INVESTIGATING THE FACTORS INFLUENCING BLENDED LEARNING SUCCESS FOR SYSTEM ANALYSIS AND DESIGN COURSE IN UNIVERSITI UTARA MALAYSIA

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MASTER OF SCIENCE (INFORMATION TECHNOLOGY)
UNIVERSITI UTARA MALAYSIA
2016

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A dissertation submitted to Dean of Awang Had Salleh Graduate School in Partial Fulfillment of the requirement for Master of Science (Information Technology) Universiti Utara Malaysia

By
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Abstrak

Analisis Sistem dan Reka Bentuk (*SAD*) adalah salah satu kursus teras yang ditawarkan dalam program Ijazah Sarjana Muda dalam bidang Sains Komputer kerana ia keperluan untuk memenuhi syarat untuk menjadi penganalisis sistem, pengaturcara komputer dan ketua projek. Walau bagaimanapun, didapati pelajar tidak dapat menguasai secara menyeluruh subjek ini yang mana seterusnya akan menjejaskan peluang pekerjaan dan nilai produktiviti dalam rantaian pembangunan perisian. Hal ini boleh dikaitkan dengan kaedah pengajaran yang digunakan dalam pembelajaran masa kini. Dalam hal ini, penggunaan model pembelajaran teradun telah dicadangkan bagi tujuan untuk meningkatkan penglibatan pelajar dalam proses pembelajaran dan seterusnya dapat mengurangkan pencapaian prestasi yang rendah dalam bidang sains komputer. Secara khususnya, masih banyak lagi faktor-faktor yang perlu dipertimbangkan untuk mencapai kejayaan akademik pelajar bagi subjek Analisis Sistem dan Reka Bentuk (*SAD*) tetapi hal ini tidak dikaji secara empirikal dan menyeluruh. Oleh yang demikian, kajian ini mempunyai beberapa matlamat untuk dicapai iaitu; (1) untuk mengenal pasti faktor-faktor yang mempengaruhi kejayaan model pembelajaran selari dengan pengajaran dan pembelajaran *SAD*, (2) untuk mengenal pasti hubungan antara faktor-faktor kejayaan dan kejayaan akademik dalam *SAD*, dan (3) untuk mengenal pasti kesan-kesan faktor kejayaan ke atas kejayaan akademik dalam *SAD*. Bagi mencapai objektif-objektif ini, kaedah penyelidikan kuantitatif telah digunakan di mana ia melibatkan instrumen kajian yang diagihkan kepada 151 pelajar dengan menggunakan persampelan rawak mudah, dan data yang dikumpul dianalisis dengan korelasi dan regresi. Kajian mendapati bahawa sikap, tahap penggunaan teknologi, akses pelajar kepada teknologi, perisian kursus pelajar, kurikulum, pembelajaran berkualiti tentang muka sistem, kualiti kuliah, dan sistem e-pembelajaran komprehensif mempengaruhi pelajar secara positif dalam aspek kejayaan akademik dalam bidang *SAD*.

Kata kunci: Sistem Analisis dan Reka Bentuk; model pembelajaran yang disesuaikan; faktor-faktor kejayaan; kejayaan akademik

Abstract

System Analysis and Design (SAD) is one of the core courses offered in Bachelor's degree programme in Computer Science because its lessons are requisites in becoming system analyst, computer programmer and project leader. However, it is observed that students are not grasping the details of the lessons, and this is affecting their employability and the productivity value in the software development chain. This experience is linked to the presently-used teaching method. In this regard, blended learning model, which improves students' learning experience and reduces underachievement in computer science, is suggested. Specifically, the generality of the factors that must be considered to achieve students' academic success in SAD has not been adequately and empirically investigated. This study therefore aims (1) to identify factors that effect the success of blended learning model for the teaching and learning of SAD, (2) to identify the relationship between the success factors and academic success of SAD, and (3) to identify the effects of the success factors on academic success of SAD. To achieve these objectives, a quantitative research method was employed, involving administration of survey instruments distributed to 151 students using simple random sampling, and data collected were analysed using correlation and regression. The study found that students' attitude, students' technology usage level, students' access to technology, students' courseware, curriculum, learning system interface quality, lecture quality, and e-learning system comprehensiveness positively influence students' academic success in SAD.

Keywords: System Analysis and Design; blended learning model; success factors; Academic success

Acknowledgement

All praises and thanks are due to Almighty Allah, the most gracious and the most merciful for lightening my way throughout the completion of this valuable thesis.

Firstly, I would like to use this opportunity to thank my supervisor, Dr. Nor Hazlyna Harun, who helped me immensely throughout the completion of this thesis. I thank her for all advice, encouragement, guidance and much needed support. A special thank is also dedicated to my father and brothers, for their encouragement and rendered assistance. In addition, I would like to extend my greatest and deepest appreciation to my wife who also selflessly contributed her time, effort and ideas in ensuring the completion of the thesis. I express my deepest thanks to Ministry of Education, Iraq, for helping and supporting me with necessary advice, guidance and facilities.

Last, but not least, special thanks to all staff of School of Computing, College of Arts and Science, Universiti Utara Malaysia, and those that contributed directly and indirectly towards the success of my study.

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter introduces this study by discussing its background, and gives the general overview of the study and its necessary details. System Analysis and Design (SAD) as a core course of computer science students and its teaching and learning difficulties are discussed as it affects the 21st century labour market demand. It highlights the problem statement to be solved, which is lack of clear and valid elicitation of the success factors for the teaching and learning of SAD. The research questions and objectives which are to be answered and accomplished respectively are also listed. This chapter also highlights the scope of the study which shows its delimitation. The significance of the study and the contributions are also discussed. The variables and key terms investigated in this study are defined and operationalised in view of the specifics of the study.

1.1 Background of the Study

System Analysis and Design (SAD) is one of the core courses offered in many Bachelor's degree programmes in Computer science and its related fields like Information Technology (IT) and Information Systems (IS) (Emre, 2014). SAD course synopsis usually centres on analysis of computer components and functionalities related with the users' actions and the requirement delivery (Dennis, Wixom & Tegarden, 2015).

In an ideal software engineering job chain, SAD would be done before the art of writing codes to instruct the computer functionalities. These functionalities are expected to have been analysed with uses cases attached to their respective actors, and identified conditions and

constraints. In other words, SAD presents a traditional, technical and international standard of analysing and communicating the functional and non-functional requirements and system's working mechanism to the entire software engineering team generally, and to the computer programmers specifically (Bennett, McRobb & Farmer, 2010; Mohammad, 2006). The need to understand these job roles is the core objective of learning SAD. It suggests why the course is one of the broad courses in computing, and why it is also difficult to teach (Emre, 2014; Topi et al., 2010).

Acquiring the course objectives of SAD lessons has mainly been through collaborative, peer and interpersonal learning among the students, using their group projects and assignments as a way of applying the taught lessons. Through this, the learnt classroom methodology, analytical and problem-solving skills, and technical communication and fact-finding skills are utilized (Emre, 2014; So & Bonk, 2010).

Notably, with the emergence of electronic learning tools and infrastructure, teaching and learning university courses generally have been made easier, accessible, functional, and more result-oriented (Chen, Kinshuk, Wei, Chen & Wang, 2007; Marika, 2011). Online learning has many advantages like 24/7 delivery, interactivity, feedback and online assessment, but it is credited for high student drop out (Birchall, 2005). To attend to this limitation, the new paradigm of learning model among educational and instructional technologists is blended learning. It is argued to be the 21st century learning model that can develop students' skills and knowledge base (Emre, 2014; Poon, 2013).

Blended learning involves a mix of both virtual delivery and the traditional classroom instructional mode (Marika, 2011; Emre, 2014). The technology-based learning from distance is supported with face-to-face teaching. According to Poon (2013), the mix of the two different learning modes complements each other and also prevents possible decline in

students' learning experience as a result of students' diversification and increased enrolment. This presents the overall expectation from the implementation of blended learning model, and the relationship between blended learning, students' learning experience and academic success.

In specific terms, as it relates to SAD teaching and learning, the stakeholders (students, lecturers and higher education institution policy makers) need to explore the technological, pedagogical, and human factors that influence the success of blended learning.

1.2 Problem Statement

System Analysis and Design, as a software engineering course, is broad, complex and thus difficult to deeply understand (Rainalee, 2012). Holmes et al. (2002) indicated that SAD is offered up to three semesters in many undergraduate programs because of the difficulty and the breadth. Also, many students are reported to fond of learning the peripherals of the course, without qualitative understanding of its details and ability to translate lesson learnt to practical usage (El-Zakhem & Melki, 2013; Rainalee, 2012). It is also reported that SAD is not taken with much importance as computer programming course, and this later negatively influences the students' employability chances (Abdul Hamid, Ragikul, & Abd Manaf, 2014). Employment of systems analysts is projected to increase by 20% during 2008 and 2018 (Guidry, et al. 2011), and to achieve this, qualitative teaching delivery is key. These implications of deficient teaching and learning method of SAD are the basis for arguing for a new model, and necessary investigation of its success factors

Improving students' achievement in SAD is posited to be possible through a reworked instructional delivery methodology by the adoption of blended learning as a 21st teaching and learning method (Emre, 2014). Blended learning model improves the students' learning

experience (Emre, 2014; Lanning, Martin & Villeneuve-Smith, 2008). Alonso, Manrique, Martinez and Vines (2011) also described how blended learning reduces underachievement in computer science. Notably, the implementation of blended learning is positively related to students' achievement (Tang & Pan, 2008; Al-Otaibi et al., 2012; Behjat, Yamini, & Bagheri, 2012; Kim, 2014). However, it is observed that the generality of the factors that must be considered to achieve this positive result, specifically students' academic success in SAD, has not been adequately and empirically investigated.

Blended learning model for teaching and learning SAD in this 21st century has not been comprehensively assessed in view of identifying the success factors that affect the students' academic success in the course (Emre, 2014). This implies that implementation of blended learning model for successful teaching and learning of SAD is currently understudied. According to Lim and Morris (2009), King and Arnold (2012) and Brooke (2015), identifying the success factors is essential in building blended learning models. This further means that education policy makers on instructional technology and learning delivery should identify the human, pedagogical and technological factors to be considered while implementing blended learning for the teaching and learning of SAD. This is essential for actualization of students' academic success in the course.

1.3 Research Questions

The research questions to be answered by this study are:

1. What factors effect the success of blended learning model for the teaching and learning of SAD?
2. What is the relationship between the success factors and academic success of SAD?
3. What are the effects of the success factors on academic success of SAD?

1.4 Research Objectives

The research objectives to be achieved by this study are:

1. To identify factors that effect the success of blended learning model for the teaching and learning of SAD.
2. To identify the relationship between the success factors and academic success of SAD.
3. To identify the effects of the success factors on academic success of SAD.

1.5 Scope of the Study

This study will identify factors that influence the success of blended learning for teaching and learning SAD. The factors are elicited based on literature review of past related studies. These factors are the independent variables of this study's conceptual model, while students' academic success in SAD is the dependent variable. The model will be evaluated through the students' perspective. This implies that, students who have taken or currently taking SAD as a course in either their undergraduate and postgraduate programs are respondents. These students will be administered the questionnaires.

1.6 Significance of the Study

This study will assist all the stakeholders i.e. teachers, students and policy makers in identifying the success factors of blended learning for SAD. This will guide in positioning their respective learning, teaching and policy strategies to achieve improved students' experience through blended learning by ensuring the factors are duly attended to.

1.7 Definitions and Operationalization of Terms

The operationalized definitions of the core terms used in this study are provided below. These terms are blended learning success factors, blended learning models, academic success in SAD, attitude, technology usage level, access to technology, courseware, curriculum, learning system interface quality, teaching quality and learning system comprehensiveness.

1.7.1 Blended Learning Success Factors

These are factors that are antecedents of blended learning success. The success is often measured by the academic performance of students who receive learning through the blended learning model (Abdul Hamid, Ragikul, & Abd Manaf, 2014), or students' satisfaction evaluation of the model (York, Gibson & Rankin, 2015). In this study, blended learning success factors are antecedents for the success of blended learning in the teaching and learning of SAD.

1.7.2 Blended Learning Models

The blended learning models are conceptual description of the relationship between the processes involved in blended learning (Bersin, 2004; Staker & Horn, 2012), or the relationship between its constructs in its formation and implementation for a particular course of study (Chew, Jones & Turner, 2010; Delialioglu, 2012). In this study, blended learning model is the conceptual representation of the relationship between the success factors of blended learning and students' academic success in SAD.

