PRELIMINARY STUDIES AND PILOT TESTING TO IMPLEMENT BLENDED LEARNING APPROACH IN LEARNING 3D DRAWING FOR STUDENTS AT SEKOLAH SENI MALAYSIA, JOHOR AND ENGLISH COLLEGE, JOHOR

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DISSERTATION SUBMITTED IN FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF ARTS

(ART EDUCATION)

FACULTY OF ART, COMPUTING AND CREATIVE INDUSTRY
UNIVERSITI PENDIDIKAN SULTAN IDRIS

2019

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APPRECIATION

In the name of Allah, most Gracious and most Compassionate.

Alhamdulillah, all praise is due to Allah for giving me the strengths, guidance, assistance and all His blessings through the blood, sweat and tears I have gone through in the process of completing this study.

First and foremost, I would like to express my heartfelt gratitude to my supervisor, Dr Abdul Aziz Zalay, a Senior Lecturer at Department of Arts and Design, who has provided me with invaluable advice, guidance, wisdom and countless inspiration during the time I have worked on this project. The importance of having the support of an experienced supervisor while conducting one's dissertation study cannot be overstated and I am grateful for his assistance who always took the time and effort to read my paper and provide valuable feedback.

I also want to express my special appreciation to the teachers, students and experts who participated in my study. Getting participants for research studies is rarely easy and I benefitted immensely from working with such helpful and dedicated people.

Not forgetting, my appreciation goes to my fellow researchers and lecturers at Faculty of Arts, Computing and Creative Industry who have walked this incredible journey together with me. I really treasure the companionship, assistance and your never-ending support.

Lastly, I must somehow try to convey the enormous gratitude I feel towards my wonderful wife, Farina Shilla Haris, my kids - Farina Khairah, Zafran Rayyan, Farina Marissa and Hud Rayyan, and my beloved mother, Hajah Hawa Haji Omar. Their never-ending support, patience, help, and love are what keeping me strong as I worked through the ups and downs of conducting this study.

Finally, to those (too many to mention) who have directly or indirectly involved in making this a success. May Allah shower you health, wealth and happiness.

ABSTRACT

This preliminary study is a pilot test for the implementation of blended learning in teaching 3D drawing by blending face-to-face classroom with ICT-based settings using 3D Blender Tutorial Courseware, Youtube and Whatsapp interactive group chat apps. The objectives were to evaluate the effectiveness of blended learning approach on the students' drawing skills, motivation, and learner autonomy, and also to determine the impact of students' perspective of blended learning and teachers' attitudes on their learning outcomes. The study was carried out using quantitative analytical approach by conducting a 3D Drawing Skill Evaluation and a survey before and after the implementation of blended learning. The respondents consisted of 40 students from Malaysian Art School and English College in Johor who were selected by using purposive sampling method based on the level of their computer literacy and interest in learning 3D drawing. The results of descriptive analysis revealed that there was a significant difference in the respondent's level of 3D drawing knowledge (Δmean=1.868), drawing accuracy (Δmean=1.793, visualization skill (Δmean=1.855), completion time (Δmean=1.742), motivation (Δmean =1.95) and learner autonomy (Δmean = 1.87) after using the blended learning approach. It was also found from the regression analysis that the respondent's attitude towards blended learning and perception of teacher's attitude had a strong and significant effect on their motivation ($R2=0.666$, $F(2,37)=36.81$, $p<.0005$) and learner autonomy ($R2=0.321$, $F(2,37)=8.763$, $p<.0005$) but no significant effect on their knowledge ($R2=0.050$, $F(2,37)=0.968$, $p=0.389$), drawing accuracy ($R2=0.154$, $F(2,37)=3.357$, $p=0.046$), visualization skill ($R2=0.041$, $F(2,37)=0.789$, $p=0.462$) and completion time ($R2=0.271$, $F(2,37)=6.888$, $p=0.003$). It was concluded from this pilot study that blended learning can positively affect students' 3D drawing skills, motivation and learner autonomy. There was also evidence in this study that students' motivation and learner autonomy can be influenced by their attitude towards blended learning and perception of teachers' attitude. Therefore, the implication of this study had proven that blended learning can be effective in a technical art setting particularly in teaching 3D drawing. However, it is important to take account of students' attitude towards blended learning and teacher's attitude during the learning process to effectively facilitate learning.

