be suitable for preparing our youth for the technology-rich and competitive future. Hence, TEL practices may help enhance this transformation.