

An Integrative Framework to Investigate the Impact of Blended Learning Adoption in Higher Education: A Theoretical Perspective

Bokolo Anthony Jr.*¹, Adzhar Kamaludin², Awanis Romli³, Anis Farihan Mat Raffei⁴, Danakorn Nincarean A/L Eh Phon⁵, Aziman Abdullah⁶, Gan Leong Ming⁷, Nurbiha A Shukor⁸, Mohd Shukri Nordin⁹, Suria Baba¹⁰

anthony.j.bokolo@ntnu.no*¹, adzhar@ump.edu.my², awanis@ump.edu.my³,
anisfarihan@ump.edu.my⁴, danakorn@ump.edu.my⁵, aziman@ump.edu.my⁶,
ming@ump.edu.my⁷, nurbihaashukor@gmail.com⁸, nmshukri@iium.edu.my⁹,
suria@umk.edu.my¹⁰

Department of Computer Science, Norwegian University of Science and Technology, NTNU, NO-7491 Trondheim, Norway¹, Universiti Malaysia Pahang²⁻⁷, Universiti Teknologi Malaysia⁸, International Islamic University Malaysia⁹, Universiti Malaysia Kelantan¹⁰

Abstract

The importance of Blended Learning (BL) in institutions is momentarily increasing at all educational levels and particularly for higher education. However, relatively little research addresses students, lecturers, and administrators' readiness towards BL adoption. Although, such study would support higher education to strategically assess current state and future direction of BL. Therefore, this study develops an integrative framework based on the Organization for Economic Co-operation and Development (OECD) framework, Hexagonal E-Learning Assessment Model (HELAM), and Khan octagonal framework to investigate the impact of BL towards measuring students, lecturers and administrator's readiness and further explore on the intensity of implementation of BL impact in higher education. Survey data was collected from 87 samples from 3 Malaysia public university. Findings from this study provide understanding of BL initiatives, and offers insights to universities on improving teaching and learning effectiveness. Besides, our findings will be valuable to improve the impact of BL implementation.

Keywords: Higher education; Blended learning; Technology mediated learning; Technology mediated enhanced; Adoption and implementation; Impact.

Biographical notes:

Bokolo Anthony Jr. is currently a Post-Doctoral Fellow at Department of Computer Science, Norwegian University of Science and Technology (NTNU). He currently works on research and development in information systems. He's research interest includes Blended Learning, Sustainability, Smart City, and Green IT/IS. His email address is anthony.j.bokolo@ntnu.no.

Adzhar Kamaludin is currently an associate professor at Faculty of Computing (FKOM) College of Computing and Applied Sciences, Universiti Malaysia Pahang. He is also the Director at Centre of Instructional Resources & e-Learning.

* Corresponding author. E-mail address: anthony.j.bokolo@ntnu.no

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Awanis Romli is currently a Senior Lecturer of Computer Science at the Faculty of Computer Systems and Software Engineering, Universiti Malaysia Pahang and also the Deputy Director at Centre of Instructional Resources & e-Learning. She got a PhD from Cardiff University UK in 2015. Her research interest areas include Sustainability, Case Based Reasoning, Engineering Management and Decision Support System.

Anis Farihan Mat Raffei is Currently a Senior Lecturer at Faculty of Computing (FKOM) College of Computing and Applied Sciences, Universiti Malaysia Pahang.

Gan Leong Ming currently a Senior Lecturer at Universiti Malaysia Pahang.

Danakorn Nincarean A/L Eh Phon is Currently a Senior Lecturer at Faculty of Computing (FKOM) College of Computing and Applied Sciences, Universiti Malaysia Pahang and had background in Educational Technology.

Aziman Abdullah is Currently a Lecturer at Faculty of Computing (FKOM) College of Computing and Applied Sciences, Universiti Malaysia Pahang.

Nurbiha A Shukor is Currently a Senior Lecturer at School of Education, Faculty of Social Science & Humanities Universiti Teknologi Malaysia (UTM) and UTM Open Education Resource Manager.

Mohd Shukri Nordin currently an assistant professor and works at the Department of Curriculum and Instruction, International Islamic University Malaysia. He does research in Teacher Education, Instructional and Educational Technology as well as Language Education.

Suria Baba is Currently an associate professor at Pusat Pengajian Bahasa dan Pembangunan Insaniah, Center for Teaching & Learning, Universiti Malaysia Kelantan.

1. Introduction

The 20th century has experienced a paradigm shift in learning offered by higher education which is due to the emergence of Information Technology (IT) to support teaching activities (Graham et al., 2013). Thus, educators are deploying innovative approaches such as Blended Learning (BL) to promote the quality of teaching and learning. Thus, BL is acknowledged as one of the foremost trends in universities (Baragash and Al-Samarraie, 2018). BL in universities comprises the mix of course delivery strategies during face to face classroom teaching with online teaching. BL is facilitated with virtual learning management systems such as Blackboard WebCT, Moodle, and other Web 2.0 platforms which are employed to facilitate collaborative learning between students and lecturers (Aguti et al., 2014). Accordingly, Aguti et al. (2014) stated that 80 percent of universities in developed regions are dynamically employ BL approach to support their teaching and learning, with 97 percent of universities reported to be deploying one or more forms of IT mediated learning.

Over the years, BL adoption has evolved to involve traditional classroom-based learning combined with the utilization of technology for improved pedagogy thereby changing higher education. But currently, BL is faced with issues related to how to assess the impact of BL adoption in higher education (Ekawati et al., 2017). Thus, one of the main challenges faced by higher education is to develop a model that can be used to evaluate the impact of BL in universities.

Although, BL has become a well-known word amongst researchers and academics from both developed and developing countries, there are fewer studies that focus on the development of a comprehensive model to define, assess and measure the impact of BL (Aguti et al., 2014).

Likewise, researchers such as Graham et al. (2013) call for research that could investigate the specific BL processes that successful universities implement to institutionalize BL. Moreover, there are limited studies that focused on the development of a holistic approach for evaluating the impact of current BL strategies related to students, lecturers, and administrators' readiness towards BL adoption (Bralić and Divjak, 2018). Hence, in examining BL in universities there is need for a model of readiness based on factors that influence the adoption of BL (Aguti et al., 2014), BL intensity and implementation impact (added value) on students and lectures (Ghazal et al., 2018).

Based on the aforementioned issues the following research questions are formulation to guide this study:

RQ1-What are the factors that influence students, lecturers, and administrators' readiness towards BL adoption in higher education?

