ACCEPTANCE OF MASSIVE OPEN ONLINE COURSE AS A SUPPLEMENTARY LEARNING TOOL IN HIGHER EDUCATION

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ACCEPTANCE OF MASSIVE OPEN ONLINE COURSE AS A SUPPLEMENTARY LEARNING TOOL IN HIGHER EDUCATION

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requirements for the award of the degree of
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DECLARATION

I declare that this thesis entitled *"Acceptance of Massive Open Online Course as a Supplementary Learning Tool in Higher Education"* is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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DEDICATION

This thesis is dedicated to my husband, Abdul Hadi, for his unfailing love, support and understanding over the course of my research, and also to my beloved parents, R.Azami and Marhamah, who constantly have faith in me, giving me liberty to choose what I desired and supported me in everything I do.

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ABSTRACT

Massive Open Online Course (MOOC) is an innovative and viable alternative to complement the conventional classroom education. Since the development of this technology may entail huge investment and arduous effort, it is crucial to understand the factors that influence this technology acceptance before it is developed. Even though there have been existing research that studied the acceptance of MOOC, there are very limited literatures that discuss it in the context of Malaysia and the use of it as a supplementary learning tool. Therefore, the objective of this research is to identify, propose and evaluate a model for measuring the acceptance of this technology as a supplementary learning tool among undergraduate students in a university in Malaysia. A systematic literature review was done to identify and propose a MOOC acceptance model. A prototype was then developed based on Chemical Equilibrium chapter in Chemistry subject to satisfy target users' needs. The prototype was assessed through usability evaluation and the acceptance model which was based on Technology Acceptance Model (TAM) was evaluated among students who undertake Chemistry course in the same university. The quantitative data obtained from 111 students through a questionnaire (eight constructs and 39 items) was analysed using SPSS and SmartPLS 3.0. Findings showed positive perception of students towards the use of MOOC. Partial least squares structural equation modelling (PLS-SEM) analysis showcased nine out of ten relationships were found to be significant. To gain better understanding of these statistical results, qualitative data was then collected via semi-structured group interview with five survey respondents. The data was analysed using deductive content analysis and the findings managed to confirm and expand the empirical study. The model proposed in this research as well as the MOOC acceptance findings provide relevant theoretical contribution to be further validated and explored by future researchers. On the other hand, the development process and the developed prototype incorporating the design criteria suggested by scholars offer practical contribution which can help developers in designing a MOOC that can be accepted by students.

ABSTRAK

Kursus Terbuka atas Talian Secara Besar-Besaran (MOOC) ialah alternatif yang inovatif dan praktikal bagi melengkapkan pendidikan tradisional di bilik darjah. Memandangkan pembangunan teknologi ini melibatkan pelaburan dan usaha yang besar, sangat penting untuk memahami faktor yang dapat mempengaruhi penerimaan teknologi ini sebelum ia dibangunkan. Walaupun terdapat kajian yang membincangkan tentang penerimaan MOOC, perbincangannya dalam konteks Malaysia dan kegunaannya sebagai alat bantu mengajar adalah terbatas. Oleh itu, objektif kajian ini ialah mengenali, mencadangkan dan menilai model untuk mengukur penerimaan teknologi ini sebagai alat bantu mengajar dalam kalangan pelajar siswazah di sebuah universiti di Malaysia. Kajian kesusasteraan yang sistematik dilakukan untuk mencadangkan model penerimaan MOOC. Kemudian, sebuah prototaip dibangunkan berdasarkan bab Keseimbangan Kimia untuk memenuhi keperluan pengguna sasaran. Prototaip ditaksir melalui penilaian kebolehgunaan dan model penerimaan yang berasaskan Model Penerimaan Teknologi (TAM) dinilai dalam kalangan pelajar yang mengikuti kursus Kimia di universiti sama. Data kuantitatif yang diperolehi daripada 111 pelajar melalui soal selidik (lapan pemboleh ubah dan 39 item) dianalisis menggunakan SPSS dan SmartPLS 3.0. Keputusan menunjukkan persepsi positif pelajar terhadap penggunaan MOOC. Analisis pemodelan persamaan struktur penganggaran kuasa dua terkecil separa (PLS-SEM) menunjukkan sembilan daripada sepuluh hubungan didapati signifikan. Untuk mendapatkan pemahaman yang lebih jitu mengenai keputusan statistik ini, data kualitatif dikumpulkan melalui temu bual semi struktur berkumpulan dengan lima responden soal selidik. Data telah dianalisis dengan menggunakan analisis kandungan deduktif dan keputusan analisis ini telah mengesahkan dan mengembangkan dapatan kajian empirikal. Model yang dicadangkan dalam kajian ini serta keputusan penerimaan MOOC memberikan sumbangan teoritis untuk pengesahan dan eksplorasi selanjutnya oleh penyelidik lain. Selain itu, proses pembangunan dan prototaip yang dihasilkan dengan menggabungkan kriteria reka bentuk dicadangkan penyelidik memberi sumbangan praktikal yang dapat membantu pembangun perisian dalam mereka bentuk MOOC yang dapat diterima oleh pelajar.