1.7.3 Academic Success in System Analysis and Design

Academic success in System Analysis and design is defined with the students' ability to score not less than B grade in the course, and/or to secure internship due to the students' proficiency in the course as judged by the employer (York, Gibson & Rankin, 2015).

1.7.4 Attitude

This is defined as the students' attitude to technology used in the teaching and learning of SAD and to the learning of the course in specifics (Rosen et al., 2013).

1.7.5 Technology Usage Level

This is defined as the extent to which the students use their mobile phone and PC for learning purpose (Rosen et al., 2013). It is measured with the previous usage of these technologies for learning by listening to lectures on podcasts, watching lecture videos, answer quizzes, among others

1.7.6 Access to Technology

This is defined as the rate at which the students can access mobile phone, internet, multimedia, software, and podcast for learning purposes (Rosen et al., 2013).

1.7.7 Courseware Quality

This is defined as the quality of the lecture materials, presentation slides, and textbook provided for the learning of SAD (Sharma & Barrett, 2011).

1.7.8 Curriculum

This is the content and structure of the lessons designed for the teaching and learning of SAD (Wang & Wang, 2014).

1.7.9 Learning System Interface Quality

The learning system interface quality is defined as the interface ability to depict readable text, visual-appealing images and graphics, and users-centered interactivity (Draffan & Peter, 2006).

1.7.10 Lecture Quality

This is defined as the quality of lecture provided through the e-learning system and the traditional face-to-face classroom (Tan & Pan, 2008).

1.7.11 E-Learning System Comprehensiveness

This is defined as the extent at which the learning system comprises of the needed components and functionalities (Tang & Pan, 2008).

1.8 Expected Research Outcome

The major contribution of this study is its blended learning success model for SAD. It provides a valid perspective and deeper insight into the understanding of blended learning success and its antecedents to students' academic success. From this success model, pedagogical and instructional strategies can be well-crafted for the performance improvement of students' performance in SAD.

1.9 Summary of the Chapter

This chapter introduces the study on blended learning for students' academic success in SAD. It describes the characteristics of blended learning and how it is regarded as a better learning model because it combines the traditional and virtual classroom approaches for complementary roles. The inadequacy and limitations of previous studies, especially the lack of empirical model on the success factors for SAD is stated as the research problem to be addressed. This is further simplified to research questions and objectives. The scope of the study which delineates the boundary of the study is also illustrated. Lastly, the significance and contributions are discussed.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter, as the literature review of this study, discusses scholarly works on blended learning and its models, application of blended learning model in the teaching and learning of SAD and blended learning model's success factors. The explanation of blended learning is given with due consideration of earlier developed models. Also, how blended learning can drive students' academic success in SAD is posited with attention to its contributing factors.

2.1 Blended Learning

This section defines learning as a process of knowledge creation and skill acquisition. It discusses blended learning, its evolution from traditional face-to-face learning method, the emergence of online and virtual learning communities and systems, and how the combination of both becomes a preferable approach. The blended learning models were also reviewed so as to situate the focus of this study.

Learning is known as a process where new knowledge, skills and habits are gained (Kuhlthau, 2010; Wirth & Perkins, 2008). The Bloom's Taxonomy (1956) was used as a system of classifying learning outcomes where knowledge, application, analysis, synthesis and evaluation are the main areas. This classic study was later further developed by Biggs (2007). Biggs developed Structure of the Observed Learning Outcome (SOLO) Taxonomy which highlighted the importance of measuring students' performance development during the implementation of the learning program. It is believed that student outcomes have higher quantitative and qualitative structural complexity through the process of new knowledge

acquisition. There have been new approaches to learning and development of employable skills (Abdul Hamid, Ragikul, & Abd Manaf, 2014; Lanning, Martin & Villeneuve-Smith, 2008). The learning skills are expected to be either analytical or flexible i.e. confidence, self-discipline, communication, collaboration, reflection etc. (Huang, et al., 2010). Therefore, learning process which is typically the traditional face-to-face learning set-up is engineered to ensure accomplishment of the learning outcomes.

However, with the advent of information and communication technologies (ICT), learning process is witnessing a remarkable progress and advancement through the adoption of e-learning system (Almarabeh & Mohammad, 2013; Olson et al., 2011). E-learning systems are ICT tools and items like web-based systems, mobile applications, multimedia and hypermedia software which are used for the purpose of learning (Almarabeh & Mohammad, 2013). According to Brooks (2000), IT infrastructure is the basis on which the knowledge is created through acquisition, transfer and the usage of information. The adoption of these tools has made learning easier and more accessible (Olson et al., 2011; Almarabeh & Mohammad, 2013). E-learning has played an important role in the society is also reflected by giving attention to a learning environment which promotes the opportunity for communication and also collaboration to a maximum level (Eison, 2010; Warger & Dobbin; 2009).

In the same vein, researchers have identified the limitations in e-learning process as a substitute to the traditional face-to-face method (Ya Ni, 2012; Eison, 2010). Therefore, blended learning method which combines both e-learning and traditional face-to-face is being promoted as better means of teaching and learning because it attends to the limitations of each of the learning modes and presents a comparative advantage (Ya Ni, 2012).

Blended learning had been widely proposed in various research groups, and close to this is Computer Supported Collaborative Learning (CSCL) suggested by Koschmann (2002). It had been regarded as the most effective method because it highlights a meaningful context of joint activities which are also assisted by technology (Eison, 2010). There are two crucial aspects which are emphasized in this method i.e. collaborative learning and computer, and this is essentially supported by the blended learning method.

In the CSCL context, as supported by blended learning model, all the members would interact through the computers and the learning environment is specifically conducted in the computer environment (Eison, 2010; Powell et al., 2015). However, one of the drawbacks observed in CSCL is the coordination of traditional and online communication in improving the teachers' and students' cooperation. Therefore, measures must be taken especially in synchronizing what the students will experience which usually occurred in different time phase and context especially in integrating and maintaining a continuous learning process (Eison, 2010).

Nowadays, it can be observed that the computer-mediated communication is widely used in teaching (Powell et al., 2015). It is also believed to have the potential of substituting the traditional way of teaching which involves direct interaction between the teacher and the students (face-to-face interaction) especially when it involves the distance learning (Warger & Dobbin; 2009; Eison, 2010). As claimed by Olson (2002), the wide use of online environment in the teaching process and the flow of learning cannot be ensured to be absolutely productive and result-oriented.

Although the use of ICT in the learning process limits the students' option, it is seen as a useful and effective strategy to lessen the socio-cognitive burden among the students (Powell

et al., 2015; Ya Ni, 2012). The combination of the blended learning model will therefore promote many benefits to the students through presentations, simulations and visualization with high quality resources and effective and productive classroom conversation (Powell et al., 2015).

Blended learning has been said to be competitively advantageous because it offers seamless communication, flexibility and time efficiency (So & Bonk, 2010; Powell et al., 2015). On the other hand, complexity is identified as a pitfall for blended learning. Therefore, teachers must be trained and online communication competence between the students and teachers must be built. According to So and Bonk (2010), 68% of the study's respondents agreed that the future of learning belongs to blended learning, but suggested deep analysis and understanding of the blended learning models in view of designing a befitting one for the subject in question

2.1.1 Blended Learning Models

Many studies have worked on blended learning models, in view of proposing a generic template for researchers and practitioners (Staker & Horn, 2012), describing functionalities of blended learning models' components (Bersin, 2004; Staker & Horn, 2012), or conceptualizing domain or study-specific blended learning models (Huang, Ding & Haisen, 2008; Delialioglu, 2012; Chew, Jones & Turner, 2010; Draffan & Rainger, 2006; Graham, Henrie, & Gibbons, 2014).

A generic model for blended learning, called Blended Learning System Structure (BLESS) was proposed by Staker and Horn (2012). The model which is sub-categorised into four types is to support researches and practical implementation of technology for blended learning

based on design pattern that supports reuse and implementation of learning models. The types are rotation model, flexible model, independent model and virtual model.

In rotation model, the course content has alternate modalities which are either traditional or online. The activities in this model are lectures to be given to the students, projects conducted in groups, mentoring, and assignments. The flexible model, on the other hand, deals with the content to be primarily presented to the students through the internet. For the independent model, the students will need to select one or more online courses as supplementary for the existing traditional teaching method. The virtual model is a model which represents the entire teaching in reference to the combination of traditional teaching method and also the online contents that the students find from home.

On the other hand, it is important to note that, the quality of teaching and learning through blended learning model can only be successfully achieved by ensuring that the process is shaped in reference to the real needs, in terms of the curriculum design, while technology serves as assistive and complementary mechanisms in its delivery process (Bersin, 2004; Huang, Ding & Haisen, 2008).

Bersin (2004) proposed two generalized approaches for blended learning. These are: (i) Program Flow Model; and (ii) Core and Branching Model. Program Flow Model was introduced by sequential curriculum in which it deals with integrating more media in a chronological manner. Students have the opportunity to plan their learning besides feeling more motivated to contribute greater involvement in the classroom. This approach is also believed to be easily tailored to the needs of the students and also the teachers. Core and branching model, in its own form, deals with fundamental teaching which includes the use of additional materials and resources, either optional or obligatory. Students can decide on their own on the additional materials that they wish to use and there is also no restriction for them

in using the new materials for the implementation of the course as long as it helps in the process of learning.

Huang, Ding and Haisen (2008) provided a blended learning curriculum model to attend to lack of clarity in the design of blended learning curriculum (BLC), and thus proposed a BLC design model, activity model, and process model. The design model presents an assessment design which depends on the teaching activity, performance definition, learning objectives and general environment of the blended learning. The design model assesses the learning process (for example, using e-portfolio), examines the curriculum knowledge (e.g. online tests), and organises the learning activities.

Huang, Ding and Haisen's activity model is built on the principles of instruction of learning theories, and how this can be used in designing problem-based and learning-centred activity. It has four main components which are (i) Lead-in, (ii) Planning, (iii) Acting, and (iv) Reviewing. The process model details how processes of the instructional activities are performed, with each captured in one of the three modules. Module one is curriculum lead-in, module two is the instructional and learning activity, and module three is the review and assessment. Also, other studies on blended learning models are conceptualised models to characterize students' engagement style in a blended learning platform (Delialioglu, 2012), learners' characteristics (Draffan & Rainger, 2006), and a highlight on the connection between education and education technology (Chew, Jones & Turner, 2010).

Delialioglu (2012) investigated how blending model affects students' engagement, using single group repeated measure. The study found that active learning tool and total time on task indicator of student engagement through the blended learning model were significantly higher in the problem-based, while interaction and level of academic challenge did not show any difference. Draffan and Rainger (2006) presented an absolute perspective to a more

inclusive learning approach for all learners irrespective of their learning disabilities. The study then proposed blended learning model for identifying challenges from learners' characteristics, teaching and learning environment, interaction and activities. These studies present a good approach towards understanding antecedent factors to the success of blended learning model.

According to Draffan and Rainger (2006), the students' physical, sensory and perceptual skills and abilities, attitudes, coping strategies, prior knowledge and proficiency in the use of technology are learners' characteristics and the courseware and quality of the technology are Learning and teaching environment. The interaction is the interactivity content of the e-learning system, and the examples of the activities are like discussion, collaborative learning and feedback experiences. Even though to Draffan and Rainger opined to have proposed their model for students with learning disabilities, the suggested components are befitting for all students to have pleasant learning experience.

Blended learning models are therefore compositions of strategies needed to implement result-oriented blended learning, the process flow of teaching and learning and their systematic mix, or highlight of factors to be considered for successful adoption of blended learning approach. This can be generic or specific. This study's objective, which is its conceptual model development, falls under the category of highlight of factors to be considered for an academic success-driven blended learning model. Specifically, it is the blended learning success factors for SAD.

2.2 Application of Blended Learning Model in Teaching and Learning System Analysis and Design

This section discusses the applicability and implication of blended learning model in the teaching and learning of Systems Analysis and Design (SAD). It explains SAD as Information System (IS) course, its importance in training programmers, business analysts, among others. Also, the difficulty experienced in the learning of SAD and why its teaching method, especially with the adoption of blended learning model, must be designed to achieve students' academic success.

2.2.1 System Analysis and Design (SAD) as Information System Course

Topi et al. (2010) defines SAD as a course that discusses the techniques, tools, processes and methods used by organisations in designing electronic systems that support the conduct of their businesses. It also treats systematic methodology for business analysis, problem, opportunity and the critical success factors in the adoption of information technologies. SAD presents and teaches the alternative approaches to acquire technological capabilities in addressing and specifying the business requirements for the information systems solution in particular, in-house development, development from third-party providers, or purchased commercial-off-the-shelf (Topi et al., 2010; Bennett et al., 2010).