RQ2-What are the BL practices to be implemented by students in higher education?

RQ3-How can lecturers fully implement BL strategies in higher education?

RQ4- How to measure the impact of BL adoption in higher education to improve teaching and learning effectiveness?

This study sought answers to the research questions by carrying out a review of prior studies on BL adoption to develop an integrative framework based on the Organization for Economic Co-operation and Development (OECD) framework, Hexagonal E-Learning Assessment Model (HELAM), and Khan e-learning framework to framework to investigate the impact of BL towards measuring students, lecturers and administrator's readiness and further explore on the intensity of implementation of BL impact in higher education. The developed framework aims to measure BL adoption based on readiness of students, lecturers, and administrators (to adopt BL), intensity (or level) of implementation of BL practice and impact. The remainder of the article is organized as follows. Section 2 is the theoretical background. Section 3 is the integrative framework and hypotheses development and section 4 describes the research methodology. Section 5 is the results, section 6 is discussion and implications and section 7 is the conclusion.

2. Theoretical Background

This section discusses the Organization for Economic Co-operation and Development (OECD) framework, Hexagonal E-Learning Assessment Model (HELAM), and Khan octagonal framework.

2.1. Background of OECD Framework

The OECD framework aims to measure the impact of IT use, thus when organization uses IT to support their operations, this is often known as e-business (OECD, 2012). Thus, in considering the adoption of IT in education, the OECD framework constructs comprises of readiness, intensity and impact (OECD, 2012). In the context of BL readiness helps to determine the willingness of universities to adopt BL (Machado, 2007). Besides, readiness is a measure of the degree to which students, lecturers, and administrators may be prepared or ready to acquire benefits which arise from IT usage (Wong et al., 2014). Intensity is the level or state of implementation of BL practices in universities based on the value, volume, and nature of face to face and online learning (Wong et al., 2014). Impact is the added quality that is potentially created in implemented BL (Wong et al., 2014).

2.2. Overview of Hexagonal E-Learning Assessment framework

HELAM was developed by Ozkan and Koseler (2009) as a theoretical multidimensional model for assessing LMS based on the perceived satisfaction of students. It comprises of two main constructs which includes assessed social constructs (supportive issues, learner perspective, attitude), and technical constructs (system quality, information quality, service quality) (Ozkan and Koseler, 2009). However, HELAM model is only applicable to students' perceptions of the use of BL and is not applicable to lecturers and administrators (Bowyer, 2017). The social constructs entail measuring the quality of the lecturer and the students perceived effectiveness. Furthermore, the technical constructs entail ensuring that the system quality have a positive effect on the effectiveness of BL approach been implemented by students in the university (Ozkan and Koseler, 2009; Anthony et al., 2019).

2.3. Background of Khan Octagonal Framework

The octagonal framework was proposed by Khan (2001) to provide guidance in the, development, design, delivery and assessment of distributed and open learning environments. The framework comprise of eight construct (pedagogical, technological, interface design, evaluation, management, resource support, ethical, and institutional) which are systemically interrelated to support BL learning and teaching in higher education. The constructs help universities to organize and guarantee that BL adoption creates a significant learning experience. Although, the framework does not contain items that can be employed to assess BL adoption it mainly provides a roadmap for measuring BL adoption in universities (Bowyer, 2017).

Figure 1 shows the conceptualization of BL adoption based on OECD framework that was previously adopted by Wong et al. (2014), HELAM model which was adopted by Bowyer (2017) and lastly khan octagonal framework that was employed by Azizan (2010); Aguti et al., (2014); Deegan et al. (2015); Gomes and Panchoo (2015); Bowyer (2017) to measure BL adoption as such all three frameworks are employed in this study to provide answers to the research questions and further develop the proposed integrative framework.

Conceptualization of Blended Learning Adoption in Higher Education		
OECD Framework -Readiness -Intensity -Impact	HELAM Model -Social constructs <i>Supportive issues</i> <i>Learner perspective</i> <i>Attitude</i> <i>Satisfaction</i> <i>Course management</i> <i>Ease of use</i> -Technical constructs <i>System quality</i> <i>Information quality</i> <i>Service quality</i>	Khan Octagonal Framework -Pedagogical -Technological infusion -Syllabus design -Evaluation -Management -Resource support -Ethical -Institutional

Figure 1 Conceptualization of BL adoption

3. Framework and Hypotheses Development

This section aims to develop the proposed framework and associated hypotheses by providing answer to the research questions in identifying the factors that influence students, lecturers, and administrators' readiness towards BL adoption. It also derives the BL practices to be implemented by students and lecturers in higher education and lastly, measures the impact of BL adoption to improve teaching and learning effectiveness.

3.1. Factors that Influence Readiness towards BL Adoption

Based on the HELAM model and Khan octagonal framework the factors that influence students, lecturers, and administrators' readiness towards BL adoption in higher education are identified as;

3.1.1. Student Readiness

In this study student's readiness is measured based on the supportive factors, student attitude, and student perspective as shown in Figure 1;

a. Supportive Factors

This variable is determined by the experience, engagement time, and self-motivation of the students towards BL adoption in their universities. In education domain experience refers to the student's prior knowledge of technological innovations, as well as the skills acquired by the student from such experience (Bowyer, 2017; Deng et al., 2019). As a result, students' prior know-how may impact their ability to towards BL (Ghazal et al., 2017). Likewise, student engagement in learning refers to the time and effort student devote in BL activities, where student engagement relates to student's willingness, passion and interest to learn (Maulan and Ibrahim, 2012).

b. Student Attitude

Attitude comprises of students' feeling and their opinion towards BL which results from the estimated advantages obtained by the student from BL adoption (Mondi et al., 2007; Wong et al., 2014). In BL the attitude of students is determined based on their impression of interaction and engagement in Face-to-Face (F2F) and online activities (Ghazal et al., 2017; Ho, 2017). Students who have positive attitudes toward IT usage are more enthusiastic to changes in learning environment (Chong et al., 2010; Sun and Qiu, 2017).

c. Student Perspective

According to Mondy et al. (2007); Ghazal et al. (2017) student's perspective of BL is influenced by the level of student availability to access, lecturer responsiveness, and communication among the lecturer and students, and students and their class mates. The availability to access of online and offline material will help in fostering teaching and improve how learning is delivered to students for efficient BL (Sari and Karsen, 2016; Savara and Parahoo, 2018). According to Ahmed (2010); Al-Rahmi et al. (2017) students should be able to easily gain access, view and download course module information during classes. Likewise, Mohd et al. (2016) opined that lecturers' feedback may potentially impact students' observed usefulness of BL. Thus, communication provides feedback that may arise from the interaction between classmates in BL environment that offers opportunities for students to improve their learning outcome (Spring et al., 2016).