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LIST OF ABBREVIATIONS

MOOC	-	Massive Open Online Course
UTM	-	Universiti Teknologi Malaysia
TAM	-	Technology Acceptance Model
TRA	-	Theory of Reasoned Action
TPB	-	Theory of Planned Behaviour
UTAUT	-	Unified Theory of Acceptance and Use of Technology
UTMSPACE	-	School of Professional and Continuing Education
PLS-SEM	-	Partial Least Squares Structural Equation Modelling
PU	-	Perceived Usefulness
PE	-	Perceived Ease of Use
ATT	-	Attitude
SI	-	Social Influence
CQ	-	Course Quality
PENJ	-	Perceived Enjoyment
COL	-	Collaboration
INT	-	Intention to Use
AVE	-	Average Variance Extracted
HTMT	-	Heterotrait-Monotrait
CR	-	Composite Reliability

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CHAPTER 1

INTRODUCTION

1.1 Overview

One of the recent educational tools that embodies the contemporary form of learning is Massive Open Online Course (MOOC) which are online courses that can be accessed by massive number of participants often with free registration (Normandi Atiaja Atiaja et al., 2016). MOOC features short video lectures, notes, assessments, discussion forum and progress report which makes it a useful, comprehensive and attractive centre of learning resources. Participants who complete a course will also receive a certificate for free or with minimum level of charge (M. Yang et al., 2017).

This technology has garnered global attention and participation with the number of courses constantly increases every year. Figure 1.1 presents the number of courses launched by more than 900 universities worldwide excluding China with over 13,000 courses by the end of 2019. In addition, the number of students who enrolled has now reached 110 million (Classcentral, 2019).

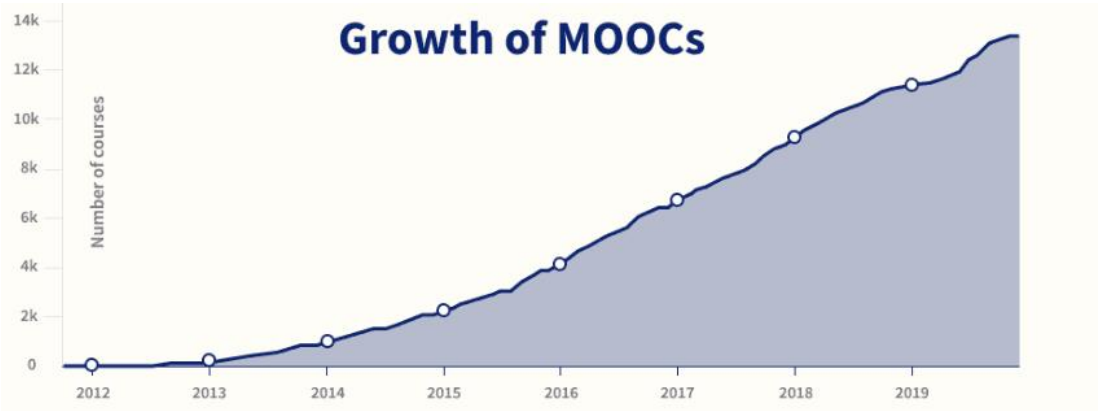

Figure 1.1 Number of MOOC developed every year among more than 900 universities in the world (Classcentral, 2019)

Malaysia government anticipates expansion of MOOC throughout the nation which is wise in utilising this readily available technology (Ministry of Education Malaysia (MoE), 2015). Accelerating information and communication technology (ICT) innovations especially for self-paced and distance learning is among the targeted national education transformation to enhance enrolment and urban-rural gap. One of the key initiatives includes making online learning a fundamental component for higher learning institution by converting common undergraduate courses into MOOC and practicing blended pedagogy (Ab Jalil et al., 2016).