KAJIAN RINTIS PEMBELAJARAN TERADUN UNTUK PENGAJARAN LUKISAN 3D DALAM KALANGAN PELAJAR SEKOLAH SENI MALAYSIA DAN ENGLISH COLLEGE DI JOHOR

ABSTRAK

Kajian ini merupakan ujian rintis menggunakan pendekatan pembelajaran teradun dalam mempelajari lukisan 3D dengan menggabungkan kaedah bersemuka di kelas dan penggunaan ICT melalui penggunaan koswer tutorial, Youtube dan apps interaktif Whatsapp. Objektif kajian adalah untuk melihat pencapaian melukis 3D, motivasi dan autonomi pelajar selepas menggunakan pendekatan ini selain mengenal pasti pengaruh perspektif pelajar terhadap pembelajaran teradun dan sikap guru ke atas hasil pembelajaran mereka. Kajian dijalankan secara kuantitatif melalui Penilaian Prestasi Lukisan 3D dan soalselidik sebelum dan selepas perlaksanaan pembelajaran teradun. Responden kajian melibatkan 40 orang pelajar dari Sekolah Seni Malaysia dan English College di Johor yang dipilih menggunakan kaedah persampelan bertujuan berdasarkan kepada tahap literasi komputer mereka dan minat untuk mempelajari lukisan 3D. Keputusan analisis deskriptif menunjukkan terdapat perubahan ketara pada tahap pengetahuan (Δmin=1.868), ketepatan (Δmin=1.793), kemahiran visual (Δmin=1.855, masa siap (Δmin=1.742), motivasi (Δmin=1.95) dan autonomi (Δmin=1.87) dalam pembelajaran responden selepas perlaksanaan pembelajaran teradun. Analisis regresi pula mendapati bahawa perspektif responden terhadap pembelajaran teradun dan sikap guru mempunyai pengaruh yang signifikan ke atas motivasi (R^2=0.666, F(2,37)=36.81, p<.0005) dan autonomi (R^2=0.321, F (2,37)=8.763, p<.0005) tetapi tiada pengaruh signifikan ke atas pengetahuan (R^2=0.050, F(2,37)=0.968, p=0.389), ketepatan (R^2=0.154, F(2,37)=3.357, p=0.046), kemahiran visual (R^2=0.041, F(2,37)=0.789, p=0.462) dan masa siap (R^2=0.271, F(2,37)=6.888, p=0.003). Kesimpulannya, pembelajaran teradun boleh meningkatkan kemahiran melukis 3D, motivasi dan autonomi pelajar. Ianya juga telah membuktikan bahawa motivasi dan autonomi pelajar boleh dipengaruhi oleh persepsi mereka terhadap pembelajaran teradun dan sikap guru. Implikasi kajian ini jelas menunjukkan bahawa pendekatan pembelajaran teradun sesuai dan efektif untuk dilaksanakan dalam pengajaran dan pembelajaran yang berkonsepkan seni teknikal terutamanya dalam pengajaran lukisan 3D. Walau bagaimanapun, perlaksanaan pendekatan ini perlu mengambil kira persepsi pelajar terhadap pembelajaran teradun dan sikap guru sepanjang proses pembelajaran bagi memastikan keberkesanan pembelajaran.

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LIST OF ABBREVIATIONS

3D	Three-dimensional
ASTD	American Society for Training & Development
CD	Compact Disc
CD ROM	Compact Disc Read Only Memory
CNC	Computer Numerical Control
CPU	Central Processing Unit
EC	English College
GB	Giga Byte
GPU	Graphic Processing Unit
HELAM	Hexagonal E-Learning Assessment Model
ICT	Information and Communications Technology
IIUM	International Islamic University of Malaysia
IT	Information Technology
LMS	Learning Management System
MB	Mega Byte
MDEC	Malaysia Digital Economy Corporation
RAM	Random Access Memory
SMK	Sekolah Menengah Kebangsaan
SK	Sekolah Kebangsaan
SSeMJ	Sekolah Seni Malaysia, Johor
UiTM	University Teknologi MARA

UKM	Universiti Kebangsaan Malaysia
UniMAP	Universiti Malaysia Perlis
UNIMAS	Universiti Malaysia Sarawak
UNITAR	Universiti Tun Abdul Razak
UPSI	Universiti Perguruan Sultan Idris
VLE	Virtual Learning Environment
VREP	Validation Rubric for Expert Panel