Based on the proceeding discussion, we hypothesized that;

H1: Student readiness positively influences blended learning implementation.

3.1.2. Lecturer Readiness

Lecturer readiness comprises of lecturer' satisfaction, course management, and ease of use of BL approach as shown in Figure 1.

a. Satisfaction

The satisfaction of the lecturer towards BL strategies is an essential factor that influences the quality of teaching (Hussin et al., 2009). Lecturers' satisfaction measures the happiness of the academic staffs in adopting BL for teaching purpose (Ghazal et al., 2018). Thus, the lecturers' satisfaction is measured based on their attitude and acceptance of BL (Bervell and Umar, 2018). The lecturers' attitude is an important factor for BL adoption because it entails not only the understanding, knowledge, and significance of BL. Thus, lecturers who exhibit a positive attitude are more likely to perceive BL value and subsequently implement it in teaching (Ahmed, 2010).

b. Course Management

The course management comprises of the teaching style and interactive content employed by the lecturer (Ho, 2017). Accordingly, teaching style refers to the pattern of teaching behaviors

and beliefs demonstrated by lecturer in BL environment (Ghazal et al., 2017). Similarly, the interactive content relates to all credible learning materials in alternative forms used by lecturers to facilitate learning outcome (Hussin et al., 2009). Thus, BL can create interactive tools that increase students' learning interest. This is similar to findings from previous research (Mondi et al., 2007), which suggested that using multimedia for teaching motivate students to learn. Arguably, students are more interested in BL initiatives that offer compelling contents in form of games, visual presentations, and simulations (Wong et al., 2018).

c. Ease of Use

The ease of use of BL means the easiness extent to which the lecturers anticipate the target of BL is of without much effort (Ho, 2017). This study explores ease of use based on the clarity and flexibility of course resources, provided via BL approach which influences lecturers' teaching experience. The simplicity of BL adoption can influence lecturers' mindset towards the usage of BL initiatives for teaching. BL approach with clarity will help lecturers to be more competent and efficient in their teaching abilities (Ho, 2017). In this context, flexibility of use refers to the degree to which BL adoption will require less skills and effort for the lecturer in achieving pedagogical. The flexibility is based on the easiness of actual adoption of BL approach as perceived by less-experienced lecturers (Bervell and Umar, 2018).

Based on the proceeding discussion, we hypothesized that;

H2: Lecturer readiness positively influences students' perception towards BL adoption.

H3: Lecturer readiness positively influences blended learning strategies.

3.1.3. Administrator Readiness

The administrator readiness is examined based on the institutional polices, resource support provided, management strategies, and ethical issues as seen in Figure 1.

a. Institutional Polices

The university administrator provides policies to develop and facilitate BL adoption for lecturers and students (Wong et al., 2014). Moreover, the institutional polices assists in offering support as well as strategy and services planning to achieve a BL environment (Yeop et al., 2016). The institutional polices is based on the purpose, advocacy, and definition of BL in the universities. In terms of purpose, universities adopting BL should specify the goals they intend to attain (Porter et al., 2014). Furthermore, successful BL adoption entails advocacy among administrators and other decision makers in achieving a shared vision for BL adoption (Chong et al., 2010; Porter et al., 2014). Additionally, creating a definition of BL can ease in achieving learning objectives for scheduling lectures, providing students with reliable and clear prospects regarding BL approach (Moskal et al., 2013). Porter et al. (2014) also argued that administrators should align their objectives with BL definition in relation to the university capacity.

b. Resource Support

Resource support relates to the provision of sufficient resources to support students achieve their learning goals and lecturers in improving their teaching (Poon, 2014). Findings from Yeop et al. (2016) indicated that administrative support is positively related with lecturers' perception of the effectiveness and accessibility of BL. Accordingly, resource support comprises of technological support, pedagogical support, financial incentives, and promotion consideration. Technological support consists of infrastructure such as wireless, wired network access, other hardware equipment and software components utilized to ensure that BL can enhance teaching and learning process (Basir et al., 2010; Carbonell et al., 2013). Thus, Ho (2017) stressed that there is need for administrators to provide pedagogical experts that provide guide to lecturers in designing blended course content. Administrators can provide financial incentives to encourage lecturers to adopt BL (Basir et al., 2010; Porter et al., 2014). Similarly, findings from Graham et al. (2013); Porter et al. (2016) suggested that the provision of incentives by administrators has been shown to increase the chances of a successful BL adoption. Equally, tenure and promotion plans should be reviewed to inspire and compensate lecturers adopting BL (Machumu and Zhu, 2019).

c. Management Strategies

Management strategies comprises of infrastructure, evaluation, professional development, and governance. In terms of infrastructure, universities seeking to adopt BL must offer the central technological infrastructure necessary to support BL adoption for lecturers and students (Ahmed 2010; Moskal et al., 2013). Furthermore, university BL programme needs to be periodically evaluated to ascertain the strength and weakness (Graham et al., 2013). The evaluation needs to be done and follow up strategies need for employed based on discovered improvement (Basir et al., 2010). Furthermore, administrators are required to put in place professional development (Jnr, 2020), which is a process by which lecturers and students are trained to gain the necessary skills required to adopt BL to accomplish teaching activity and learning task (Tahir et al., 2013). Thus, findings from prior studies (Kuar, 2013; Bowyer, 2017; Bokolo Jr et al., 2019) suggested that professional development has been found to be important factors that promote BL adoption. In addition, administrators should have a governance policy to help determine who approves BL courses to be taught in the university such as 20-80, 30-70, or 40-60 for F2F and online learning (Poon, 2014).

d. Ethical issues

Due to increase of educational resources and dissemination of course materials over the internet, ownership of Intellectual Property (IP) is a concern in BL (Roszak et al., 2014). Thus, administrators should initiate policies on intellectual property rights of course materials (Basir et al., 2010; Graham et al., 2013). Thus, BL policies initiated in the university should explicitly state the rules relating to ownership of course materials designed by lecturers (Fleck, 2012; Moskal et al., 2013).

Based on the proceeding discussion, we hypothesized that;

H4: Administrators readiness positively influences students' perception towards BL adoption.

H5: Administrators readiness positively influences lecturers' perception towards BL adoption.

H6a: Administrators readiness positively influences teaching effectiveness.