According to Emre (2014), SAD course plays an important role in many Bachelor's degree programmes in computing and other related fields. SAD is a broad perspective course, and has impacts on other courses. Its lessons on requirement analysis and subsequent translation to diagrams like actor diagrams, sequence diagrams, communication diagrams and class diagrams, make the course practical-oriented and problem-solving-centred. It helps in

preparing students for job roles such as IT project manager, business analyst, and systems analyst or developer.

The study of SAD in industry and universities had been evolving over the decades, and the objectives are to allow the students to analyse the simple and complex information, identify the requirements as well as documenting the design solutions by utilizing the appropriate and suitable methods, tools and also standards (Pelz, 2004). Besides that, SAD course covers major concepts of modelling, and enables the students in developing and documenting their solutions using modelling/diagramming process with diagrammatic representations that is universally understood by technical practitioners in software engineering (Bennett et al., 2010).

On another hand, Information System (IS) faculty posited that teaching SAD courses requires an understanding of IS theories and concepts, and its application which are often difficult to teach to students because of the rapid change in Information Technology (IT) (Stephen & Margaret, 2001). These theories and concepts are especially difficult for students to learn because ambiguity dominates their learning spaces. For example, information gatherings, identification of a business problem or opportunity, proposal of a solution to problem, and consequent design of solution, as well as the deployment of the solution to the users are core activities that must be grasped (Bacon & Brian, 2001). In the final stage, SAD illustrates how continuous improvement with due attention to users' feedback to the development team can be utilized for system optimization and maintenance (Hirschheim, Klein & Lyytinen, 1996). All these learning deliverables have made teaching and learning SAD difficult and tasking.

In view of this, teaching SAD has been often supported by group assignment that provides a valuable interpersonal learning experience and an intensive opportunity for students to apply their newly learnt methodology, tools, and variety of skills, such as communication and fact-

finding (Emre, 2014). In order for it to be utilized correctly and efficiently, systematic teaching and learning need to be emphasized besides taking into account about benefiting from new technologies (Emre, 2014; Pelz, 2004). But with reported limitation in absolute adoption of technologies such as e-learning management systems (Emre, 2014), teaching and learning SAD through blended learning is suggested.

2.2.2 Teaching and Learning Systems Analysis and Design (SAD) Through Blended Learning Model

Teaching and learning SAD through blended learning is dissected in Emre's (2014) "*A Critical Inquiry: Teaching Systems Analysis and Design Beyond 2015*." The study posited that with the 21st century student-centred learning method, practical demonstrations of knowledge acquired must be made by the students. This is supported by Boud and Prosser (2002) which emphasised teachers' roles in encouraging learners' reflection, self-monitoring and practical demonstration. In learning SAD, these student-centred core values must be further emphasised because of the gravity and sensitivity of the job responsibility of a system analyst in the 21st century (New Zealand Ministry of Business, Innovation and Employment, 2014). This is essentially what blended learning, being a combination of both online and traditional face-to-face learning methods, wants to achieve.

According to Pelz (2004), in blended learning and its pedagogical composition, the teacher would allow the students to do most of the work. Simultaneously, the teacher still needs to display a cohesive and affective presence, and the course with clear content structures and guidelines. The teacher is responsible for providing constructive feedback, which involves monitoring and negotiating with learners. Interactivity between everyone through collaborative learning system is also pivotal through online delivery, and the teacher would

use engagement strategies to increase students' attention, curiosity, and involvement through the traditional face-to-face teaching method.

Emre (2014) further stated that, apart from necessary update that must be done in the SAD courseware, blended learning should be further supported in delivering SAD. This is said to be essential in achieving competitive advantage in the labour market. Although the study discussed few other factors like quality of technology and its usage in achieving result-oriented teaching of SAD, they were not empirically tested. It does not also consider the non-technology factors which will contribute to the overall success of blended learning for SAD.

2.3 Blended Learning Model Success Factors and System Analysis and Design

Success factors of blended learning model are elicited factors that are suggested by literature review to be related with academic success. In this study, they are the independent variables which are hypothesized to be related with students' academic success in SAD. Impliedly, the blended learning model success factors for SAD are variables suggested by literature review to be related with students' academic success in SAD.

To start with, previous related studies on the role of blended learning model in academic success and/or teaching success of some courses are reviewed. It is to set a background for the success rate in the adoption of blended learning model and highlight the domain gap (i.e. none has yet to be conducted on SAD) that this study attends to. The success factors are then reviewed as suggested from literatures, and on that basis, hypotheses to be tested are developed.

2.3.1 Review of Previous Studies on the Effect of Blended Learning on Enhanced Learning Experience

There are also remarkable studies that were conducted to investigate the role and effect of blended learning on certain learning experiences. This review covers English language learning (Al-Otaibi et al., 2012; Alshwiah, 2008; Banados, 2006; Behjat, Yamini, & Bagheri, 2012; Tang & Pan, 2008; Kim, 2014), media literacy (Morisse, Ramm, Schuler, & Wichelhaus, 2009), computer science (Alonso et al, 2011), programming lesson (Ning & Wuzi, 2011; Yongxing, 2008; Hadjerrout, 2008; Selvi, & Perumal, 2012), information and communication technology (ICT) (Debnath, Rahman, Bashir, & Hossain, 2014), and computer networks (Shen, Gao, & Ning, 2014; Zhi & Ya, 2014). Others are Hoic-Bozic, Dlab, and Mornar (2015) on Web 2.0, Nygaard, Bihn, and Shanaberger (2012) on oil drilling and safety, Neumann, Neumann, and Hood (2011) on Statistics, and Gagnon, Daniel A (2014) for Economics.

Blended learning method is found to positively effect English language listening test performance (Al-Otaib et al., 2012), improve English language reading comprehension (Behjat, Yamini, & Bagheri, 2012; Kim, 2014), and enhance English language writing skill (Keshta & Harb, 2013). Other studies supported the applicability and success of implementing blended learning for teaching and learning English language (Alshwiah, 2008; Banados, 2006; Tang & Pan, 2008).

Also, blended learning method has been found to increase students' competence in media literary (Morisse, Ramm, Schuler, & Wichelhaus, 2009), computer science (Alonso, Manrique, Martinez, & Vines, 2011), programing and network administration lessons (Hadjerrout, 2008; Ning, & Wuzi, 2011; Selvi & Perumal, 2012; Shen, Gao & Ning, 2014; Yongxing, 2008; Zhi & Ya, 2014). Blended learning model has also been reported to have

enhanced lesson delivery and learning experience in oil drilling and safety (Nygaard, Bihn, & Shanaberger, 2012), Economics (Gagnon & Daniel, 2014), and Statistics (Neumann, Neumann, & Hood, 2011).

Notably, all the studies supported the claim that blended learning model improves teaching and learning experiences and the learners' success rate, as the case may be. This strongly suggests that implementation of blended learning model for SAD will also improve the teaching and learning experiences, and the students' academic success. Therefore, identifying the details of the success factors for the implementation of the blended learning as highlighted by Draffan and Rainger (2006), Delialioglu (2012), and Huang, Ding and Haisen (2008), will be required. This will also attend to the limitation of Emre (2014) which is sole work accessed on the implementation of blended learning model for the teaching of SAD.

2.3.2 Blended Learning Model Success Factors for System Analysis and Design

The success factors of blended learning model for SAD to be reviewed are attitude, technology usage level, access to technology, courseware, curriculum, and interface quality of the e-learning system, lecture quality and e-learning system comprehensiveness.

a. Attitude

Attitude of the learners has been suggested as a factor that influences successful learning experience (Sakaran, Sakaran, & Bui, 2000; Rosen et al., 2013; Sharma & Barrett, 2011; Konradt et al., 2003; Draffan & Peter, 2006; Natasa, Mornar, & Boticki, 2009; Tang & Pan, 2008). This attitude could be either to the pedagogical model of the teaching and learning (Sharma & Barrett, 2011; Konradt et al., 2003; Draffan & Peter R, 2006), or to the technology used in the learning process (Natasa, Mornar, & Boticki, 2009;Sharma & Barrett, 2011; Tang & Pan, 2008).

Students are opined to be of different attitudinal features toward learning method and/or technology, as caused by different reasons ranging from their childhood learning habit, personal innate traits and social background (Agabrian, 2007; Miller, 2005). This implies that certain students learn efficiently better through practical hands-on engagement than classroom tele-guided approach, and students from more socioeconomically better family will find learning through technology better than others. These factors are responsible for students' attitudes toward technology and learning model and would affect the students' handling of blended learning model too.

The students' attitude towards the blended learning model, the students' attitude towards technology usage for learning, and the learning systems for cooperative and collaborative learning are the conceptualized characteristics of the learners' attitude in this study.

b. Technology Usage Level

Technology usage level of the learners is reported to be positively related and influences the success rate of online learning model (Draffan & Peter, 2006; Rosen et al., 2013; Sharma & Barrett, 2011). Draffan and Peter (2006) explain that e-skills that are instrumental to knowledge acquisition and construction, ability to use appropriate technology and possession of requisite knowledge about e-learning, assistive technologies for learning are influential to the success of online learning. This implies that students who have been adequately exposed to technology and possibly used it for previous learning exercises will find it more resourceful and efficient.

Therefore, since online learning which is leveraged with technology is an integral part of the blended learning model, the extent at which the students learning SAD can use technology, the school online learning systems and other associated IT tools is posited to influence the students' academic success.

c. Access to Technology

Learners' access to appropriate technology in a blended learning environment is a factor to successful implementation of the blended learning model (Rosen et al., 2013; Sharma & Barrett, 2011; Tang & Pan, 2008). It is generally known that technology must be leveraged for the implementation of blended learning model, the e-learning system which is usually web-based, is not the only necessary technology for teaching and learning medium. There are several others like strong internet broadband, podcasts, multimedia-PC-classroom setting, learning assistants, digital devices, etc. Sharma and Barrett (2011) hinted that the learners' access to technology must be all encompassing.

From the common web-based e-learning system, strong internet broadband, to podcasts, to multimedia-PC-classroom setting, learners must be exposed and must be able to access all round technology for successful learning delivery through blended learning model, and enhanced learners' experience (Tang & Pan, 2008). Learners, and in this specific case, the students of SAD, must have access to all range of technologies for consolidating and complimentary roles in the process.

This study argues that for successful implementation of blended learning model for the teaching and learning of SAD, the students must be able to access different range of educational software, multimedia and ICT, among others.

d. Courseware Quality

The learning resources, especially courseware materials, which are always designed to convey the learning deliverables of the studies influence learning success (Sharma & Barrett, 2011; Tang & Pan, 2008). These materials are essentially used in guiding the students to learn the course content and delivering the stated learning objectives. On this note, they must

be success-oriented (Sharma & Barrett, 2011). Tang and Pan (2008) reported that internet-based teaching pattern stresses rich teaching resources and computer aided instruction courseware. The study highlighted the essence of rich learning resources and support learning material as factors of successful implementation of internet learning model. It emphasises that with rich courseware, the students will have the chance of studying independently in with their comfortable planning.

This study therefore argues that, since the richness of the courseware is a factor for successful implementation of internet learning platform, and internet learning platform is an integral component of blended learning, it is safe to propose that courseware will be a factor for successful implementation of blended learning model for the teaching and learning of SAD.

e. Curriculum

The content of course curriculum is a factor that determines the success of the course and the entirety of the program (Draffan & Peter, 2006; Guidry et al., 2011). Wang and Wang (2014) categorically stated that the curriculum of SAD, being part of Management Information System (MIS) programs, affects a wide range of issues like stable low enrolment. The curriculum, in this instance, addresses the topics to be taught, the scope and details, and their connections with the learning deliverables. The importance of SAD curriculum to positively influence choice of advanced information technology courses is emphasised (Natasa, Mornar, & Boticki, 2009). The study requested for the redesign of the curriculum for the teaching of information systems courses generally, and SAD specifically. This implies that curriculum of SAD is not only suggested to be presently wrongly-designed in face new job realities, but also an important factor in successful learning and teaching experience.

This study therefore argues that, with the emphasis in the curriculum of SAD in view of maintaining global labour demand and learning objectives, it will be a factor for successful

implementation of blended learning model. The courseware to be given to be students must comply with 21st century curriculum design.

f. Learning System Interface Quality

The quality of the interface of the learning system is said to be a factor in successful usage of the system, and by extension, the enhanced learning experience which is its purpose (Natasa, Mornar & Boticki, 2009; Tang & Pan, 2008). Quality interface is an important factor in systems' usability and satisfactory users' experience (Draffan and Peter, 2006; Sheneiderman & Plainsant, 2010), and this is extensible to e-learning system, being a typical example of user-centered technology. This instructs that the end result of technology usage and its ability to achieve the set objectives, which in e-learning system is successful learning experience, depends on its interface quality.