CHAPTER ONE

INTRODUCTION

1.0 Introduction

Over the past 10-15 years, the rapid advances in information technology have had significant impact on numerous aspects of the daily living of the mankind and the society including education. Technological development and wide availability of personal computers, CDs, smart phones, tablets, Internet, broadband etc. has gradually opened up new instructional possibilities in learning institutions and organizations to seek greater educational cost-effectiveness hence resulted in e-learning (also known as distance learning or web-based learning). Numerous schools, colleges and universities have adopted e-learning to some extent to supplement or augment the traditional instructor-led classroom courses. Companies have adopted e-learning to train their employees and convey business information to their customers. People on

their own have adopted e-learning as a vehicle for self-study on numerous subjects of interest for various purposes.

Even though the traditional instructor-led classroom learning is a proven and effective means of learning which offers interaction between the learning instructors and learners, the lack of equipment in the classroom may make it difficult for the instructors to teach certain topics effectively. The technology-enabled e-learning such as the use of audio/video instructions or streaming, CD ROMs, multimedia courseware, virtual learning environments (VLE), satellite TV, online conferences, the Internet and Intranet for materials on specific topics of interest can help address such difficulties. However, a "fully e-learning" has its limitations. Depending on the types of e-learning and how the e-learning is designed, the learning process may not be fully effective due to the absence of learning instructor, poorly created or inconsistent learning materials, the absence of a deadline pressure and the lack of learners' ability to cope with technical difficulty as well as technical skills in computer operations and internet navigation.

As both the traditional classroom instructor-led learning and e-learning simultaneously offer strengths and suffer from limitations, it is only natural to combine the two learning approach into blended learning. Indeed there is a growing amount of research suggests that blended learning have been found to be significantly related to students' academic performance from early childhood education to tertiary education. It appears in the literature that blended learning can improve and enhance students' learning outcomes (Boyle et al., 2003; Dziuban et al., 2006; Garnham & Kaleta, 2002; Lim & Morris, 2009; O'Toole & Absalom, 2003; Twigg, 2003a),

knowledge construction and skill acquisition (Twigg, 2003a; Kenney & Newcombe, 2011; López-Pérez et al., 2011; Rahman et al., 2011), retention rate (Garrison & Kanuka, 2004), enjoyment and satisfaction (Banks, 2001; Garrison & Kanuka, 2004), meaningful and value added learning, participation, interaction (Banks, 2001; Garrison & Kanuka, 2004), exposure to technological advances (Barshay, 2011), motivation, commitment, perseverance (Lim & Kim, 2003; Donnelly, 2010; Sharpe et al., 2006; Wang et al., 2009; Woltering et al., 2009), critical thinking skills (Abdul Wahab et al., 2016), access to learning that reinforces the learner's autonomy, reflection, and powers of research (Chambers, 1999; Lebow, 1993; Radford, 1997; Sharpe et al., 2006; Tam, 2000; Abdul Wahab et al., 2016), facilitates the review and control of learning (Osguthorpe & Graham, 2003) and ability to control their own pace of learning (Garnham & Kaleta, 2002; Owston et al., 2008; Smyth et al., 2012).

In recent years, blended learning approach has also been implemented in technical, vocational and arts education system such as in technical drawing, engineering drawing, animation, art and creative design subjects by combining face-to-face learning in classroom with computer assisted instructions or simulations to improve students' learning achievements. Numerous studies have shown that learning materials in technical subjects are delivered best in blended learning mode, easier to be planned and managed, able to enhance classroom interactions, able to be delivered to a large population of learners, allow learners to visualize the components and procedure, and allow learners to learn at their own pace and to repeat the process as many times as they require for complete understanding (Abdoolrasool, 2010; Hira, 2009). The process of iterative learning through assessment, evaluation, decision

making and error correction creates a much stronger learning environment than the traditional classroom instructions.

This study is to investigate the effectiveness of implementing blended learning approach in learning 3D drawing by integrating face-to-face learning settings with ICT-based settings for the delivery of the learning materials to secondary school students. Technical art subject requires students to have good visualization skills, accurate mind, creativity, critical thinking and motor skills to produce good drawings and graphic designs (Saud & Lee, 2007; Wiley, 1990; Bertoline et al., 1997; Baartmans & Sorby, 2003; Landa, 2006; Ryan & Conover, 2004; Davis, 2012) as well as able to control their own learning while remaining receptive to new information, instruction, and corrections from others (Oreck et al., 2000). Therefore, this study is significant to prove that blended learning approach is effective in improving students' skills, motivation, and learner autonomy in learning 3D drawing thus suitable to be implemented in the learning modules for technical art subjects.