In line with this, many universities have consistently strived to improve the incorporation of ICT into their teaching and learning activities and have also started to develop their own MOOC. One of them is Universiti Teknologi Malaysia (UTM) through New Academia Learning Innovation (NALI) model which encourages the use of MOOC as a blended learning tool and emphasizes lecturers' role as a facilitator to nurture student-centred environment. Blended learning refers to the education that combines face-to-face instruction and online mode. A policy has been established in UTM on the development of MOOC, the opportunity to transfer credit and the recognition of academic staff's workload through teaching using this online learning medium. (UTM, 2018)

This technology is seen as not only capable of offering more learning opportunities, inspiring lifelong learning, facilitating distance education and lowering education cost, it can also serve as a supplementary learning tool to optimize students' interest in learning and support their revision process (Kaveri et al., 2017). Student-centred education can also be empowered via MOOC particularly during learning recovery (Magro et al., 2017). Apart from that, this learning tool can allow more time and opportunities for instructors to conduct engaging activities during formal classroom period. This is possible as curriculum content can be delivered to students before class through online video lectures, online notes and quizzes. As a result, lecturers can spend the classroom time with in-depth discussion, problem-based learning, peer collaboration and other activities that can focus more on students' development and boost students' understanding (Ganapathy et al., 2017).

For instance, a study employed this technology as a supplement to support the classroom teaching by having lectures and assignments conducted through the online medium while classroom time was utilized for lab and problem-based activities. As a result, big improvement was exhibited in students' exam marks and grades such as percentage of students who passed the subject increased from 59% to 91%. The research stated that instead of viewing MOOC as a replacement to traditional teaching method, this technology should be utilized to help nurture learning and social networking (Fox, 2013).

1.2 Problem Background

This section discusses the root of the problem that becomes the foundation of this research.

1.2.1 Challenges of Teaching and Learning in Higher Education

Education system has undertaken various transformation over the years. As the world keeps changing briskly, teaching methods need to match the learning preferences of the young generation and the current workforce expectation (Sari et al., 2019). In higher education, with traditional lecture style, students are said to be able to capture only 10% of the information delivered to them (Cardellini, 2012). Hence, educators have to integrate technology to sustain and boost the interest of the digital era students in learning.

Focus also can no longer be placed solely on academic achievement as labour force nowadays desires holistic individuals who are not only knowledgeable but also armed with thinking skills and soft skills that enable them to quickly adapt what they have learnt into practice and become a confident and efficient problem solver (Ministry of Education, 2012). However, with exam grades still being the focus of the society, educators may experience time constraint to conduct learning activities that can equip students with such skills in addition to delivering knowledge and ensuring the curriculum is delivered in a timely manner.

This is particularly difficult for subjects that require thorough explanation where educators may need to spend most of the face-to-face session with lecture and discussion. Monitoring students' learning progress is another challenge faced by educators especially with the diversity of students in a classroom and a large class scenario (Hornsby & Osman, 2014). Furthermore, for part time students who have to work to support themselves or wish to further studies while working, they have to travel long distance to attend classes during the weekend.

1.2.2 Introduction of Modern Education such as Massive Open Online Course (MOOC) in Higher Learning Institutions

In overcoming all the challenges in today's education, many forms of modern education have been introduced particularly in higher institutions level such as online learning, open education resource, blended learning, flipped classroom, digital classroom, distance education and learning management system (Education, 2012).

Among the benefits of online learning is it can help to improve access to education as well as learning quality and cost-effectiveness of learning (Panigrahi et al., 2018). Due to the fast-changing environment and globalisation, government and academia strive to break geographical and social limits, expand education opportunities and reduce education costs (Islam et al., 2015). Hence, regardless of an individual's age and background, learning becomes more accessible and flexible with online instruction as anyone can gain information and knowledge at anytime and anywhere without being restricted to brick and mortar education. Moreover, this online learning medium was also adopted by educators along with face to face instruction in a blended learning format to enhance students' engagement (Bralić & Divjak, 2018).

The advent of Massive Open Online Course (MOOC) responds to the need of contemporary education such as online learning, distance education and blended learning. Therefore, it is not a surprise that this technology has become one of the salient phenomena in today's education, gaining the attention and involvement among academics and practitioners worldwide (Ma & Lee, 2020; Sari et al., 2019). Since the online courses are accessible to anyone, lifelong learning is also encouraged via this

educational tool. Apart from that, people can become more motivated to advance their knowledge with the flexible learning opportunity and lower costs requirement provided by this technology (Littenberg-tobias & Reich, 2020).