Draffan and Peter (2006) posited that if e-learning interactivity is limited, and basic usability issues are not well treated, the students will feel overwhelmed of the disposable amount of information provided by the system, or feel uninterested in the usage. There are instances whereby the amount of effort needed in operating the system will be burdensome due to poor interface design. This will therefore leads to information overload, and the students will hardly gain from the e-learning system. The content is suggested to be highly readable, navigable, and linked with a befitting environment that supports the learning module.

Also, incorporation of 'drag and drop' in the online assessment system, and all other enabling assistive features for users of visual or hearing disabilities will enhance the system usability (Marchionini, 1991; Natasa, Mornar & Boticki, 2009). This study therefore argues that, with the essence of learning system interface quality in the usability and usefulness of the system, it determines the success of blended learning model which depends on the e-learning system for knowledge delivery.

g. Lecture Quality

The flexibility that blended learning has in terms of the mix of on-line learning and elements of traditional face-to-face learning makes it to be successful than typical lone approach of lecture delivery. However, how the lecture delivery mode combines the various pedagogical approaches (e.g., constructivism, behaviourism, cognitivism) to produce an optimal learning outcome with or without educational technology is a success factor (Tang & Pan, 2008). An instructional practice, which can also be described as lecture quality, is reported to positively influence students' learning. This experience is equally observed in the inability of university lecturers with less teaching experience to effectively communicate to students' needs and understanding, because of their poor lecture quality (Barry, 2010; Bett, 2014).

Quality of teaching is the preparation and knowledge of the educator, and also the content to be delivered to the learners (Heck, 2008). The qualities that can drive the lecturers' efficiency are expected to be all inclusive of the educational philosophy and teaching integrity. The professional quality and teaching strategies, which can be learned or improved, influences academic success and improves teaching experience (Al-Barwani, Al-Ani & Amzat, 2012). Studies have established that teaching effectiveness which is almost measured by lecture quality is a factor in improving students' learning experience and the academic outcome. Teaching and learning are process of strong relationship and they collectively measure good teaching and students' learning outcomes (Elmore, 2010).

This study therefore argues that, with due attention to instructional technologies where necessary, the quality of the lecture delivered through the blended learning model is a factor to the success of the model. In the teaching and learning of SAD, instructors should ensure that lecture deliveries are done with due consideration to befitting pedagogical dictates.

h. E-Learning System Comprehensiveness

Computer technologies help both teachers and students through interaction that can be achieved with live virtual classroom and self-paced instruction. The learning system, through video streaming, audio and text, allows educational goals to be timely and adequately achieved (Draffan & Peter, 2006). However, Tang and Pan (2008) noted that the learning system must be comprehensive enough for the blended learning model to be successful. Being comprehensive is defined as comprising of the totality of the e-learning components which are user management system, discussion system, toolkit of platform, teaching evaluation system, course management system and material database system.

According to Tang and Pan (2008), the toolkits of platform ensure that lessons are delivered with clarity for all students to understand in spite of their language deficiency. It also supports instructors that are not well-skilled at multi-media technology and Internet application. The user management system verifies the different types of users, and therefore provides personalized learning opportunities when necessary. The teaching evaluation system evaluates the teaching effect and students can use it to identify their grades. The discussion system allows students and teachers to interact and students can receive feedback on any questions or inquiries that are earlier posted. Lastly, the material database saves and updates the courseware and other instructional multimedia materials.

This study therefore argues that, e-learning system for the teaching and learning of SAD must be comprehensive by having its components comprising of user management system, discussion system, toolkit of platform, teaching evaluation system, course management system and material database system for successful implementation of the blended learning model. Table 2.1 presents the summary of the factors influencing the blended learning success for SAD. It presents the factor, the justification and the supporting references.

Table 2.1: Summary of the Factors influencing Blended Learning Success for System Analysis and Design

No	Factors	Justifications	References
1	Attitude	Students' different attitudes to learning reflect on the preferred methods of learning which is either through practical hands-on engagement or classroom tele-guided approach. Also, students from more socioeconomically better family will find learning through technology better than others	Boticki (2009), Draffan & Peter (2006), Konradt et al. (2003), Natasa, Mornar, & Tang & Pan (2008)
2	Technology usage level	Students who have been adequately exposed to technology and possibly used it for previous learning exercises will find it more resourceful and efficient	Draffan & Peter (2006), Sharma & Barrett(2011)
3	Access to technology	Technology must be leveraged for the implementation of blended learning model. The e-learning system is usually web-based, and a necessary technology for teaching and learning in the blended learning model	Sharma & Barrett (2011), Tang & Pan (2008)
4	Courseware Quality	The essence of rich learning resources and support learning material as factors of	Sharma & Barrett (2011),

		successful implementation of internet learning model.	Tang & Pan (2008)
5	Curriculum	It addresses the topics to be taught, the scope and details, and their connections with the learning deliverables. Curriculum of SAD is not only suggested to be presently wrongly-designed in face new job realities, but also an important factor in successful learning and teaching experience.	Draffan & Peter (2006), Guidry et al. (2011), Natasa, Mornar, & Boticki (2009), Wang & Wang (2014),
6	Learning System Interface Quality	The end result of technology usage and its ability to achieve the set objectives, which in e-learning system is successful learning experience, depends on its interface quality.	Marchionini (1991), Natasa, Mornar & Boticki (2009), Sheneiderman & Plainsant (2010), Tang & Pan (2008)
7	Lecture quality	Lecture delivery mode combines the various pedagogical approaches (e.g., constructivism, behaviourism, cognitivism) to produce an optimal learning outcome with or without educational technology.	Al-Barwani, Al-Ani & Amzat (2012), Barry(2010), Elmore (2010), Heck(2008),

			Tang &Pan (2008)
8	E-Learning system comprehensiveness	The toolkits of e-learning platform ensure that lessons are delivered with clarity for all students to understand in spite of the learners' language deficiency. It also supports instructors that are not well-skilled at multi-media technology and Internet application.	Draffan & Peter (2006), Tang &Pan (2008)

2.4 Review of Blended Learning Frameworks

This section presents the review of blended learning frameworks which are Garrison & Vaughan (2008) Community of Inquiry model, Wang, Han, & Yang (2015) Complex Adaptive Blended Learning System (CABLS) Framework, DIY E-Learning model, and Khan Model.

2.4.1 Community of Inquiry Blended Learning Framework (Garrison & Vaughan, 2008)

Garrison and Vaughan (2008) suggested thoughtful integration of online learning and face-to-face learning to improve educational experience and optimize students' engagement. The framework for Community of Inquiry (CoI) is a guideline for virtual and classroom teaching and learning using the Dewey's idea on constructivism. The guideline suggests that practical process of problem investigation and solution findings should be emphasized in educational inquiry, not memorization. The educational process is suggested to be socially interactive and collaborative. Garrison and Vaughan (2008) successfully shifted technology to learning and

explained how this can be integrated to enhance educational experience. It supported the adoption of educational technologies for both faculty and individual levels, but emphasized its usage for faculty levels.

CoI also supports reflection and criticism of the course design, pedagogy and the integration of pedagogy and technology, through a community-based inquiry developmental process. Notably, CoI is not only about integrating educational technology with face-to-face background, it equally suggests the holistic, reflective and self-sustaining framework of inquiry based on strong educational theory. It guides academics and practitioners in blended learning related researches in evaluating and positioning blended learning prospect. The model is illustrated in Figure 2.1.

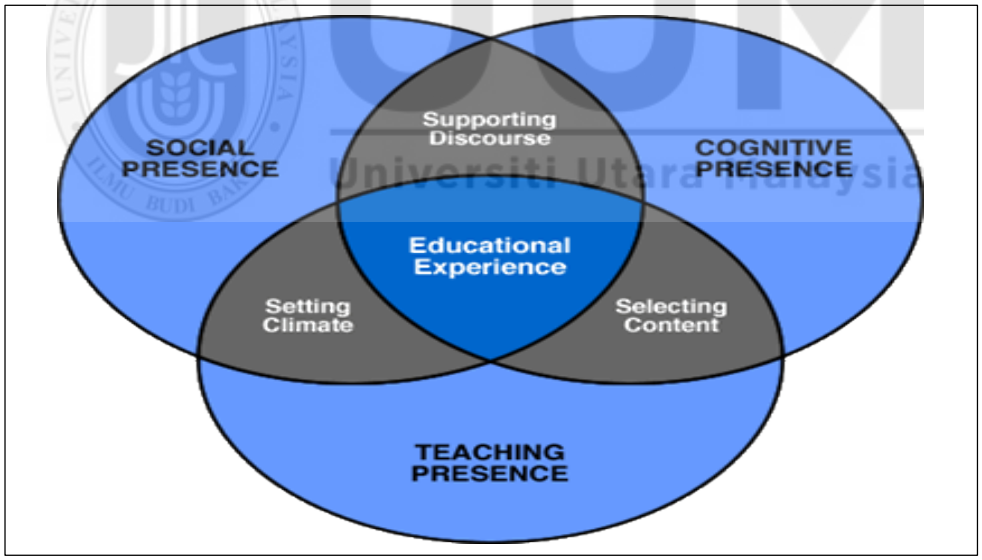

Figure 2.1. Community of Inquiry Blended Learning Framework (Garrison & Vaughan, 2008)

2.4.2 The Complex Adaptive Blended Learning Framework

The Complex Adaptive Blended Learning System (CABLS) framework of Wang, Han, & Yang (2015) has six subsystems. These subsystems, which are dynamic in a non-linear form, are the learner, the teacher, the technology, the content, the learning support and the institution. Each of these subsystems has is its own driving forces and vitalities.

The learner in CABLS co-evolves with other sub-systems in the blended learning system with adaptive and dynamic characteristics which afford learners to be able to change from being passive to being active. The teachers essentially co-habit with the learners in view of becoming teachers of better qualities and teaching methodologies. The content in CABLS is rich, interactive, multimedia and engaging. Its support is categorized into blending offline and online learning; blending self-paced and lives, collaborative learning; blending structured and unstructured learning; blending custom content, blending learning practice, and performance support.

Also, technology in CABLS is the internal structure and mechanism that connects the human entities in CABLS and organizes its system in a way that facilitates its blended learning functionalities. Learning support is one of the new imports in CABLS. It characterizes academic and technical support for students' improvement. Lastly, the institution in CABLS raises blended learning to institutional level from course level, and provides strategies policies and service to guide the interaction and cohabitation of other subsystems. Figure 2.2 illustrates the six subsystems and their relationships: the learner, the teacher, the technology, the content, the learning support, and the institution.

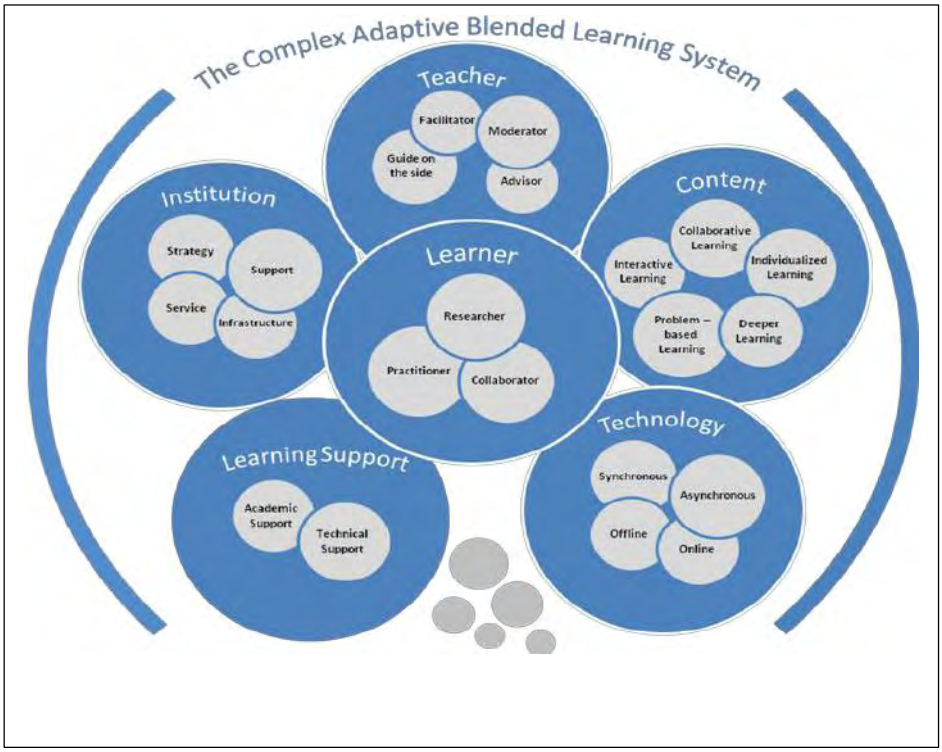

Figure 2.2. The Complex Adaptive Blended Learning System (CABLS) Framework

2.4.3 DIY E-Learning Model

Teachers learn about e-learning mainly from peers and mentors instead of through formal professional development. The materials and the communication among teachers and students in the DIY model are more significant, and it gives the teachers all the control (Thompson & Lamshed, 2006). “Do it yourself (DIY)" e-learning model bases is on the positive experiences of interviewed trade teachers currently using e-learning in their teaching practice. According to Thompson and Lamshed (2006), the DIY model means that the fast adoption of new e-learning tools as they become available is likely to happen, as well as a more open attitude to adoption and experimentation. The model consists of eight steps as seen in Figure 2.3.