1.1 Background

Historically, blended learning has been a combination of different modes of instructional delivery, teaching, and learning styles. In 1840s, Sir Isaac Pitman launched the first distance education course which resembled distance learning today by sending shorthand texts to his students via mailed postcards and they were required to send them back to be graded and corrected. In 1960s and 1970s, companies began to train their employees by using computer-based training where employees could

simply login to their character-based terminals to access the information. From **1970s to 1980s**video networks were used to train employees. The instructor no longer had to be physically on-site in order to onboard new hires or broaden the skill sets of existing staff members but learners were able to communicate with their peers, watch the instructor on TV, and even address any questions or concerns sending them by mail.

As technology evolved, so did blended training approaches and applications. In 1990s, schools and organizations began using CD-ROMs to deliver more interactive learning experiences, such as those that features **video** and sound. Beginning 1998, blended learning has seen rapid change as web-based instruction was firstly introduced and more people began to have access to the Internet. Through e-learning, learners could access learning materials uploaded via the web simply with a click of a mouse button. In year 2000s, an increasing number of learning institutions are beginning to see the benefits of a blended learning approach. Today, blended learning has evolved into a mammoth education program that merges traditional classroom-based instruction with technology enhancements such as electronic whiteboards, Internet devices, multimedia assistance, digital textbooks and online lesson plans.

Accordingly, many studies have been carried out over the past ten years to investigate the importance and suitability of blended learning as an acceptable pedagogical approach to learners and teachers in learning institutions (Dziuban et al., 2004; Garrison & Vaughan, 2008; Graham, 2006; Osguthorpe & Graham, 2003; Shea, 2007). As Graham (2006) claims, the widespread adoption and availability of digital learning technologies has led to increased levels of integration of computer-mediated

instructional elements into the traditional face-to-face learning experience (p. 7). Thus, it can be said that the upsurge of interest in blended learning within the past decade, as evidenced by the volume of publications within this period, came about due to the increased capabilities of modern computers.

Between 2003 and 2006, most of the studies were focusing on defining blended learning. One of the most cited articles is written by Osguthorpe and Graham (2003) who define blended learning as an approach that combines face-to-face interactions with distance delivery systems. Singh (2003) defined dimensions that can be blended as offline and online learning, self-paced and collaborative learning, structured and unstructured learning, custom content with off-the-shelf content, learning, practice and performance support. Garrison and Kanuka's (2004) study is the most cited article on blended learning which discussed the potential of blended learning in higher education. Later, Graham (2006) summarized blended learning, its' background, definition, trends, blend categories, challenges faced and future directions in his book.

In the following years, scholars began to investigate the perceptions of learners and instructors on the effectiveness of blended learning, its benefits and conveniences, their satisfaction with the instructional delivery and with respect to their learning styles. Chen and Jones (2007) found that when students are in traditional setting, instruction becomes clearer but when they are in blended class, learning process may become doubtful for them although they see more improvements in their analytical skills. Akkoyunlu and Soylu (2008) pointed out that face-to-face environment is important in blended learning. Chandra and Fisher (2009) revealed that web-based

learning environment has been evaluated as convenient, accessible, promoted autonomy of learning, promoted positive interactions between peers during web-based lessons, enhanced enjoyment and regarded as clear, easy to follow and understandable. Another study by So and Brush (2008) indicated that psychological distance and social interaction play a very important role in online blended learning as the absence of immediate feedback and synchronicity can be regarded as negative part of the course (So & Brush, 2008). All these findings showed that although students perceived web-based online learning environment as effective, face to face instruction is also regarded as one of the very important part of education.