H6b: Administrators readiness positively influences learning effectiveness.

3.2. BL Practices to be Implemented in Higher Education

Based on the HELAM model and Khan octagonal framework, BL practices to be implemented by students and how lecturers can implement BL practices are discussed below;

3.2.1. BL Practices to be Implemented by Students

The BL practices to be implemented by students are discussed based on HELAM model technical constructs presented in Figure 1.

a. System Quality (Face-to-Face and Activities)

F2F refers to on-site teaching and learning that involves the traditional classrooms where lecturer and students are physically in the same place (Kaur, 2013; Baragash and Al-Samarraie, 2018). F2F usually comprises of physical BL activities that include lectures, individual and group discussion, laboratory exercises, scheduled presentation, and quiz assessment (Kaur and Ahmed, 2006). In F2F the lecturer uses whiteboard, flash card, handouts, books, and printed paper for creative teaching (Sun and Qiu, 2017). Moreover, technologies such as Overhead Projector (OHP), Liquid Crystal Display (LCD) projector, computer, power point presentation, software application, etc. are used to aid students' learning (Ramakrisnan et al., 2012). Activities in BL comprises of a virtual classroom that creates a platform that allows lecturers and students to be in different places at the same time and allows the lecturer to conduct online class through the use of virtual collaborative tools (Arbaugh et al., 2008; Koohang, 2009).

b. Information Quality (Information and Resources)

In BL context information is an item or links provided by the lecturer to support learning in online learning platforms such as Moodle (Ramakrisnan et al., 2012; Belwal and Belwal, 2018). Similarly, resources are the media that helps to deliver learning contents to students (Roszak et al., 2014). Resource may also be an item that a lecturer can employ to facilitate learning, such as a link or file. In BL resources may be content package, folder, label, URL, and page (Kaur, 2013). Resources can also be synchronous and asynchronous. In synchronous the lecturer and student are present online at the same time (BakarNordin and Alias, 2013). Thus, synchronous is carried out in real-time with a lecturer live facilitating the teaching (Wahyuni, 2018). Conversely, asynchronous involves self-paced learning, either via CD/DVD, flash drive, or internet-based.

Students access to lecturer via discussion groups, bulletin boards, YouTube video, social media, links and e-mail to access course materials provided by the lecturer (Edward et al., 2018).

c. Service Quality (Assessment and Feedback)

Assessment is a significant phase in BL that check students' abilities and capacity to apply the knowledge they have acquired during the semester in addressing real problems (Klentiena and Wannasawade, 2016; Nguyen 2017). In BL, assessment comprises of formative and summative evaluation (McKenzie et al., 2013). Formative assessment consists of online post-test through the completion of course assignments, course test scores and performance in individual and group discussion, and class performance (Mustapa et al., 2015). Whereas, summative assessment comprises of online test, colloquium, mid-term exam, online graduation test and offline final examination (Liqin and Ning, 2015). Feedback involves the collection of information, qualitative view or comment from students in relation to the lecturers' course content and their learning performance (Selvi and Perumal, 2012). Thus, feedbacks from the students are used by the university to identify how the learners understand the lecturer teaching methods, and also create an avenue to improve their current teaching pedagogy (Kaur and Ahmed, 2006). findings from Bentley et al. (2010); McKenzie et al. (2013) suggested that feedback is the most frequently mentioned process in BL that can be used by the university to monitors the actual teaching pedagogy of lecturers and provides response for further enhancement in the instructive method employed by the lecturer.

Based on the proceeding discussion, we hypothesized that;

H7: Blended learning practice implemented by students positively influences learning effectiveness.

3.2.2. BL Strategy Implementation by Lecturers

The BL strategy implementation by lecturers is discussed based on khan octagonal framework comprises of pedagogical, technological infusion and syllabus design as presented in Figure 1.

a. Pedagogy

Pedagogy entails lecturers selecting the most suitable teaching strategies that facilitates the learning objectives (So and Brush, 2008). Thus, when lecturers develop BL course materials, maintaining teaching quality must be paramount and the learning objectives of the students need to be fully considered (Kaur, 2013). Thus, the module design should support teaching and delivery innovative ideas, subsequently improving students' learning outcomes and experiences (Poon, 2012). Consequently, lecturers should carefully select collaboration applications, be technically prepared when designing and implementing BL activities, and course materials provided online to

students must be prudently chosen to support successful teaching and learning process (Yusoff et al., 2017).

b. Technological Infusion

Technology is important in BL implementation and it consists of software and hardware that lecturers use to facilitate teaching. The success of BL inevitably relies on lecturers' equitable access to technologies (Bowyer, 2017). According to Edward et al. (2018) these technologies refers to the platform that supports integration between lecturers and students. Furthermore, software technologies such as multimedia applications can be used to enhance teaching and learning processes (Fleck, 2012). In this regard, the competence of lecturers in using technologies in teaching is highly important for the success of BL (Savara and Parahoo, 2018).

c. Syllabus Design

Syllabus design relates how well BL course environment is presented and managed (Ozkan and Ozkan, 2009). Researchers such as Hussin et al. (2009) emphasized that in BL the syllabus or curriculum design employed by the lecturers should be easy for both offline and online thereby providing a sense of helpfulness, human interaction, and responsiveness to the needs of students (Hussin et al., 2009). Thus, the lecturer should design quality course information in the right length, well-ordered, efficiently presented, visibly written, and provide proper degree of breath (Ozkan and Ozkan, 2009; Deng et al., 2019). Based on the proceeding discussion, we hypothesized that;

H8: Blended learning strategy implemented by lecturers positively influences teaching effectiveness.

3.3. Teaching and Learning Effectiveness

3.3.1. Teaching Effectiveness

In this study the teaching effectiveness is measured based in the teaching satisfaction, performance expectancy, and student evaluation.

a. Teaching Satisfaction

The notion of teaching satisfaction refers to the social processes for realizing meaningful student's learning experience from lecturers (Kintu et al., 2017). The teaching satisfaction can be measured based on the lecturers' level of fulfillment in relation to the design of methods and curriculum, presentation of course objectives, course delivery and students' performance (Rahman et al., 2015). Findings from prior studies (Rahman et al., 2015; Almutairi and White, 2018) revealed that lecturers' satisfaction is influenced by self-motivation in teaching in BL approach.

b. Performance Expectancy

Expectancy refers to academic development outcome of the student based on the knowledge disseminated by the lecturer (Mondi et al., 2007). Students are expected to acquire new knowledge, understanding, creativity and critical thinking skills by learning via BL approach to underpin their educational goals (Almutairi and White, 2018).

c. Student Evaluation

To confirm the quality of BL approach in universities there is need to measure students' learning experiences. Thus, there is need to evaluate the quality of BL course based on students' perceptions of BL usefulness in improving learning (Almutairi and White, 2018). Furthermore, evaluation can potentially help lecturers to assess student's knowledge of course content (Ghazal et al., 2017; Laaziz and Elkhouzai, 2018).