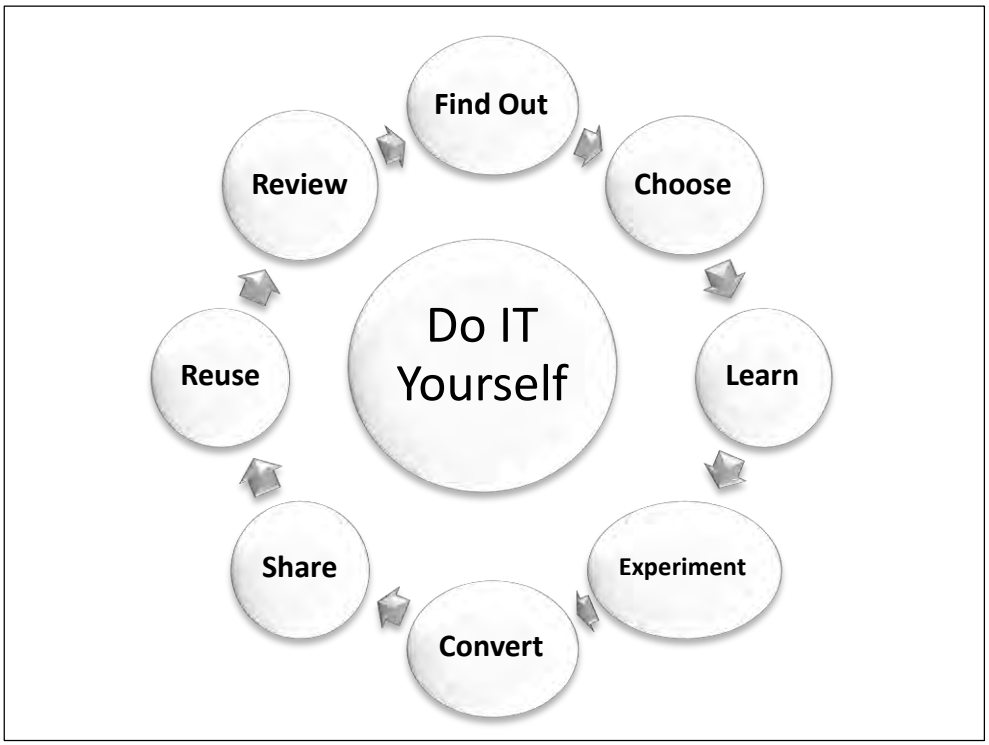

Figure 2.3: DIY E-learning Model (Thompson & Lamshed, 2006)

This model focuses on the teachers more than students. It concentrates on appropriate tools for the teachers. In the developing process, when exploring or testing new ideas, students can provide feedback at the commencement of the process. Teachers will learn about e-learning primarily from peers and mentors rather than through formal professional development. Therefore, the skills will be passed from one teacher to another, mostly informally and in the context of their teaching. Although this means teachers will need to initially spend more time learning how to use e-learning tools, once mastered, there may be a longer term impact and more rapid spread across a trade department because the skills will reside in the department, not externally.

2.4.4 Khan's Blended Learning Model

Khan (2010) developed an e-learning framework, its have eight dimensions are: interface design, evaluation, management, institutional, pedagogical, and technological, resource support, and ethical issues. Each dimension possesses sub-dimensions with focus on particular e-learning environment. List of factors that can be considered for the creation of successful experience for diverse learners are presented in the Khan's framework (Khan, 2010). This is further explained below.

According to Khan (2010), the five functionalities of blended Learning framework revolves around its ability to provide guidance for (a) planning and designing blended learning materials, (b) organizing resources for blended learning environment, (c) designing distributed learning systems, (d) evaluating blended learning courses, and (e) evaluating blended learning tools and systems.

Badrul Khan's (2010) Blended Learning Framework is illustrate an encompassing approach to engaging blended learning. The framework serves as a guide to plan, develop, deliver, manage, and evaluate the blended learning model. Badrul Khan's (2010) Blended Learning Framework is the most comprehensive framework that deeply and widely addressed blended learning model formation. Badrul Khan's (2010) Blended Learning Framework is presented in Figure 2.4 below.

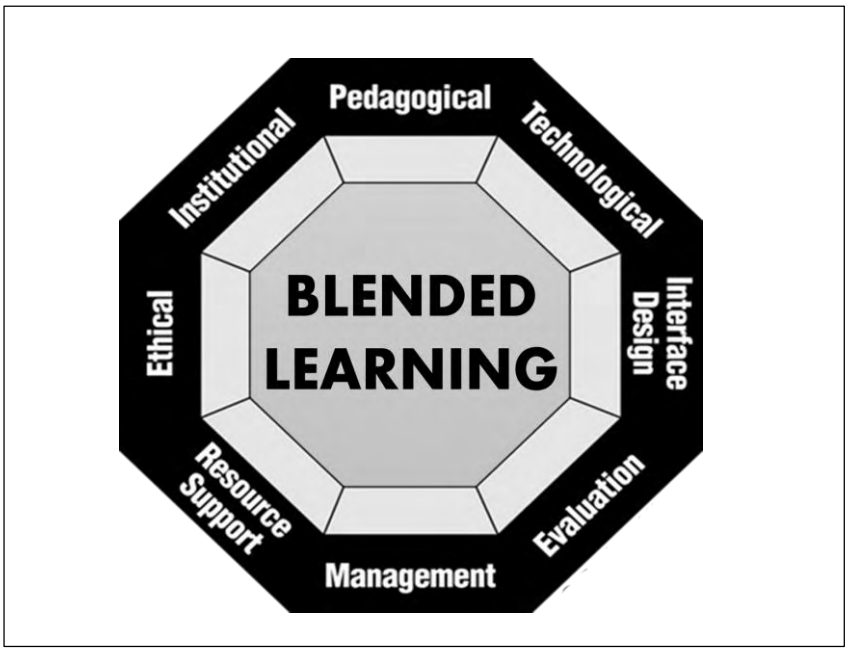

Figure 2.4: Badrul Khan's (2010) Blended Learning Framework.

Figure 2.4 illustrates the eight dimensions for Blended Learning as proposed by Badrul Khan (2010). These dimensions are proposed as essentials of any blended learning environment for effectiveness and positive results. The explanations to these dimensions are presented as follows:

a. The pedagogical dimension of blended learning addresses teaching and learning issues concerning the content to be delivered, the students' needs and learning objectives. The design approach and methods of delivery, and the curriculum are addressed. Also, the attitudinal and motivational information about the students are captured under this dimension.
b. The technological dimension of this blended learning framework examines technology infrastructural issues. In all, it addresses the tools needed for the learning objectives and its delivery. It suggests the need for suitable learning management system, its comprehensive components and functionalities.

c. The interface design refers to the user interface of each blended learning elements. The user interface is expected to support all the elements which allow the students to use each learning delivery type and switch between the different types. Interface design dimension includes class sessions and site design, content structure, navigation, graphics, course design, and usability testing.

d. The evaluation of blended learning includes both assessment of students and evaluation of the instruction and learning environment. It examines the usability of a blended learning program, which should have the capability to evaluate the quality of learning model, and the performance of the students.

e. The management of the blended learning addresses the maintenance, editing, updating the learning environment and course contents.

f. The resource support dimension of the blended learning framework addresses the making of the online and offline support and resources that students can explore for enhanced learning experience.

g. The ethical considerations of a blended learning are cultural diversity, students' diversity, and equal opportunity. They should be considered in administering blended learning platform.

h. The institutional dimension is concerned with issues of administration and students' needs. It suggests requisite planning and understanding of the students' needs in the overall implementation of the blended learning model.

2.4.5 Comparison of the Blended Learning Frameworks

In comparing the above reviewed blended learning frameworks, it shows that the focus of each of these blended learning models and frameworks is different from each other. Garrison and Vaughan's (2008) CoI focus on the integration of online learning and face-to-face learning; CABLS discusses the dynamism and non-linear feature of the blended learning

subsystems, the materials and the communication among teachers and students are the core attention in the DIY model, and the contributing factors to e-learning framework is the focus of Khan (2010) model. DIY does not take e-learning developers into much and consideration by involving technology-related features. And, the only limitation found in CoI is the absence of teaching and learning element. However, Khan (2010) developed an e-learning framework with comprehensive factors that can be considered for the creation of successful experience for diverse learners. The framework serves as a guide to plan, develop, deliver, manage, and evaluate the blended learning model.

2.5 Summary of the Chapter

This chapter presents the scholarly foundation of this study. It presents blended learning models in view of establishing their central theme which is ability to systematically combine online and face-to-face teaching methodology for quality learning experience. It also discusses blended learning frameworks. Past related studies that chronicled application of blended learning model in other to show the necessity of similar study for SAD were presented. Based on this, this chapter presents a justifiable ground for the investigation of the factors that influence blended learning success for system analysis and design. The methodology of this study is presented in the next chapter; Chapter 3.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter presents the research methodology of this study. It shows the research design which illustrates the phases, stages and methods employed in achieving the research objectives, with their justifications. It also explains the population size and the characterization of this study's respondents. The sample size of the study is equally explained. The instrument design, data collection and the data analysis processes are also described. This chapter also includes the reliability and validity testing of the data collected where the reliability and validity of the preliminary stage of the study is reported.

3.1 Research Design

Research methodologies are of different types with different methods providing special benefits. The selection of these methods depends on the objectives to be achieved by the research. Also, the findings of the research can be justified by choosing the most appropriate research methodology (Sekaran, 2010). According to Grinnell (1993), a research is an inquiry structured in a way that utilizes acceptable scientific method of solving problem and creating new knowledge.

According to Creswell (2009), research design is a structured plans or procedure taken by a researcher. It is stemmed from its broad assumptions to the methods involved in its data collection and analysis. It is of three different types, namely; the qualitative, quantitative and

mixed methods. The qualitative and quantitative can be combined to address a research problem. In this study, the quantitative approach is employed.

Quantitative approach involves quantitative data which are expressed in numerical and statistical figures, analyzed and measured through statistical analyses (Hossein, 2007). The quantitative research design is used in this study to examine the responses from a large sample with regard to identification of the success factors for the teaching and learning of SAD, and to evaluate the success factors model. Quantitative research design as defined by Nueman (2007) is the design which is appropriate for the examination of the relationship between one set of things and another; these are independent variables and dependent variables. Quantitative research design is usually used for the establishment of the association and relationship between variables.

Quantitative research design also allows the researcher to analyse the behaviour of respondents (Lakshman et al., 2000). Smith (2012) stated that quantitative research design can validate the conclusion of the study by verifying the established concept and by proving or disproving a proposed concept. Sekaran (2009) added that the quantitative research design can produce consistent results when used with a descriptive research design. Several researchers have also identified the quantitative research design as the most suitable approach for investigating the individual opinions and the motives behind the actions, behaviour, and attitudes of respondents.

Therefore, it is important illustrate the structured approach to be taken by this study in answering its research questions and achieving its research objectives. Figure 3.1 shows this study's structured approach to address its research questions.