In other studies, scholars measured effectiveness of blended learning on different variables such as satisfaction, motivation, achievement, attitude, cooperativeness, knowledge retention, critical thinking skills and drop-out rate for at risk students (Hughes, 2007; Melton et. al., 2009; Akyuz & Samsa, 2009; Deliağaoğlu & Yıldırım, 2008; El-Deghaidy & Nouby, 2008; Woltering et. al., 2009). Some are focusing more on the effectiveness of blended learning using different types of technologies such as the use of blogs, forums, wikis, tablets, smart phones, touch screen devices, learning management system tool etc. (Miyazoe & Anderson, 2010; Bayram Güzer & Hamit Caner, 2014; López-Pérez et al., 2011; Yeh et al., 2011; Yen & Lee, 2011; and Jia et al., 2012). There are also other studies to discover the challenges of blended learning such as conducted by Smyth, Houghton, Cooney and Casey (2012), Hofmann (2014), Park and Choi (2009), Kintu and Zhu (2016), Shraim and Khlaif (2010), Cohen, Stage, Hammack and Marcus (2012), Pituch and Lee (2006) and Vaughan (2007).

However, despite the fact that blended learning has been widely implemented in other countries, it is still at its infancy stage in Malaysia. In addition, research on the effectiveness of blended learning approach in a technical art course such as 3D drawing as well as the implementation of blended learning at secondary school level is still in vague and yet to be examined from the point of view of both teachers and students. Hence, this study seeks to uncover the potentials of blended learning approach in a technical art setting of Malaysian education system particularly in teaching and learning 3D drawing for secondary schools. From this study, the key benefits and limitations of blended learning approach with regards to its suitability, functionality, and implementation can be identified thus the best practice can be devised to implement this learning approach into technical arts subjects in secondary schools.

1.2 Problem Statement

Over the last decade, the digital and creative multimedia industry in Malaysia has changed drastically thanks to technological advancements, skill enhancements and greater ease of distribution. This can be seen in the establishment of some 220 animation studios employing some 10,193 people throughout the country and generating annual revenue of more than RM7.6 billion (Malaysia Digital Economy Corporation (MDEC), 2017). It is also reported that Malaysia's creative industry was estimated to be worth RM24 billion in 2017 based on figures from the advertising, TV and films, radio, animation, games, music, interactive software and new media segments (MDEC, 2017). In addition, the success of local animation series such as

Ejen Ali, BoboiBoy and Upin & Ipin which are among Malaysia's biggest services exports through the creative media industry shows enormous potential ahead and so more employment opportunities in this industry are expected to be created.

As stated by the Minister of International Trade and Industry Malaysia, Dato' Seri Mustapa Mohamed, a major challenge to be addressed in the expansion of the digital and creative multimedia industry in Malaysia would be the acquiring of essential infrastructure, ecosystem and skilled talents (Free Malaysia Today, June 20, 2017). According to Kamil Othman, the Vice President of MDEC, demand of creative multimedia manpower is expected to reach 53,209 in 2017. Hence, aggressive action must be taken to produce more skilled and creative talents in order to enhance capacity, capability and competency in Malaysia's creative industry and make the country a regional hub for digital content.

Since the potential of the digital and creative multimedia industry to generate jobs is clear, there are major needs for convergence of arts and science in the future education system to provide relevant human resources for the industry. However, Malaysia is still experiencing shortage of skill and talented workers for design due to lack of holistic education and training system that combines science, innovation and creativity (Creative Industry Sector Final Report, Akademi Sains Malaysia, 2015). The potential of local talent and resources in creative industry has also not been fully tapped due to lack of opportunities in local industries. Apart from that, many studies have identified that various problems related to learning visual based application in art and technical education such as animation and 3D drawing are subjected to students' lack of technical knowledge, visualization skills, creativity, motivation, attitudes and

awareness (Zdravkovic & Vian, 2000; Abdul Khalil, 2010; Othman & Lee, 2004; Ahmad Razali, 2003; Tahar, 2011).

Therefore, it is important for the Malaysian Government to collaborate with learning institutions and creative industry agencies to revamp the current education system and bring science, art and technology together to improve skills, innovation and the quality of its human capital. The integration of various learning styles such as blended learning approach can provide a platform that uses the information technology to help students get the information, knowledge and skills in art and technical courses such as 3D drawing. This approach also supports the traditional practice of face-to-face interaction in the classroom, promotes the characteristics of collaborative and self-directed learning, culture of innovation and the ability to think visually in the product creation process from the beginning to the end (Chiliban et al., 2012, Ahrens et al., 2015; Abdulrasool, 2010).