3.3.2. Learning Effectiveness

Learning effectiveness is measured based on study satisfaction, self-efficacy, and enjoyable experience.

a. Study Satisfaction

Satisfaction refers to the student's perceptions of the degree to which BL meets their learning expectations (López-Pérez et al., 2011; Ghazal et al., 2017). Findings from Owston et al. (2019) suggested that positive satisfaction with BL is more likely to encourage a positive outlook towards learning, thus, student satisfaction is a significant attribute to assess the impact of BL. Similarly, Ekawati et al., (2017) mentioned that student satisfaction is an essential factor to measure the quality of BL implementation.

b. Self-efficacy

Self-efficacy refers to the student's judgments of his/her capabilities to execute and organize activities required to achieve learning (Al-Rahmi et al., 2017). Accordingly, self-efficacy is reported in literature as an important factor in examining the satisfaction of students (Ho, 2017), towards the belief that he or she can attain enhanced learning (Ghazal et al., 2017). Arguably, as students devote time using BL resources, this improves their self-efficacy and enriches their learning experience (Mondi et al., 2007).

c. Enjoyable Experience

Enjoyment is the magnitude to which the learning activity of adopting BL is observed to be entertaining in improving the BL performance (Padilla-Meléndez et al., 2013). The enjoyable is based on the students' views of the ease of use of BL course content in relation to teaching quality of the lecturer and complete experiences of the course (Dziuban et al., 2018). Moreover, enjoyable experience relates to students' emotional feedbacks in relation to BL.

Based on the factors that influence readiness towards BL adoption (section 3.1), BL practices to be implemented (section 3.2), and teaching and learning effectiveness (section 3.3) the proposed integrative framework is developed as shown in Figure 2.

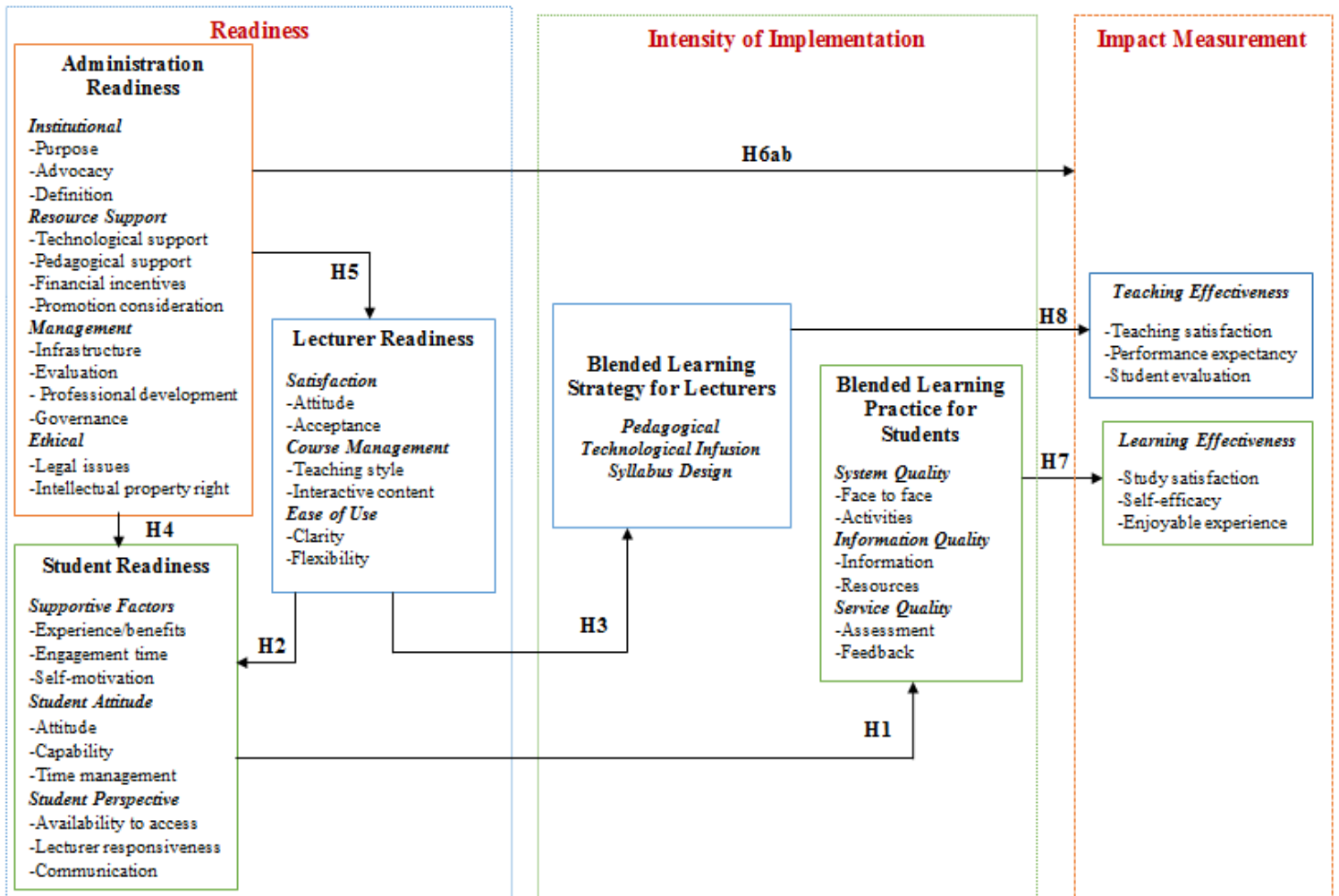


Figure 2 Developed integrative framework

Figure 2 depicts the developed integrative framework based on the OECD framework, HELAM model, and khan octagonal framework to investigate the impact of BL towards measuring students, lecturers and administrator's readiness and further explore on the intensity of implementation of BL impact in higher education.