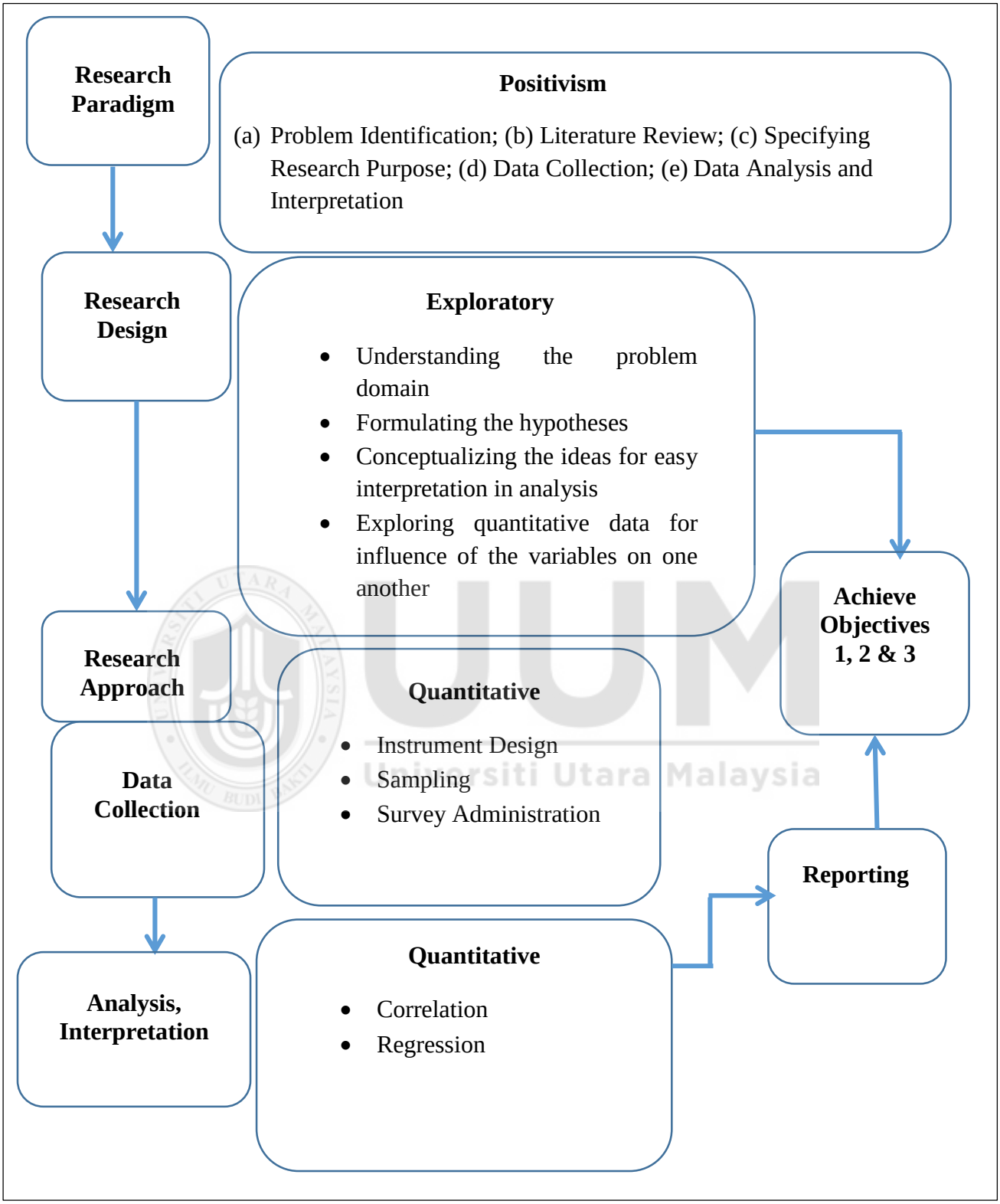

Figure 3.1 Research Methodological Approach

The exploratory study is essentially the literature review and critical analysis of previous related studies that are done by this study. This forms the basis for the highlight of the problem statement, research questions and objectives that are stated in Chapter One of this study. Also, the review presented in Chapter 2 presents and as later done in this Chapter give the scholarly basis for the development of the hypotheses. The variables and the relationship to be investigated are also elicited as shown in Section 3.3. The empirical testing of these relationships therefore necessitates data collection and its subsequent analysis. The testing of the hypotheses stated by this study collectively achieves its research objectives.

3.2 Data Collection Methods

According to Saunders et al. (2003), there is a relationship between the data collection method employed and the quality of the results obtained. Therefore, the correctness of the data collection method must be adequately considered. In this study, data were collected from the respondents through a design questionnaire with the direct approach method. This implies that the researcher directly administers the questionnaire with the selected respondents. Questionnaire is one of the result-oriented surveying techniques especially when opinions of the respondents are involved (Currie, 2005). The questionnaire design is further discussed in Section 3.4.

Furthermore, other related data collections methods employed used by this study are the sampling method and sample size calculation. The construct and content validity methods, and the statistical analyses using correlation and regression techniques are also highlighted.

3.2.1 Population

The people, events, and things that constitute the subject of a research are referred to as the population (Bougie & Sekaran, 2010). This study focuses on postgraduate (Master) and undergraduate students of IT in UUM, specifically those that have taken SAD as a course. Sampling methods can be divided into probability and non-probability sampling. This study adopts the simple random sampling technique, which is a probability sampling method, in order for each aspect of the population to be represented in the sample (Zikmund et al., 2010). It provides accurate statistical descriptions and representativeness of the population (Sekaran & Bougie, 2010).

The population of these students is 300, for semester A152, A151, A142 for undergraduate students and for semester A152, A151 for postgraduate students (Master information technology) according to the Assistant Registrar of School of Computing. Therefore, the population size of this study is 300. The sample size is drawn from this population size using the appropriate sampling method.

3.2.2 Sampling Technique and Sample Size

The sample size for this study was determined through the sample size decision table of Krejcie and Morgan (1970) presented in Appendix A. According to this table, for a population size of 300, the sample size for a confidence level of 95% is 175. Therefore, the survey questionnaires are administered to 175 respondents. Data collected from the survey questionnaire was quantified through the Likert scale. According to Vagias (2006), Likert scale is used in collecting respondents' responses to inquires made in form of numerical values. The detail of the questionnaire design is presented in Section 3.4.

To evaluate the proposed success factors in this study, opinions from the respondents for this study were collected using the designed survey instrument, and statistically analysed. As

earlier stated, this study uses simple random sampling. For the data collection process, the 175 respondents which are the sampling respondents are randomly picked from the list of their names using Microsoft Excel sheet. These students are subsequently administered the questionnaire designed. The data is then analysed using SPSS version 19, with Correlation and Regression as the analysis techniques.

3.3 Conceptual Model of the Study

The conceptual model depicts the success factors for SAD as the independent variables while academic success of SAD is the dependent variable. The hypotheses tested in this study are based on these variables. The success factors of blended learning model for SAD to be reviewed are attitude, technology usage level, access to technology, courseware, curriculum, and interface quality of the e-learning system, lecture quality and e-learning system comprehensiveness.

3.3.1 Conceptual Model

Based on the success factors elicited and discussed in chapter two provided, this study's conceptual model is proposed.

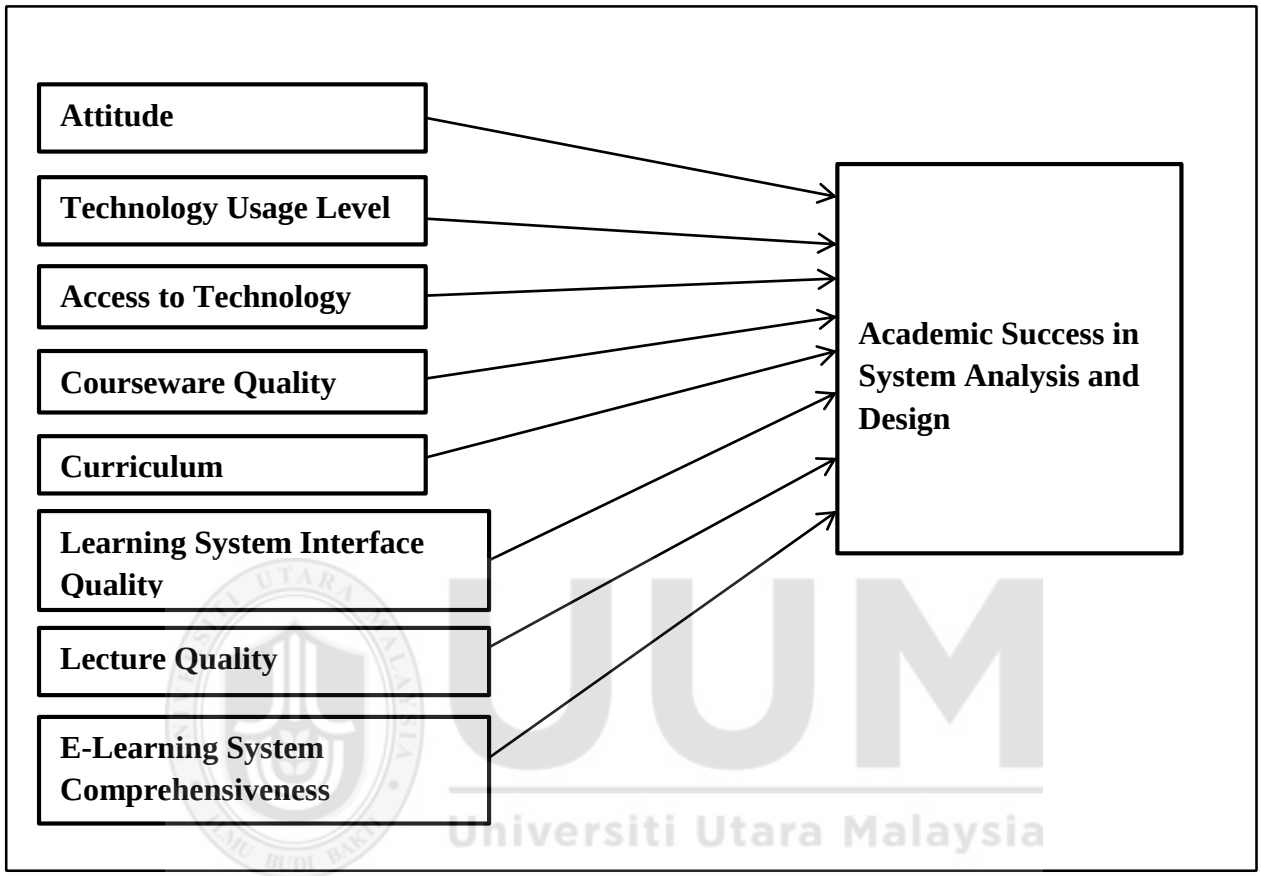

Figure 3.2: Conceptual Model of the Study

3.3.2 Research Hypothesis

This study aimed in examining relationship and effect between the success factors of blended learning model for SAD and academic success of SAD. The success factors of blended learning model for SAD are attitude, technology usage level, access to technology, courseware, curriculum, and interface quality of the e-learning system, lecture quality and e-learning system comprehensiveness.

Hence, the followings are the proposed research hypothesis that will be tested in this study;

H_1: SAD students' attitude influences students' academic success

H_2: SAD students' technology usage level influences students' academic success

H3: SAD students' access to technology influences students' academic success

H4: SAD students' courseware influences students' academic success

H_5: SAD curriculum influences students' academic success

H_6: SAD's learning system interface quality influences students' academic success

H_7: SAD Lecture quality influences students' academic success

H_8: SAD Learning System Comprehensiveness influences students' academic success

3.4 Survey Instrument (Questionnaire) Design

The questionnaire was designed based on the earlier highlighted theoretical framework of the study and the suggested factors, as discussed in Section 2.3 and shown in Section 3.3. The questionnaire is divided into three parts: A, B and C. Part A consists of the questions related to the respondents' demographic background which are gender, age, and program of study. Part B contains items to measure the academic success in SAD, while Part C contains items measuring each of the elicited factors: attitude, and technology usage level, access to technology, courseware quality, curriculum content, learning system interface quality, lecture quality, and learning system comprehensiveness.

3.4.1 Items Development and Data Coding

The following items in a-j illustrate the measurement dimensions of each of the factors in the conceptual model, with their respective references. The data coding is the process of assigning alphanumeric values to each of the survey items. It is used to represent the items during the statistical data analysis exercise.

a. Academic Success in System Analysis and Design

Academic success in System Analysis and design is defined with the students' ability to score not less than B grade in the course, and/or to secure internship due to the students' proficiency in the course as judged by the employer (York, Gibson & Rankin, 2015; Baldwin, Bensimon, Dowd & Kleiman, 2011). This study measures academic success in System Analysis and Design using the student's grade in the course and securement of internship due to proficiency in the course. Table 3.1 shows the items for measuring academic success in System Analysis and Design and the codes. The responses are graded using Likert Scale of (1 – 5), where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Table 3.1: Items for Academic Success in System Analysis and Design

Code	Items
ASS01	I do not get less than Bs in my System Analysis and Design course.
ASS02	I secured/am securing internship due to my proficiency in System Analysis and Design.
ASS03	I won a competition based on my performance in System Analysis and Design.