In response to this situation, this research attempts to conduct preliminary studies and pilot testing to implement blended learning approach in teaching 3D drawing for students at Sekolah Seni Malaysia, Johor and English College, Johor. The blended learning approach was implemented by blending face-to-face settings with ICT-based settings such as a multimedia courseware developed by the researcher namely 3D Blender Tutorial Courseware, online video instructions -YouTube and interactive group chat apps - Whatsapp. The purpose of this study is to evaluate the effectiveness of blended learning approach on the students' drawing skills, motivation, and learner autonomy. The outcome of the study will also determine whether students' perspectives and teachers' attitudes play a significant role in

affecting students' learning outcomes in blended learning approach. It is hoped that this study can prove whether this approach can serve as a practical and effective pedagogical practice in technical art subjects/courses particularly in teaching and learning 3D drawing at secondary school level and consequently will contribute to the effort of enhancing the capacity, capability and competency of local talents and resources in creative industry.

1.3 Objective

Generally, the main objective of this research is to investigate the effectiveness of implementing blended learning approach in learning 3D drawing among secondary school students.

Specifically, the objectives of this research are:

1) To investigate the effect of implementing blended learning approach on students' skills in 3D drawing.
2) To investigate the effect of implementing blended learning approach on students' motivation in learning 3D drawing.
3) To investigate the effect of implementing blended learning approach on inculcating students' learner autonomy.
4) To analyze the effect of students' perspectives of blended learning approach on their learning outcomes in blended learning.
5) To analyze the effect of students' perspectives of teachers' attitudes on their learning outcomes in blended learning

1.4 Research Question

Based on the problem statement above, a number of research questions are constructed to form the basis of this study.

1) How does the implementation of blended learning approach affect students' skills in 3D drawing?
2) How does the implementation of blended learning approach affect students' motivation in learning 3D drawing?
3) How does the implementation of blended learning approach inculcate students' learner autonomy?
4) How students' perspective of blended learning approach is related to their learning outcomes in blended learning?
5) How students' perspective of teachers' attitudes is related to students' learning outcomes in blended learning?

1.5 Scope and Limitation

The aim of this study is to investigate the effectiveness of implementing blended learning approach in learning 3D drawing among secondary school students. The blended learning approach in this study refers to the integration of face-to-face settings with ICT-based settings inclusive of 3D Blender Tutorial Courseware developed by the researcher, video instructions online through YouTube and interactive chat groups through Whatsapp application. The effectiveness of this learning approach is determined by evaluating the changes in the students' skills in

3D drawing (knowledge of 3D Blender program, drawing accuracy, visualization skill, and completion time), motivation in learning 3D drawing and their learner autonomy before and after learning 3D drawing using blended learning approach. This study will also determine whether students' perspective of blended learning approach and teachers' attitude play a significant role in affecting students' learning outcomes in blended learning approach by referring to Hexagonal E-Learning Assessment Model (HELAM) developed by Ozkan (2009).

Since the study will be focusing on blended learning which uses information technology for the delivery of the learning materials of 3D drawing, the students must have certain learner characteristics and backgrounds. They must have good computer competency (Kintu, Zhu & Kagambe, 2017; Lin & Vassar, 2009; Shraim & Khlaif, 2010; Abubakar & Adetimirin, 2015) and have access to appropriate technology tools and support (Park & Choi, 2009) to ensure better learning outcomes such as skills, knowledge, motivation and learner autonomy. However, the unavailability of sufficient computer facilities as well as low IT skills and lack of general knowledge on 3D drawing among students in schools in rural areas has resulted to the decision of conducting the study in schools located in a more urban area.

Consequently, this study is only limited to a small population of students from two types of school - Sekolah Seni Malaysia (Malaysian Arts School), Johor and English College, Johor Bahru. Twenty (20) students from Sekolah Seni Malaysia were selected among those who are undertaking arts and design courses which require them to have good 3D drawing skills. Another twenty (20) students from English College were also selected among those who have good computer literacy and have

interest in learning 3D drawing. For this reason, these findings cannot be generalized to the broader community based on this study alone although the result of the study can still be useful for future reference in the concerning field of interest.