4. Research Methodology

4.1. Participants and Procedure

This study employed quantitative research methodology using survey, where three different survey questionnaires for students, lecturers and administrators were developed to validate the proposed framework hypotheses. Each questionnaire items were derived from prior BL adoption and implementation studies. Data was collected from 87 purposive sampled respondents; however, 9 samples were partially filled and were removed which resulted to 78 samples collected from three Malaysia universities from January-February 2019. The demographic data of the respondents are presented in appendix. The questionnaire was developed in English language and to ensure that the questionnaires were suitable for purpose, a workshop was conducted based on a focus group discussion to help refine the questionnaires instruments for face and content validity by 10 experts (7 IT and 3 education domain). After which the questionnaires were updated and sent for another expert review for construct validity by an expert from education domain to verify the correctness of the questionnaires. Then the questionnaire was approved, deployed online and links to the survey sent to prospective respondents.

Furthermore, since the aim of this survey is to measure the effectiveness of BL in Malaysia universities, the first section of the questionnaire collected data regarding the demographic information the respondents and their respective institutions. The second section part measured students, lecturers and administrators' readiness towards blended learning adoption. The third section measures to what extent students and lecturers implement BL initiatives based on five-point Likert-style. The fourth section measures to what extent BL has improved student learning and lecturers teaching effectiveness all based on a five-point Likert-style statement which ranges from 1 to 5, where 1 is strongly disagree and 5 is strongly agree.

5. Results

5.1.Data Analysis

The survey data was coded and entered into Statistical Package for Social Science (SPSS) version 23 for analysis. Descriptive, exploratory, and inferential analysis were deployed on the data to validate the developed framework.

5.1.1. Descriptive and Exploratory Analysis

This involves checking the mean and standard deviations (SD) values of the constructs associated factors in the framework similar to prior studies (Ginns and Ellis, 2007; Zhu et al., 2016). Also, two statistical analyses were employed which includes test of reliability and validity. Reliability was assessed by measuring the internal consistency of the items relating each variable using Cronbach's alpha. Next, validity was tested based on Exploratory Factor Analysis (EFA) which comprises of factor loadings, Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, and Bartlett's test of Sphericity (Ozkan and Koseler, 2009; Alhabeeba and Rowley, 2018) as presented in Table 1.

Accordingly, descriptive analysis was employed to present the variability of the data by examining the mean and SD of the factors. Table 1 depicts the mean score based on the 5 point Likert Scale response from the respondents. For the mean measure 1 = least effective; 2 = fairly effective; 3 = effective; 4 = very effective; and 5 = most effective (Anthony Jr et al., 2018). Results from Table 1 show that all factors mean values are greater than 3.00 which measured as significant criteria to assessing respondents' readiness, implementation and impact of BL. Moreover, Table 1 presents the SD of the factors were all SD values are equal to 1 or less than 1 showing that the response from the respondents are similar and not widely dispersed (Anthony et al., 2020). In order to assess the internal consistency of the factors, Cronbach's alpha coefficient was assessed which should be equal or higher than 0.70 (Ozkan and Koseler, 2009; Anthony Jr, 2020). Results from Table 1 show that the reliability of all factors also exceeded the minimum threshold of 0.70.

Table 1 Descriptive and exploratory analysis

Constructs	Factors	Mean	SD	Cronbach's Alpha (α)	Factor Loading	KMO	Bartlett's test of Sphericity (p-value)
Administration Readiness	Institutional	3.04	1.455	0.998	0.987	0.500	0.000
	Resource Support	3.94	0.348	0.701	0.948		
	Management	4.02	0.641	0.972	0.999		
	Ethical	4.13	0.854	0.914	0.912		
Students Readiness	Supportive Factors	3.87	0.249	0.810	0.901	0.693	0.000
	Student Attitudes	3.84	0.351	0.723	0.933		
	Student Perspective	3.75	0.343	0.863	0.842		
Lecturers Readiness	Satisfaction	3.80	0.919	0.950	0.723	0.516	0.000
	Course Management	3.88	0.580	0.662	0.966		
	Ease of Use	4.00	0.527	0.827	0.828		
BL Strategies for Lecturer	Pedagogical	3.72	0.645	0.982	0.972	0.748	0.000
	Technology Infusion	3.68	0.694	0.982	0.966		
	Syllabus Design	3.70	0.743	0.970	0.987		
BL Practice for Students	Face-to-Face	3.69	0.595	0.935	0.802	0.777	0.000
	Activities	3.89	0.295	0.888	0.865		
	Information	3.91	0.263	0.884	0.933		
	Resources	3.91	0.199	0.896	0.911		
	Assessment	3.90	0.354	0.876	0.901		
	Feedback	3.82	0.350	0.875	0.903		
Teaching Effectiveness	Teaching Satisfaction	3.70	0.790	0.975	0.982	0.773	0.000
	Performance Expectancy	3.77	0.681	0.990	0.964		
	Student Evaluation	3.74	0.746	0.972	0.983		
Learning Effectiveness	Study Satisfaction	3.85	0.360	0.747	0.849	0.712	0.000
	Self-Efficacy	3.92	0.239	0.872	0.722		
	Enjoyable Experience	3.84	0.312	0.764	0.811		
Note: For Mean 1 = least effective; 2 = fairly effective; 3 = effective; 4 = very effective; and 5 = most effective, Factor analysis & Cronbach's alpha => 0.7, KMO=>0.5, and p-value =<0.05 to be significant							

Furthermore, EFA was employed to explore the survey data, where EFA is one of the analysis techniques that can be utilized to assess critical factors in the developed framework as seen in Figure 2. Values of factor loadings for all factors should exceed the minimum benchmark of 0.70 were considered statistically significant (Padilla-Meléndez et al., 2013). Next, the

suitability of the survey data was explored using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's Test of Sphericity. Statistically, KMO values of more than 0.5 and 0.7 can be considered average and good (Alhabeeba and Rowley, 2018). Results from Table 1 suggest that all KMO values are above the acceptable range of 0.50, and Bartlett's test has a significance level that is lower than 0.05%, hence the data was deemed reliable and valid.

5.1.2. Inferential Analysis (Hypotheses Testing)

The assessment of the hypotheses was carried out through regression analysis using SPSS. The *f-test*, R^2 , path coefficient (β), *standard error*, measure the effect size (*t-value*), and *p sig value* were tested to help confirm or reject the 9 hypotheses based on regression test similar to prior study (Tahir et al., 2013) as presented in Table 2.