ASS04	I got an award because of my excellent understanding of System Analysis and Design.
ASS05	I got a job due to my proficiency in System Analysis and Design.
ASS06	My proficiency in System Analysis and Design has positive effect in my programming
ASS07	My proficiency in System Analysis and Design has positive effect in my software development

b. Attitude

Measurement of learners' attitude towards the teaching and learning style and technology usage is adapted from Sakaran, Sakaran, and Bui (2000) and Rosen et al. (2013) respectively. The responses to "Attitude towards technology" and "Attitude towards learning SAD" are both are graded using Likert Scale of 1 – 5. For "attitude towards technology", 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. For "attitude towards SAD", 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, and 5 = Always. Table 3.2 shows the items for measuring attitude.

Table 3.2: Items for Attitude

Code	Items	Sub-variable
ATT01	I feel it is important to be able to learn online	Attitude towards technology
ATT02	I feel it is important to be to access internet anytime I want	
ATT03	I feel it is important to explore details of any learning technology I come across	

ATT04	I believe technology makes learning easy	
	When you think of learning System Analysis and Design, how often do you feel the following:	
ATT05	Happy	Attitude towards learning SAD
ATT06	Excited	
ATT07	Ambitious	

c. Technology Usage Level

The technology usage level is the frequency at which students use for learning related purposes. The items are adapted from Rosen et al. (2013). The responses are graded using Likert Scale of 1 – 5, where 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, and 5 = Always. Table 3.3 shows the items for measuring technology usage level.

Table 3.3: Items for Technology Usage Level

Code	Items
	How often do you do the following using PC or mobile phone connected to the internet?
TUL01	Listen to lecture podcast
TUL02	Watch lecture videos
TUL03	Answer quizzes
TUL04	Submit assignment report

TUL05	Ask questions from the instructor
TUL06	Participate in discussion forum
TUL07	Guide co-students through a particular lesson

d. Access to Technology

The students' access to technology is measured by items suggested by Rosen et al. (2013). It measures the availability of related learning technologies. The responses are graded using Likert Scale of 1 – 5, where 1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, and 5 = Excellent. Table 3.4 shows the items for measuring access to technology.

Table 3.4: Items for Access to Technology

Code	**Items**
	How can you rate your access to the following technologies for purpose of learning:
ATH01	Mobile phone
ATH02	Internet
ATH03	Laptop
ATH04	Multimedia
ATH05	Software
ATH06	Podcast
ATH07	Portable Digital Assistant

e. Courseware Quality

Items to measure the quality of the courseware are designed based on provisions of Sharma and Barrett (2011) and Tang and Pan (2008). The responses are graded using Likert Scale of 1 – 5, where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. Table 3.5 shows the items for measuring courseware quality.

Table 3.5: Items for Courseware Quality

Code	Items
CSW01	I get useful learning material on System Analysis and design
CSW02	The study textbook guides in building my System Analysis and design skill
CSW03	Lecture notes are available for all lessons taken on System Analysis and design
CSW04	Lecture notes provided simplifies the difficult lessons in System Analysis and design
CSW05	The study textbook teaches current lessons in System Analysis and design skill
CSW06	The study textbook contains practical-oriented exercises and projects in System Analysis and design skill
CSW07	The lecture notes provide connection between System Analysis and design and my programming lessons.

f. Curriculum

The content of the curriculum used in teaching System Analysis and Design is to be evaluated based on the proposal of Wang and Wang (2014). The responses are graded using

Likert Scale of 1 – 5, where 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, and 5=Always. Table 3.6 shows the items for measuring coverage of the curriculum content.

Table 3.6: Items for Curriculum Content

Code	Items
	How often do you experience the following content of System Analysis and Design curriculum
CRC01	Requirements Analysis
CRC02	UML Design models
CRC03	Preparation and design of Use Case diagrams
CRC04	Sequence and Communication Diagrams
CRC05	Activity Diagram
CRC06	Class Diagram
CRC07	Implementation process

g. Learning System Interface Quality

The interface quality of the learning system is measured by e-learning interactivity as proposed by Draffan and Peter (2006) with adapted items from Medina-López, Alfalla-Luque, and Arenas-Márquez (2011). The responses are graded using Likert Scale of 1 – 5, where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. Table 3.7 shows the items for measuring the learning system interface quality.

Table 3.7: Items for Learning System Interface Quality

Code	Items
SIQ01	The e-learning system interface text is readable
SIQ02	The e-learning system interface supports sound
SIQ03	The e-learning system interface can navigate
SIQ04	The e-learning system interface links the learning modules
SIQ05	The e-learning system interface graphics are readable
SIQ06	The e-learning system interface has good combination of colours
SIQ07	The e-learning system interface is interactive

h. Lecture Quality

The lecture quality evaluates the quality assurance of the teaching of SAD as influenced by the lecturer and the e-learning system. This is proposed by Tan and Pan (2008). The items are developed based on teaching evaluation framework of Bett (2014). The responses are graded using Likert Scale of 1 – 5, where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. Table 3.8 shows the items for measuring the lecture quality.

Table 3.8: Items for Lecture Quality

Code	Items
LCQ01	The lectures are relevant to the course's objectives
LCQ02	The lectures are up-to-date

LCQ03	The course outline are met
LCQ04	The lecture is skill-building
LCQ05	The course assignments are related to the course outcome
LCQ06	The assessment processes for this course are fair
LCQ07	The feedback provided during the course is helpful

i. E-Learning System Comprehensiveness

The learning system comprehensiveness is measured by the expected functionalities and components of an e-learning system as suggested by Tang and Pan (2008). The responses are graded using Likert Scale of 1 – 5, where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4= Agree, and 5 = Strongly Agree. Table 3.9 shows the items for measuring the learning system comprehensiveness.

Table 3.9: Items for Learning System Comprehensiveness

Code	Items
LSC01	I need my user identity to log-in into the e-learning system
LSC02	I can discuss with my course mates using the e-learning system
LSC03	I can receive feedback from by lecturer through the e-learning system
LSC04	The e-learning system allows the lecturer to upload our assessment marks
LSC05	The e-learning systems automatically calculates our course scores
LSC06	Each of my courses has its separate section in the e-learning system
LSC07	I can download my courseware from the e-learning system

3.4.2 Data Instrument Scaling Method

Notably, the responses are collected using the 5-point Likert scale because the scale presents a friendly data for analysis, and allows respondents to choose from varying intervals (Brown, 2011). However, the code of the responses is not uniform. Responses for items measuring academic success in SAD, attitude (towards technology), courseware quality, learning system interface quality, lecture quality, and e-learning system comprehensiveness are coded with 1 (Strongly Disagree), 2 (Disagree), 3 (Neutral), 4 (Agree) and 5 (Strongly Agree). Responses for items measuring attitude (towards learning), technology usage level, curriculum content are coded using Likert Scale of 1 – 5, where 1 = Never, 2 = Rarely, 3 = Sometimes, 4= Often, and 5 = Always. The access to technology is coded with Likert Scale of 1 – 5, where 1=Poor, 2 = Fair, 3 = Good, 4 = Very Good, and 5 = Excellent. The questionnaire is presented in Appendix B.

3.5 Data Screening and Cleansing

The data screening is performed to ensure that the data is suitable for drawing inferences. The hypotheses testing can be reliably done after this, as Hair et al. (2010) suggested missing data, detection of outliers, and normalization of the datasets as stages of data cleaning in multivariate data analysis.

3.5.1 Missing Data

The data collected are fed into SPSS version 19 for the statistical analysis. Through a descriptive analysis, it is observed that there are few missing data in the main study's data. The missing data are treated using Maximum Likelihood (ML) – Estimation Maximization (EM) algorithm. The algorithm assumes a normal distribution, estimates a correlation matrix for the missing values using the existing and missing data, and uses maximum likelihood

estimation in replacing the missing values. The next stages of the data cleaning are therefore proceeded to.

3.5.2 Detection of Outliers

Outliers are respondents of extreme scores within the responses gathered from the questionnaires administered (Tabachink & Fidel, 2006). They are opined to be liable to affecting the authenticity of the result. Detection of outliers is done by calculating the Mahalanobis distance for each respondent. The result is then compared to the Chi-Square with a significant error of 0.001 which is obtained from the general Chi-Square table using the number of items designed in the questionnaire as the determinant.

The total number of items for the inferential statistics (i.e. the hypotheses testing) is 63, and this gives a critical value (X^2) of 103.46. Two outliers (Respondent ID 8 and 61 of Mahalanobis distances (D^2) of 104.65 and 103.64) are detected and deleted. The data of respondents to be finally analysed are now 149.

3.5.3 Normality of the Data

Data normality is a check of the distribution of the scores on the items from the data collected from the respondents. It is needed before inferential statistics is done. For data normality, Skewness and Kurtosis are employed as measures (Pallant, 2009). Hair et al. (2010) posited that a z-skewness value of less than 2 is acceptable when the sample size is small. The findings showed Skewness (symmetry of the distribution) and kurtosis (peakedness of the distribution) are near from zero (0), the acceptable range for skewness or kurtosis below +1.5 and above -1.5 (Tabachnick & Fidell, 2013). The descriptive statistics of the maximum and minimum values of the z-score is presented in Appendix C. The result showed that almost all

the values for the items are within the range of 1 and -1 which suggest the normality of the data (Bulmer M. G, 1979).

3.6 Validity and Reliability Testing

The reliability and validity testing were conducted for the data collected. These are discussed in sections 3.6.1 and 3.6.2 below, respectively.

3.6.1 Validity

Validity is the capability of the instrument in assessing the target items (Sekaran, 2003). The quality of the procedure of the instrument measurement, and the degree to which the researcher has measured what he is set to measure, provide the accuracy and respectability (Smith, 2012).

The reliability coefficient, which is expressed in terms of Cronbach's alpha, has an acceptable value of 0.70 to 0.80 (Kaplan & Sacuzzo, 2008). This is however different from the validity which is either the content validity or the construct validity. The validity is used to improve and evaluate the scales' reliability using different procedures like factor analysis (Smith, 2012; Zikmund et al., 2010).

The content validation is testing respondents' comprehension of the items in the instrument and the correctness of its construction. This was done by the two faculty members (Appendix E). They are experts in SAD and information system research. Comments and suggestions provided by these faculty members were used in modifying the instrument before collecting data.

3.6.2 Reliability Testing

The reliability testing is conducted to confirm the internal consistency of the instrument scale. Table 3.9 presents the findings of verification of the instrument scale.

Table 3.9: Reliability Test for the Main Study

No	Variables	No of Items	Cronbach's Alpha
1	Academic Success	7	0.816
2	Attitude	7	0.762
3	Technology Usage Level	7	0.820
4	Access to Technology	7	0.808
5	Courseware Quality	7	0.785
6	Curriculum	7	0.885
7	Learning System Interface Quality	7	0.849
8	Lecture Quality	7	0.859
9	E-Learning System Comprehensiveness	7	0.842

The findings of the reliability test for the study showed all variables achieved an acceptable Cronbach Alpha coefficient value of 0.7 and above (Pallant, 2013). This therefore suggests internal consistency all the items measuring the variables.

3.7 Summary of the Chapter

The research design of this study which entails its methodology and phases in achieving its research objectives are presented in this chapter. Also, several procedures and justifications on the choice of population, the sample size and data analysis techniques are discussed. The research framework is also presented, with due attention to the conceptual model development, hypotheses development and survey instrument design. This study uses a questionnaire as the primary data collection instrument, being a quantitative approach study. The data screening and cleaning which involved the treatment of missing data, outliers and assessment of normality of the data collected are reported, and also is the validity and reliability of the data in the main study. The findings of the main data collection are reported in the next chapter.

CHAPTER FOUR

FINDINGS

4.0 Introduction

This chapter entails the data analysis process of this study. It shows how the hypotheses are tested, one after the other, in view of collectively answering the research questions of this study. It is also based on the hypotheses testing that the research objectives are achieved. The data analysis process, which entails the descriptive statistics for the demographic data and inferential analysis using correlation and regression, is presented. These are the processes involved in testing the hypotheses, answering the research questions and accomplishing the research objectives.