1.6 Significance of the Research

As the literature shows, such a study has not previously been conducted in Malaysia, especially what is related to blended learning approach using face-to-face and online method in learning 3D drawing. Therefore, the outcome of this study can be used to determine whether blended learning approach is effective in a technical art setting particularly in teaching and learning 3D drawing for secondary schools in order to improve students' drawing skills, motivation, and learner autonomy. It is expected that the result of the study will be helpful for arts and design teachers or instructors who seek for a better approach in teaching technical art subjects by implementing blended learning in their module. The integration of blended learning in a classroom practice will gradually reduce teachers' work load making the teaching and learning process more organized, time and money efficient, more fun and flexible for students.

The study can also prove to be of immense importance as it is likely to provide some feedbacks on the drawbacks it might trigger for future consideration as well as its promising potential to support the current curriculum. From the pedagogical standpoint, blended learning has the potential to be the next educational asset that can leverage learning to expand the school as one of the leading secondary institutions in Malaysia. It will revolutionize the conventional way of learning practices conducted

in the present classroom setting elevating its current standard to be awarded as one of the best education systems in the country itself. Not only that, the system used to support the integration of technology in the classroom namely 3D Blender Tutorial Courseware, is also flexible to be used for any level of education be it primary, secondary up to tertiary levels.

1.7 Research Methodology

The study was carried out using quantitative analytical approach by conducting a performance evaluation on twenty (20) secondary school students from Malaysian Arts School, Johor and twenty (20) secondary school students from English College, Johor before and after blended learning approach was implemented. The purpose of the performance evaluation is to verify if there was any improvement of the students' level of 3D drawing skills using the 3D Blender program after the implementation of blended learning approach. This study was also carried out by conducting a survey on the students to gain their perceptions on their motivation in learning 3D drawing, their learner autonomy, perspectives on blended learning and teachers' attitudes after the implementation of blended learning approach. Data gathered from both performance evaluation and survey was analyzed using Statistical Package for Social Science (SPSS v24.0) to answer the research questions.

Secondary data analysis including journals, reports, research papers, reference books and on-line articles were also used in developing conclusions for this study. Most of the references were gathered from the libraries of Universiti Perguruan Sultan Idris (UPSI), Universiti Teknologi MARA (UiTM), Universiti Malaya (UM) dan Universiti Kebangsaan Malaysia (UKM).

1.8 Theoretical Framework

The framework of this study was developed and adapted based on Hexagonal E-Learning Assessment Model (HELAM) which was developed by Ozkan (2009). Figure 1.1 illustrates the idea about the research framework. It involves 'perspective of blended learning' and 'perspective of teacher's attitude' as independent variables, and learning outcomes consist of three dependant variables - 'skills', 'motivation' and 'learner autonomy'.

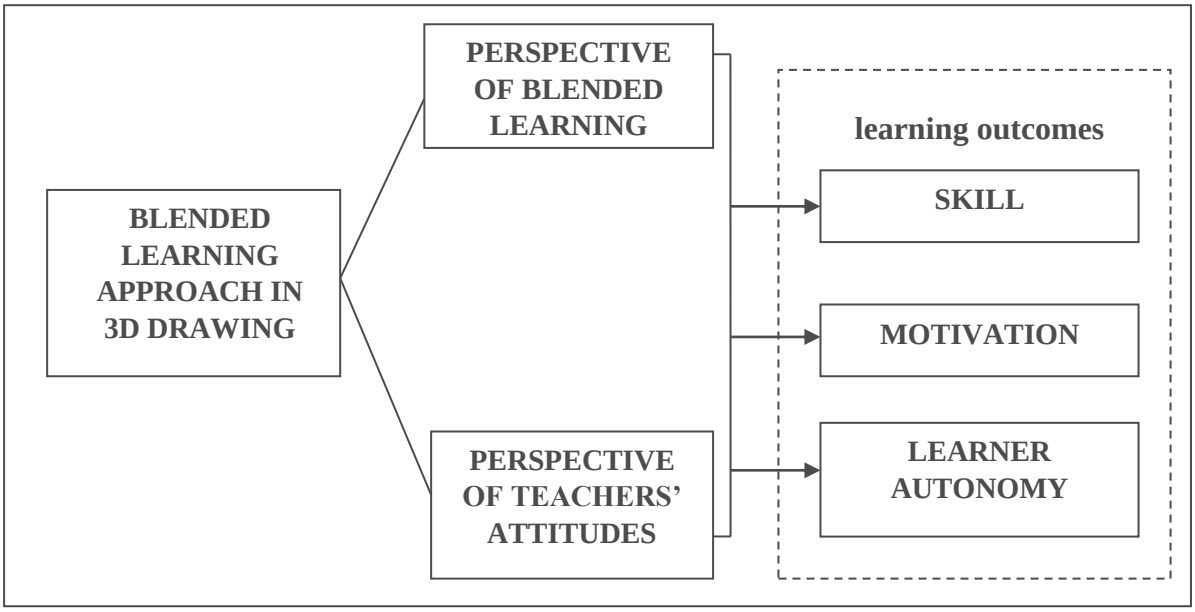

Figure 1.1. Research framework (adopted from HELAM, Ozkan, 2009)