Table 2 Inferential analysis

Relationships		Regression Analysis						
Hypothesis Path	Hypothesis	F-Tests	R^2	Path coefficients (β)	Standard Error	t-test	p-value (Sig.)	Decision
Student Readiness → BL Practice	H1	147.581	0.721	0.849	0.075	12.148	0.000	Valid
Lecturer Readiness → Student Readiness	H2	3.000	0.200	0.290	0.020	3.247	0.012	Valid
Lecturer Readiness → BL Strategy	H3	6.783	0.459	0.677	0.290	2.604	0.031	Valid
Administration Readiness → Student Readiness	H4	9.450	0.321	0.566	0.019	7.205	0.000	Valid
Administration Readiness → Lecturer Readiness	H5	5.220	0.207	0.455	0.745	4.539	0.045	Valid
Administration Readiness → Teaching Effectiveness	H6a	1.614	0.447	0.668	0.300	1.977	0.019	Valid
Administration Readiness → Learning Effectiveness	H6b	9.450	0.321	0.105	0.399	10.854	0.008	Valid
BL Strategy → Teaching Effectiveness	H7	75.233	0.904	0.951	0.439	8.674	0.000	Valid
BL Practice → Learning Effectiveness	H8	154.633	0.731	0.855	0.062	12.435	0.000	Valid
Decision: Hypothesis is Valid if <i>t-value</i> = > 1.96 and <i>p-value</i> = < 0.05								

Table 2 shows the result of inferential test using regression analysis between constructs where the results outline the goodness of fit relationship test, namely; *F-test* for the constructs given as 147.581, 3.000, 6.783, 9.450, 5.220, 1.614, 9.450, 75.233, and 154.633 with *p-value* 0.000, 0.012, 0.031, 0.000, 0.045, 0.019, 0.008, 0.000, and 0.000 outlining the test is highly significant for all hypotheses. Since *p-value* of *F-test* is less than significance level $p=0.05$, therefore confirms that there is a significant relationship between the constructs. The strength of relationships is measured by examining R^2 of all the constructs where $R^2=0.721$ for student readiness to implement BL practices showing that the construct has been interpreted at 72.1% of the variance. Next, is lecturer readiness influence on student readiness with $R^2=0.200$ interpreting

20% of the variance. Where, lecturer readiness to implement BL strategy has an $R^2 = 0.459$ interpreting 45.9% of the variance, next is administration readiness impact on student readiness with $R^2 = 0.321$ interpreting 32.1% of the variance followed by administration readiness impact on lecturer readiness with $R^2 = 0.207$ interpreting 20.7% of the variance.

Furthermore, the hypothesis administration readiness impact on teaching effectiveness is given as $R^2 = 0.447$ interpreting 44.7% of the variance. Followed by administration readiness impact on learning effectiveness with $R^2 = 0.321$ interpreting 32.1% of the variance. Next is, BL strategy implemented by the lecturers' impact on teaching effectiveness with $R^2 = 0.904$ interpreting 90.4% of the variance and BL practice implemented by the students' impact on learning effectiveness with $R^2 = 0.731$ interpreting 73.1% of the variance. Additionally, all the constructs have a direct impact as shown by the positive beta result ($\beta = 0.849, 0.290, 0.677, 0.566, 0.455, 0.668, 0.105, 0.951, 0.855$), which express the relative importance of the constructs. Moreover, considering the *t-test* value (12.148, 3.247, 2.604, 7.205, 4.539, 1.977, 10.854, 8.674, 12.435) of all constructs are higher than 1.96 benchmark as recommended by Anthony Jr (2019). The result reveal that all hypotheses in this study are significant and valid, with BL practice implemented by the student influencing learning effectiveness being the most significant construct at $t = 12.435, p = 0.000$ and administration readiness to improve teaching effectiveness being the least significant construct at $t = 1.977, p = 0.019$. This is evident due to the fact that university administration mostly has less influence on the outcome of teaching effectiveness in their institution.

6. Discussion and Implications

6.1. Discussion

This study develops an integrative framework to investigate the impact of BL in higher education. As such, this article contributes to the limited knowledge that examines BL effectiveness in Malaysian context, as well as the investigation of BL from students, lecturers and administrators perspectives. Findings from this study indicate that students' readiness positively influences BL implementation. This result is analogous with findings from prior studies (Ghazal et al., 2017; Almutairi and White, 2018). Where the fundamental theoretical assumption underpinning student readiness proposes that learners, as BL users, have expectations which are value-base, and that attitude play an active role in implementing BL to satisfy their learning needs. Similarly, the regression results suggest that lecturer readiness to adopt BL for teaching significantly influences students' perception towards BL. This finding is supported by Hussin et al. (2009); Ahmed (2010), due to the fact when lecturers employ BL approach for teaching in higher education requires a different strategy that emphasizes less on the aggregate of time students spend together learning in the class room.

Our results also indicate that lecturer readiness significantly has a positive effect on BL strategies implemented by the lecturer in teaching. This is because BL support the preparation,

selection and development of course syllabus resources (Almutairi and White, 2018). Hence, the perception of lecturers will impact their style of teaching demonstrated by the lecturer (Ho, 2017). The results of this study support the findings of previous works (Graham et al., 2013; Porter et al., 2014; Wong et al., 2014) that have shown that the administrators' readiness positively influences students' perception towards BL adoption. As postulated by Garrison and Kanuka (2004) university management provision of support for students is a critical constituent of BL. More specifically, administrator providing committed student service support department to aid students with technology related issues access. Likewise, the results reveal that the administrators' readiness positively influences lecturers' perception towards BL adoption. This is in parallel with many BL-related studies (Moskal et al., 2013; Porter and Graham, 2016), which stated that policies related to BL support to be provided for lecturers by administrative or technical staff towards BL usage will encourage lecturers to adopt BL for teaching (Bervell and Umar, 2018).

Furthermore, the regression results revealed that administrators' readiness positively influences teaching and learning effectiveness. This result is in line with findings from previous studies (Chong et al., 2010; Tahir et al., 2013), affirming that administrative BL polices should be aligned with learning and teaching effectiveness by focusing on how the lecturer and student motivation can be facilitated to improve learning and teaching quality in BL environment. In addition, the results report a positively relationship, starting that the BL practice implemented by the students positively influence learning outcome. This result is consistent with findings from the literature (Sari and Karsen, 2016; Ekawati et al., 2017; Deng et al., 2019). Finally, our results suggest that BL strategy implemented by lecturers positively influences teaching effectiveness which may thrive in a blended environment (Mondi et al., 2007). Our result is consistent with findings from prior studies (Pillay and James, 2014; Poon, 2014) which argued that teaching effectiveness is an important feedback for lecturers to assess BL strategy implementation impact. Moreover, Lean et al. (2018) stated that teaching effectiveness is based on the successful learning and satisfaction of student's accomplishment in learning with the enjoyment they experience during F2F and online learning.