In Malaysia, MOOC is still in the introductory phase as there is still lack of awareness, development and use of this technology. For example, 4,122 out of 4,449 (93%) students were first time users in a study on the four Malaysia pilot MOOC (Ab Jalil et al., 2016). Similarly, the initial investigation result for this research showed that 90% of 73 diploma students in an institution in Malaysia were not aware of MOOC as shown in Figure 1.2. In addition, another literature that explored MOOC readiness among 190 postgraduate students in a university in Malaysia revealed that most of the students did not use MOOC at all and displayed lack of awareness as well as procedural knowledge of MOOC (Tahiru & Kamaludeen, 2019). Since this online learning tool has become the key part of government initiatives, more research in the context of Malaysia can be beneficial towards the development of this technology.

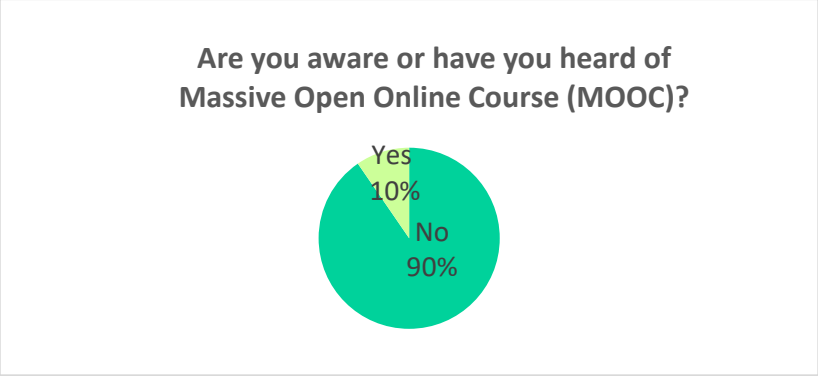

Figure 1.2 Students' responses on their awareness of MOOC

1.2.3 Low Completion Rates of Massive Open Online Course (MOOC)

Despite the vast popularity of MOOC and the well-acknowledged benefits this online learning tool brings forth, studies found that the major setback of MOOC is its low completion and high dropout rates (Reparaz et al., 2020). For example, a recent study which collected data from 261 MITx and HarvardX courses on edX revealed that the number of active students typically dropped every year as shown in Figure 1.3. The research shared that students normally perform worse in online courses than face-

to-face courses, so to sustain the financial of the MOOC platforms, it was advisable for the courses to reach smaller number of students who are already embedded in higher education system and have good financial (Reich & Ruipérez-Valiente, 2019).