1.9 Hypothesis

The research hypotheses developed in this study are as follows:

*H_1 - There is a significant difference in the level of 3D drawing **skills** of students before and after using blended learning approach.*

For the first hypothesis, this study will assess the improvement in the students' level of knowledge on the operation of the 3D Blender program, 3D drawing accuracy, visualization skills and time taken to complete a 3D drawing after using blended learning approach.

*H_2–There is a significant difference in the student's level of **motivation** before and after using blended learning approach.*

For the second hypothesis, this study will assess the improvement in the students' level of interest, drive, motivation and enjoyment in learning and developing more skills and techniques in creating 3D drawing using 3D software program and to be involved in creative industry in the future after using blended learning approach.

*H_3 - There is a significant difference in the student's level of **learner autonomy** before and after using blended learning approach.*

For the third hypothesis, this study will assess the improvement in the students' students' ability to manage and organize their own learning process; identify their own strengths and weaknesses in the learning process and make enrichment or improvement plans accordingly; develop interest in learning; make decisions on what,

when and where to learn; and evaluate their own learning outcomes after using blended learning approach.

*H_4 – **Students' perspective of blended learning** has a significant effect on their **learning outcomes** using blended learning approach.*

For the fourth hypothesis, this study will assess the impact of students' attitude towards blended learning and technology on their learning outcomes (which consists of students skills, motivation, and learner autonomy) in blended learning.

*H_5 – **Students' perspective of teachers' attitudes** has a significant effect on their **learning outcomes** using blended learning approach.*

For the final hypothesis, this study will assess the impact of students' perception of teachers' attitude (which consists of teachers' responsiveness, teaching style, enjoyment, availability, communication ability, interaction) on their learning outcomes (which consists of students' skills, motivation, and learner autonomy) in blended learning.

1.10 Conclusion

The study consists of five chapters. Chapter One serves as an introduction to the study. It discusses the background of the research topic, problem statements, objective of the study, research questions, scope and limitation, significance of the study, research methodology and organization of the chapters of the paper.

A comprehensive discussion on the review of previous studies related to the topic is discussed in Chapter Two. This includes the definition of terms, blended learning implementation, blended learning model, impact of blended learning approach on students/learners, impact of blended learning approach on teachers/learning institutions, issues and challenges of blended learning, and the implementation of blended learning in learning institutions in Malaysia. This chapter also includes discussion on the evaluation model used as a guideline in this study which is adapted from Hexagonal E-Learning Assessment Model (HELAM) (Ozkan, 2009).

Chapter Three starts with the discussion on the conceptual framework and hypotheses constructed in this study based on Hexagonal E-Learning Assessment Model (HELAM) (Ozkan, 2009). The discussion is then followed by explanation on the instructional design of the 3D drawing blended learning module, research design and how the performance evaluation and survey are to be carried out to gather data for the study. This includes the discussion on population, sampling plan, research instrument, validity, reliability, data collection and data analysis procedure of the study.

Chapter Four analyses the results of the performance evaluation and the survey conducted by using the SPSS (Statistical Package of Social Science) version 24.0 to measure changes in the students' level of skills, motivation and learner autonomy before and after the implementation of blended learning approach as well as to evaluate the relationship between students' perspective of blended learning and teachers' attitudes and their learning outcomes.

Finally, Chapter Five discusses a comprehensive view of the effectiveness of blended learning approach on students' 3D drawing skills using the 3D Blender program, their motivation in learning 3D drawing and learner autonomy as well as the effects of students' perspective of blended learning approach and teachers' attitudes on their learning outcomes in blended learning in order to answer the research questions developed in this study. This chapter also presents some of the recommendations for future research and better practice of blended learning approach for technical arts subjects in secondary school.