6.2.Implications of Study

Findings from this study offer some implications for higher education towards adopting BL. Firstly, this study identifies the factors that influence students, lecturers and administrators' readiness towards adopting BL. Which can be employed by universities to evaluate students, lecturers and administrators' readiness and adaptability towards BL and can be used to inform university in making decisions regarding BL development. Moreover, by examining the' readiness based on OECD framework for adopting BL, this study provides insight to university's top management regarding students, lecturers and administrators' perception towards BL implementation. Secondly, the BL practices derived based on HELAM model which comprises of face-to-face, activities, information, resources, assessment, and feedback can deployed by

educators to design suitable learning counter agenda in order to support students towards improving BL practice intensity. Thus, these findings provide guidelines on the design and implementation of BL practice. This study suggest that for BL practice to be successfully implemented the decision of lecturers are determined by the ease with which online course services are managed, thus the availability of reliable and durable computer hardware and software resources, pedagogical support, financial support, and promotion consideration should be provided by university management.

Besides, this study also suggests that lecturer's attitude, teaching style, and acceptance toward BL are important in motivating students to adopt BL. Also, lecturer's level of responsiveness and communication are important factors that motivate students in BL environment. The findings emphasized the importance of administrative commitment towards BL adoption, showing that the purpose, advocacy and definition initiated towards BL have a strong impact on both learning and teaching effectiveness. Decision makers in higher education can utilize the results of this study to improve their understanding of the factors that impacts students, lecturers and administrators' perception towards BL adoption. Respectively, given the different perspectives of students, lecturers and administrators it is mandatory for policy makers in higher education involved in the implementation of BL to deliberate on the perspectives of all stakeholders. Based on the khan octagonal framework, this study provides lecturers with understanding of students' perspective on BL in helping them to reflect on their role in improving their current pedagogy, technological infusion, and syllabus design to enhance student learning outcome.

In regards to the outcome of BL implementation, this study sheds some light that study satisfaction, self-efficacy, and enjoyable experience improves student's competency towards learning effectiveness in BL environment. Likewise, this study also highlighted that teaching satisfaction, performance expectancy, and student evaluation are factors that impact teaching effectiveness of lecturers in BL approach. As a conclusion, findings from this study significantly provide an outline for Ministry of Education Malaysia towards fostering BL as a teaching and learning approach for academic staffs in higher education. The BL practices for students and strategies to be implemented by lecturers can be integrated to the existing Malaysian Educational Blueprint 2015-2025 polices to improve the significance of BL as one of the new method in learning.

7. Conclusion

This study developed an integrative framework based on the OECD framework, HELAM model, and khan octagonal framework to investigate the impact of BL towards measuring students, lecturers and administrator's readiness and further explore on the intensity of implementation of BL impact in higher education. Data was collected by employing 3 survey questionnaires from students, lecturers and administrator to validate the framework associated hypotheses. Findings

from the survey data reveal that the developed instruments are reliable and valid. More importantly, the results proved that all nine hypotheses were supported, and the developed framework can be employed by higher educations in improving the effectiveness of teaching and learning outcome in a BL environment. This study, as any other research has limitations. First, there are other factors apart from those considered in this study such as culture, social norms, etc. which could be included in the developed framework to further examine BL adoption.

However, this research develops a useful framework to examine BL adoption by concurrently considering students, lecturers and administrator and presented some interesting findings. Secondly, data was collect from only three Malaysia University hence the results from this study cannot be generalized to all universities in this region. Thirdly, the study sample size is low since data was collected from few respondents. Lastly, this study will benefit from qualitative case study data which can provide deeper understanding on the experience of students, lecturers and administrator in regards to BL practice adoption. Hence, for future research, it is suggested for the developed framework to be refined. Besides, it is recommended that the researchers should include respondents from Malaysia private and public universities to get more samples which can be used to carry out a comparative study of BL adoption in order to derive more insight for higher education in Malaysia. Furthermore, qualitative data will be collected using interview to provide practical insights into the factors that influence the readiness of students, lecturers and administrator.

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Appendix

Demographic data of respondents

Students	Response (%)	Lecturer	Response (%)	Administration	Response (%)
Gender	Male = 46.7 Female = 53.3	Gender	Male = 10 Female = 90	Gender	Male = 100
Age	Born in 1990s = 36.7 Born in 2000s = 63.3	Current Position	Lecturer = 40 Senior Lecturer = 60	Job Title	E-learning director =25 E-learning manager =25 Others =50
Enrolled Program	Doctorate = 3.3 Master = 3.3 Bachelor = 56.7 Diploma = 36.7	Academic Qualification	Doctorate = 80 Master = 20	Years of Experience in E-learning	1 to 5 = 100
				Institution Level	University = 75 University College = 25
Institutional Type	Public = 96.7 Private = 3.3	Institutional Category	University = 90 University College = 10	Highest Academic Qualification	Doctorate = 50 Master = 25 Bachelor = 25
Institutional Category	University = 100	Years of Experience in Teaching (in years)	1 to 5 = 40 6 to 10 = 10 11 to 15 = 10 16 to 20 = 40	Academic Background	Computer Science = 25 Education = 50 Arts & Humanities = 25
Year of Study	1 st year = 89.8 2 nd year = 8.5 5 th year and above = 1.7	Year of Involvement in E-learning (in years)	1 to 5 = 30 6 to 10 = 50 11 to 15 = 10 16 to 20 = 10	Year of Establishment E-learning Dept./Centre/Unit:	2001-2005 = 25 2011-2016 = 75
Mode of Study	Fulltime = 100	Years of Experience in ICT (in years)	1 to 5 = 10 6 to 10 = 20 11 to 15 = 20 16 to 20 = 40 Above 20 =10	No of Staffs involved in E-learning from 2015-2019	Below 100 = 25 600-1000 = 50 1100-5000 = 25

Area of Study	Education = 1.7 Engineering = 1.7 Computer science = 93.2 Arts & Humanities = 3.4	Employment Type	Permanent = 100	Frequency of E-learning Training from 2015-2019	1 to 5 = 100
IT Experience (in years)	1 to 5 = 86.4 6 to 10 = 11.9 11 to 15 = 1.7	Area of Specialization	Computer Science = 90 Arts & Humanities = 10	Annual Budget for E-learning from 2015-2019	20000-50000 = 75 Above 5000000 = 25