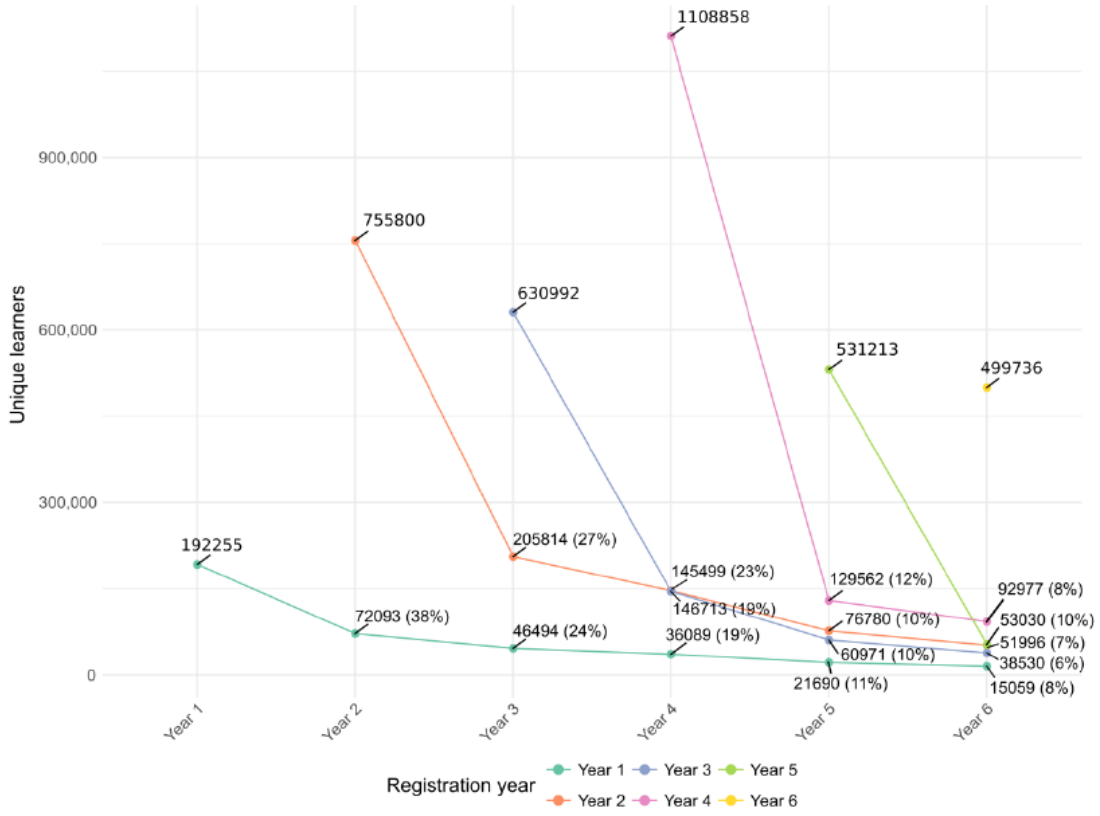

Figure 1.3 Number of active users per year in 261 MITx and HarvardX courses on edX (Reich & Ruipérez-Valiente, 2019)

Various factors have been considered by scholars that possibly lead to the high dropout rates and one of them is students' low motivation to learn. A study on MOOC learners' motivation demonstrated positive relation between students' overall motivation on instructional material and their course completion rate (B. Huang & Hew, 2017). Ineffective and lack of social interactions and collaboration activities were also deemed by previous literature as a factor that contribute towards the low retention rates. Unorganized forum where abundant of information and discussions flood into the same place can be overwhelming and difficult for students to navigate, find information and join into the conversation. In addition, lack of a sense of community was indicated as the main problem of MOOC platforms (Zheng et al., 2015).

Past research also mentioned that completion should not be the only measure of MOOC success since students may enrol in a course with variety of reasons and purposes (Deshpande & Chukhlomin, 2017). Trends generally showed that learners started a MOOC just to gain information that they looked for to support their education needs or curiosity, so once they obtained the information that they were interested in, they dropped the course (Arzu et al., 2016; Deshpande & Chukhlomin, 2017). Moreover, lack of accreditation, free registration without any obligation to continue and the lack of monitoring of students' learning could also be the cause of non-completed users (Arzu et al., 2016; Ghazali, 2016).

Another literature which investigated the trends in MOOC's enrolment and completion in Coursera, Open2Study and 12 other providers involving 78 institutions found that among 221 sampled courses, percentage of students who completed a course varied between 0.7% to 52.1% (Jordan, 2015). The correlation between completion rates and course duration was negative but the correlation between the rates and course start date was positive indicating that higher number of users was observed for the more recent courses and courses that were conducted within less number of weeks long. Since some courses in this research were able to achieve higher percentage of completed users than other courses, it means that this issue can be improved given the right strategies which calls for more studies to be done.

Even though completion may not be a reliable measure of MOOC as online courses are different with conventional courses, concerns may arise about the efficacy of this technology since its development entails arduous effort and enormous investment (Alraimi et al., 2015; Dai et al., 2020). Hence, it is crucial for MOOC developers to understand user's need and expectation as well as the important criteria that can influence the use of the technology.

1.2.4 Acceptance of Massive Open Online Course (MOOC)

Acceptance refers to the willingness of users to employ a new technology that is designed to support their task. It is regarded as the pivotal element that determines the success and the productivity of the technology (Dillon & Morris, 1996). If majority

of people are not interested to use, then the technology can be viewed as a failure. Therefore, as success depends on user-centred design and development, it is critical for those involved in a technology development to recognize the predictors of user acceptance before the technology is created and implemented. This is to maximize user participation and the adoption of the technology as well as the productivity and the worthiness of the investment spent in developing the product.

Among the user acceptance theories that have been widely employed by researchers are Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT). Perceived usefulness or user expectancy and perceived ease of use or effort expectancy were discovered as the prominent determinant of MOOC acceptance based on the results in Chapter 2 Table 2.8.

Although several research has been conducted to study MOOC and its acceptance, low completion rates were still observed for many courses (Mohamad et al., 2018). Furthermore, from the systematic literature review as discussed in Chapter 2, among 22 literatures on the acceptance of this online learning tool, only three studies were in the context of Malaysia and one of them merely provided descriptive statistics results.

1.2.5 Development of Massive Open Online Course (MOOC) in Malaysia

Currently, it appears that in Malaysia, MOOC is employed more as a blended learning approach than to reach global widespread and international interactions (Fadzil et al., 2016). This way of application can be an early practice towards developing a MOOC with bigger target audience. As this technology is generally designed to target open crowd, there are limited studies that discuss the development for blended learning purpose or as a supplementary learning tool (Liyanagunawardena et al., 2013; Zhu et al., 2018).

Based on the evaluation report of the four Malaysia pilot MOOC launched by four public universities, which were conducted fully online, study found that among

4,449 students, the course which had the policy set forth for students to enrol in their first semester had 24% students completed it compared to 9% for the course with flexible enrolment. In terms of the frequency of accessing MOOC, 2.8% of the students accessed daily, 18.5% several times in a week, 25.6% weekly, 24.3% monthly, 25.5% only once and 3.4% never, which showed that many students rarely accessed the MOOC. Some of the challenges shared by developers include time constraint to plan, develop and evaluate a MOOC, the lack of human resource especially in technical area, no expert and dedicated person in charge for video production as well as lecturers and students being accustomed and complacent to traditional method (Ab Jalil et al., 2016).

Similarly, another literature that studied the perception of university lecturers in Malaysia highlighted time constraint and technical problem as one of the challenges in adopting MOOC. Lecturer's self-efficacy as well as the production of the videos that require a lot of time and huge investment to be spent were also indicated as the challenges of this technology application (Ghazali, 2016). Thus, more research in MOOC development should be done to assist instructors and developers to design and develop a MOOC that minimize some of these challenges while still satisfying target users. Currently, there is not much research available that discussed the detailed development process particularly for a supplementary learning approach (Liyanagunawardena et al., 2013; Zhu et al., 2018). In addition, it is difficult to find a suitable Chemistry MOOC for diploma students context.

Moreover, although the procedure of developing MOOC had been studied by scholars, one research mentioned that existing literatures only explored the development process by employing the general instructional design model such as ADDIE (Analysis, Design, Development, Implementation and Evaluation) without integrating the design principles and considering the characteristics of MOOC (G. Lee et al., 2016). Scholars have shared many suggestions and criteria for creating a successful MOOC but this aspect was rarely incorporated into the development stages as well. Furthermore, the procedure was mostly for developing a MOOC that targets online learners. Since this technology can also be adopted as a supplementary tool to assist students in brick and mortar education, there is a need of a process that considers this scope of target users with different learning environment.

1.2.6 Challenges in Teaching and Learning of Chemistry Subject

Chemistry is regarded as one of the most difficult subjects alongside Physics and Mathematics by a sample of 60 university students (Magro et al., 2017) and prior literature attributed the abstract nature as the reason students find the subject difficult to learn (Cardellini, 2012).

From a preliminary investigation via target user analysis which was conducted among 73 diploma Civil Engineering and Mechanical Engineering students in School of Professional and Continuing Education (UTMSPACE) Kuala Lumpur, feedbacks were attained on the Chemistry course they undertook during their first semester as well as their opinion and experience with online learning. 39% of them agreed that the abstract concept makes Chemistry challenging. Besides that, 70% of the respondents actually found memorising information as the reason that makes the subject tough and 30% of them felt the calculation element in Chemistry is the factor. Among all the topics in Diploma Chemistry, they chose Chemical Equilibrium as the hardest one.

More than 60% of them suggested to have more in-class discussion and approved that video lectures can support their revision as they can re-watch it whenever they miss or forget certain information. Overall, half of the respondents preferred to have supplementary materials in the form of online videos, online notes, graphic, animation, online games and online quizzes. 64% of the respondents also indicated that they are willing to go through lecture notes or videos before class so that they can have more engaging activities during class. The rest were mostly neutral about the ideas. Since MOOC has all these elements that students desire, it can be a great tool to support students' learning and personal growth. However, based from the systematic literature review in Chapter 2 Section 2.4.2, there are still lack of studies done for the application of this online learning tool for this subject. In addition, it is also difficult to find a suitable Chemistry MOOC for diploma students.

1.3 Problem Statement

Development of MOOC involves significant amount of effort and ventures, therefore, getting high enrolments and partaking is critical. Prior research had extensively studied on the predictors of this technology acceptance to identify the factors that can influence the use of this educational tool, but there is still limited amount of literatures in the context of Malaysia, Chemistry subject and the application of MOOC as a supplementary learning approach. Since this technology in Malaysia is still in its infant stage, the intention by the government and institutions to increase its expansion requires more studies to be done in Malaysia perspective. UTMSPACE is a higher learning institution in Malaysia that aims to provide lifelong learning programmes that are widely accessible and flexible but the awareness and use of this technology was found to be low. To encourage this technology acceptance and adoption, it can be initially embraced for complementing conventional education before applying it for entirely online learning approach and targeting for bigger target audience. So far, the acceptance of this technology was mostly investigated on existing courses and users from certain countries. So the results cannot be generalized as different places have different cultures, education system, learning style and environment. Demographic factors such as gender which are found to be one of the component of technology acceptance could also be different depending on the context of study. Furthermore, the contradict findings presented by some of the literatures is another sign that more research need to be done.

1.4 Research Objectives

The objectives of the research are:

1. To identify the factors that influence the acceptance of MOOC from past studies.
2. To propose a model for measuring the acceptance of MOOC among undergraduate students in higher education.
3. To design and develop a MOOC for learning Chemical Equilibrium topic in Chemistry course.
4. To evaluate students' acceptance of MOOC as a supplementary learning tool in higher education.

1.5 Research Questions

The following are the research questions.

1. What are the factors that influence the acceptance of MOOC from past studies?
2. How is the model for measuring the acceptance of MOOC among undergraduate students in higher education?
3. What is the process and criteria for designing and developing a MOOC?
4. How is students' acceptance of MOOC as a supplementary learning tool in higher education?

1.6 Research Hypothesis

Research hypothesis is a predictive statement about the outcome of a research that relates an independent variable with a dependent variable. The hypotheses constructed for this study are as follows where significant relationship were hypothesized as alternative hypothesis whereas insignificant relationship were hypothesized as null hypothesis (Venkatesh et al., 2003).

H_A1 Perceived usefulness has positive relationship with intention to use MOOC.

H_A2 Attitude has positive relationship with intention to use MOOC.

H_A3 Perceived usefulness has positive relationship with attitude.

H_A4 Perceived ease of use has positive relationship with attitude.

H_A5 Perceived ease of use has positive relationship with perceived usefulness.

H_A6 Social influence has positive relationship with perceived usefulness.

H_A7 Course quality has positive relationship with perceived usefulness.

H_A8 Collaboration has positive relationship with perceived usefulness.

H_A9 Collaboration has positive relationship with perceived ease of use.

H_A10 Perceived enjoyment has positive relationship with perceived ease of use.

H_011 There is no significant difference in gender towards the factors that influence acceptance of MOOC.

H_012 There is no significant difference in program of study towards the factors that influence acceptance of MOOC.

1.7 Scope of the Study

The scope of this study is investigation on acceptance of MOOC as a supplementary tool for learning Chemistry topic, Chemical Equilibrium. In order to do that, a MOOC was developed for evaluation. The research sample is diploma Mechanical Engineering and Civil Engineering students at UTMPSPACE Kuala Lumpur taking Chemistry course during their first year. They have basic Chemistry knowledge from high school, have no knowledge about MOOC and have never used this technology prior to this research. 111 students participated in the survey for evaluating MOOC acceptance in this research while five of them participated in the interview afterwards. This research focused mainly on the MOOC development and the quantitative study of students' acceptance. The qualitative part was only to support the statistical results.

1.8 Research Significance

The empirical findings from this research enrich the current study on MOOC and its acceptance determinants. The results on the elements that can influence students to use MOOC as well as the proposed model for measuring MOOC acceptance can be used as a reference for further research. Apart from that, the MOOC produced for this study including its design elements can be one of the guidance for practitioners particularly when developing an online course to complement classroom education. Developers and instructors can make use of the findings in this research to assist them in creating a MOOC that can attract students to use as a supplementary learning tool. The findings are especially beneficial for Malaysia context and the application of this technology to support formal education with online instruction.

1.9 Definition of Terms

The definition of the terms used in this research are described as follows:

i) Massive Open Online Course (MOOC)

Massive Open Online Course are online courses that are opened for unlimited number of participants. The courses comprise video lectures, notes, discussion forum, quizzes and progress report. Once participants complete a certain course, they will receive a certificate for free or at minimum level of charge (Hakimi, 2018).

ii) Acceptance

Acceptance refers to the readiness of target users to use a new technology while acceptance theory is a theory that is based on human behavioural which influences an individual's action (Dillon & Morris, 1996). Some of the established and prominently used acceptance theories among scholars are Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT).

iii) Supplementary Learning Tool

Supplementary learning tool in this research refers to a tool that provides additional resource and medium in helping students to enhance their learning outside the classroom.

iv) Structural Equation Modelling (SEM)

SEM is a multivariate statistic technique which consists of two types namely covariance-based and variance-based. Variance-based SEM or also known as partial least squares (PLS)-SEM has been gaining popularity in recent years due to its ability to develop theories in exploratory research under conditions of non-normality with small to medium sample size (Hair et al., 2019).

v) Construct

In this study, construct refers to factors or latent variables which cannot be directly observed. Thus, it needs to be measured by observed variables serve as indicators or items. Construct can be categorized into two types with the first one being exogenous variable (independent variable) referring to the variable that causes other variable. In structural model of PLS-SEM, it has arrows pointing out from it. Another type is endogenous variable (dependent variable) which is affected by other variable, hence, it has at least one arrow pointing to it (Garson, 2016; Ramayah et al., 2018).

1.10 Theoretical Framework

The theoretical framework of this research as illustrated in Figure 1.4 comprises four main parts. MOOC design criteria from prior literatures was incorporated into MOOC components during the development process based on ADDIE. Students' acceptance was then assessed using a model adopted from TAM.

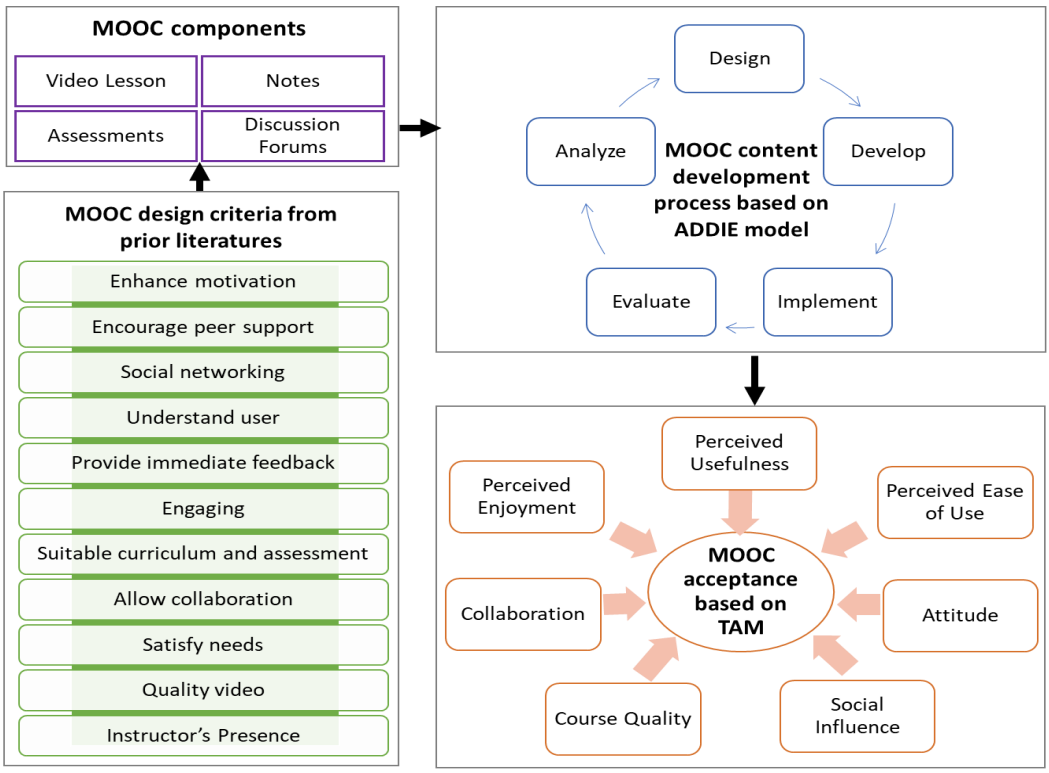

Figure 1.4 Theoretical framework

1.11 Chapter Summary

The paradigm shifts in education system due to the rapid technology development, learning styles of digital age students and workforce expectation has prompted the evolution of various forms of modern education such as Massive Open Online Course (MOOC). This new information technology has garnered widespread interest and attention among researchers, practitioners and academician due to its numerous benefits especially as a revolution of open education resource. However, there were setbacks and challenges that come with this technology such as the high dropout rates and the lack of usage of it given the arduous effort and enormous investment spent in its development. Hence, it is critical for MOOC acceptance to be studied to identify the factors that can influence the intention to adopt this technology.

While literatures on acceptance of MOOC are progressively growing, some of them are still in progress and do not include empirical results. There are also contradict findings as well as limited studies in the context of Malaysia and its acceptance as a supplementary learning tool. Since Malaysia government intends to expand this technology throughout the nation particularly in higher learning institutions and focuses more on utilising MOOC as a blended learning approach at this early stage, more research need to be done in this area.

Therefore, this research aims to identify the factors that can influence students to use this online learning medium as a supplementary learning tool in higher education. A MOOC was developed based on ADDIE (Analysis Design Development Implementation Evaluation) Model for Chemical Equilibrium topic in Chemistry. The purpose of the content development is to match the needs and expectations of target users. The content was then used to evaluate the MOOC acceptance model in this research which was adapted from the Technology Acceptance Model (TAM) to determine the predictors of students' acceptance towards this learning tool. The model consists of eight constructs and ten hypotheses. Detailed explanation about this research model can be referred in Chapter 3 Section 3.3.1.

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