4.1 Response Rate

This study administered a total of 175 questionnaires to postgraduate and undergraduate students of IT in UUM. The result of the aforesaid effort resulted in a response of 151 returned questionnaires out of a total of 175 questionnaires that were administered, which gave an effective response rate of 86.28%. Following Sekaran (2003), a response rate of 30% and above is acceptable for a survey. The breakdown is presented in Table 4.1 below.

Table 4.1

Response Rate of the Questionnaires

Response	Frequency/Rate
Number of distributed questionnaires	175
Returned questionnaires	151
Number of Questionnaires not returned	24
Response rate	86.28%

4.2 Respondent Profile

The respondents' population distribution is done based on gender, age and program of study. The findings are presented in Tables 4.2 – 4.4 respectively. For the gender distribution, 77 (51%) and 74 (49%) are males and females, respectively. Table 4.2 presents the gender distribution of the respondents.

Table 4.2: Gender

		Frequency	Percent
Valid	Male	77	51
	Female	74	49
	Total	151	100.0

The age distribution is skewed in favour of 18 – 25 years, with a frequency of 128 (84.8%) out of the 151 respondents. Only 23 (15.2%) are 26 – 35 years. Table 4.3 presents the age distribution of the respondents.

Table 4.3: Age

	Frequency	Percent
18 - 25 years	128	84.8
26 - 35 years	23	15.2
Total	151	100.0

For the program of study, respondents that are presently running their bachelor degree in IT are 134 (88.7%), and those of Master degree are 17 (11.3%). Table 4.4 presents the program of study distribution of the respondents.

Table 4.4: Program of Study

	Frequency	Percent
Bachelor Degree	134	88.7
Master Degree	17	11.3
Total	151	100.0

4.3 Testing the Research Hypotheses

The hypotheses' testing is done using correlation and regression as statistical techniques for the investigation of the strength and direction of the relationship between the variables, and the effect of each of the independent variables on the dependent variable (Hair et al, 2006). Cohen (1988) guideline of interpreting Correlation result (i.e. Pearson correlation coefficient

value, r), and Regression result (i.e. R^2) was used. This suggests that when r is within 0.10 to 0.29, it is small, medium for r of 0.30 and 0.49, and large for r within 0.50 to 1.0. For the R^2, 0.02 to 0.12 is weak influence, 0.13 to 0.25 is moderate influence, and above 0.26 is substantial influence. The results generated by the SPSS version 19 are presented in Appendix D.

4.3.1 H_1: SAD students' attitude influences students' academic success

SAD students' attitude and students' academic success are firstly tested through Pearson product-moment correlation to investigate their relationship. The correlation result is given as r = 0.457, and p = 0.000 (i.e. p < 0.05). This shows that there is a significant and medium positive relationship between SAD students' attitude and students' academic success. The result also shows that 45% variance in SAD students' attitude can be explained by 45% variance in students' academic success in SAD.

The regression analysis gives the value of R as 0.457 and R^2 as 0.209. This shows that 20% variance of the predictor (SAD students' attitude) explains students' academic success in SAD which is the dependent variable with a Sig. value of 0.000 (i.e. p < 0.05). The regression result shows that SAD students' attitude has a moderate significant positive influence on students' academic success. The results for the correlation and regression are presented in Table 4.5 and 4.6 respectively below. This points that the hypothesis; SAD students' attitude influences students' academic success, is accepted.

Table 4.5: Correlation Result for Hypothesis 1

		Academic Success in System Analysis and Design
Attitude	Pearson Correlation	0.457
	Sig. (2-tailed)	0.000

Table 4.6: Regression Result for Hypothesis 1

Model	R	R Square	Sig.
Dependent Variable: Academic Success in System Analysis and Design	0.457	0.209	0.000
Predictor: Attitude			

4.3.2 H_2: SAD students' technology usage level influences students' academic success

SAD students' technology usage level and students' academic success are firstly tested through Pearson product-moment correlation to investigate their relationship. The correlation result is given as $r = 0.462$, and $p = 0.000$ (i.e. $p < 0.05$). This shows that there is a significant and medium positive relationship between SAD students' technology usage level and students' academic success. The result also shows that 46% variance in SAD students' technology usage level can be explained by 46% variance in students' academic success in SAD.

The regression analysis gives the value of R as 0.462 and R^2 as 0.213. This shows that 21% variance of the predictor (SAD students' technology usage level) explains students' academic success in SAD which is the dependent variable with a Sig. value of 0.000 (i.e. $p < 0.05$). The regression result shows that SAD students' technology usage level has a moderate significant positive influence on students' academic success. The results for the correlation and regression are presented in Tables 4.7 and 4.8 respectively below. This points that the hypothesis; SAD students' technology usage level influences students' academic success, is accepted.

Table 4.7: Correlation Result for Hypothesis 2

		Academic Success in System Analysis and Design
Technology Usage Level	Pearson Correlation	0.462
	Sig. (2-tailed)	0.000

Table 4.8: Regression Result for Hypothesis 2

Model	R	R Square	Sig.
Dependent Variable: Academic Success in System Analysis and Design	0.462	0.213	0.000
Predictor: Technology Usage Level			

4.3.3 H_3: SAD students' access to technology influences students' academic success

SAD students' access to technology and students' academic success are firstly tested through Pearson product-moment correlation to investigate their relationship. The correlation result is given as r = 0.272 and p = 0.001 (i.e. $p < 0.05$). This shows that there is a significant and small positive relationship between SAD students' access to technology and students' academic success. The result also shows that 27% variance in SAD students' access to technology can be explained by 27% variance in students' academic success in SAD.

The regression analysis gives the value of R as 0.272 and R^2 as 0.074. This shows that 7% variance of the predictor (SAD students' access to technology) explains students' academic success in SAD which is the dependent variable with a Sig. value of 0.001 (i.e. $p < 0.05$). The regression result shows that SAD students' access to technology has a weak significant positive influence on students' academic success. The results for the correlation and regression are presented in Tables 4.9 and 4.10 respectively below. This points that the hypothesis; SAD students' access to technology influences students' academic success, is accepted.

Table 4.9: Correlation Result for Hypothesis 3

		Academic Success in System Analysis and Design
Access to Technology	Pearson Correlation	0.272
	Sig. (2-tailed)	0.001

Table 4.10: Regression Result for Hypothesis 3

Model	R	R Square	Sig.
Dependent Variable: Academic Success in System Analysis and Design	0.272	0.074	0.001
Predictor: Access to Technology			

4.3.4 H_4: SAD students' courseware influences students' academic success

SAD students' courseware and students' academic success are firstly tested through Pearson product-moment correlation to investigate their relationship. The correlation result is given as $r = 0.446$, and $p = 0.000$ (i.e. $p < 0.000$). This shows that there is a significant and medium positive relationship between SAD students' courseware and students' academic success. The result also shows that 44% variance in SAD students' courseware can be explained by 44% variance in students' academic success in SAD.

The regression analysis gives the value of R as 0.446 and R^2 as 0.199. This shows that 20% variance of the predictor (SAD students' courseware) explains students' academic success in SAD which is the dependent variable with a Sig. value of 0.000 (i.e. $p < 0.05$). The regression result shows that SAD students' courseware has a moderate significant positive influence on students' academic success. The results for the correlation and regression are presented in Tables 4.11 and 4.12 respectively. This points that the hypothesis; SAD students' courseware influences students' academic success, is accepted.

Table 4.11: Correlation Result for Hypothesis 4

		Academic Success in System Analysis and Design
Students' Courseware	Pearson Correlation	0.446
	Sig. (2-tailed)	0.000

Table 4.12: Regression Result for Hypothesis 4

Model	R	R Square	Sig.
Dependent Variable: Academic Success in System Analysis and Design	0.446	0.199	0.000
Predictor: Students' Courseware			

4.3.5 H_5: SAD curriculum influences students' academic success

SAD curriculum and students' academic success are firstly tested through Pearson product-moment correlation to investigate their relationship. The correlation result is given as r = 0.497, and p = 0.000 (i.e. $p < .05$). This shows that there is a significant and medium positive relationship between SAD curriculum and students' academic success. The result also shows that 49% variance in SAD curriculum can be explained by 49% variance in students' academic success in SAD.

The regression analysis gives the value of R as 0.497 and R^2 as 0.247. This shows that 24% variance of the predictor (SAD curriculum) explains students' academic success in SAD which is the dependent variable with a Sig. value of 0.000 (i.e. $p < 0.05$). The

regression result shows that SAD curriculum has a moderate significant positive influence on students' academic success. The results for the correlation and regression are presented in Tables 4.13 and 4.14 respectively below. This points that the hypothesis; SAD curriculum influences students' academic success, is accepted.

Table 4.13: Correlation Result for Hypothesis 5

		Academic Success in System Analysis and Design
Curriculum Content	Pearson Correlation	0.497
	Sig. (2-tailed)	0.000

Table 4.14: Regression Result for Hypothesis 5

Model	R	R Square	Sig.
Dependent Variable: Academic Success in System Analysis and Design	0.497	0.247	0.000
Predictor: Curriculum Content			

4.3.6 H_6: SAD's learning system interface quality influences students' academic success

SAD's learning system interface quality and students' academic success are firstly tested through Pearson product-moment correlation to investigate their relationship. The correlation result is given as $r = 0.419$, and $p = 0.000$ (i.e. $p < 0.05$). This shows that there is a significant and medium positive relationship between SAD learning system interface quality and

students' academic success. The result also shows that 41% variance in SAD learning system interface quality can be explained by 41% variance in students' academic success in SAD.

The regression analysis gives the value of R as 0.419 and R^2 as 0.176. This shows that 17% variance of the predictor (SAD's learning system interface quality) explains students' academic success in SAD which is the dependent variable with a Sig. value of 0.000 (i.e. $p < 0.05$). The regression result shows that SAD's learning system interface quality has a moderate significant positive influence on students' academic success. The results for the correlation and regression are presented in Tables 4.15 and 4.16 respectively below. This points that the hypothesis; SAD's learning system interface quality influences students' academic success, is accepted.

Table 4.15: Correlation Result for Hypothesis 6

		Academic Success in System Analysis and Design
Learning System Interface Quality	Pearson Correlation	0.419
	Sig. (2-tailed)	0.000

Table 4.16: Regression Result for Hypothesis 6

Model	R	R Square	Sig.
Dependent Variable: Academic Success in System Analysis and Design	0.419	0.176	0.000
Predictor: Learning System Interface Quality			

4.3.7 H_7: SAD Lecture quality influences students' academic success

SAD lecture quality and students' academic success are firstly tested through Pearson product-moment correlation to investigate their relationship. The correlation result is given as r = 0.349, and p = 0.000 (i.e. $p < 0.05$). This shows that there is a significant and medium positive relationship between SAD lecture quality and students' academic success. The result also shows that 34% variance in SAD lecture quality can be explained by 34% variance in students' academic success in SAD.

The regression analysis gives the value of R as 0.349 and R^2 as 0.122. This shows that 12% variance of the predictor (SAD lecture quality) explains students' academic success in SAD which is the dependent variable with a Sig. value of 0.000 (i.e. $p < 0.05$). The regression result shows that SAD lecture quality has a weak significant positive influence on students' academic success. The results for the correlation and regression are presented in Tables 4.17 and 4.18 respectively below. This points that the hypothesis; SAD lecture quality influences students' academic success, is accepted.

Table 4.17: Correlation Result for Hypothesis 7

		Academic Success in System Analysis and Design
Lecture Quality	Pearson Correlation	0.349
	Sig. (2-tailed)	0.000

Table 4.18: Regression Result for Hypothesis 7

Model	R	R Square	Sig.
Dependent Variable: Academic Success in System Analysis and Design	0.349	0.122	0.000
Predictor: Lecture Quality			

4.3.8 H_8: SAD E-Learning System Comprehensiveness influences students' academic success

SAD learning system comprehensiveness and students' academic success are firstly tested through Pearson product-moment correlation to investigate their relationship. The correlation result is given as $r = 0.243$, and $p = 0.003$ (i.e. $p < 0.05$). This shows that there is a significant and small positive relationship between SAD learning system comprehensiveness and students' academic success. The result also shows that 24% variance in SAD learning system comprehensiveness can be explained by 24% variance in students' academic success in SAD.

The regression analysis gives the value of R as 0.243 and R^2 as 0.059. This shows that 5% variance of the predictor (SAD learning system comprehensiveness) explains students' academic success in SAD which is the dependent variable with a Sig. value of 0.003 (i.e. $p < 0.05$). The regression result shows that SAD learning system comprehensiveness has weak significant influence on students' academic success. The results for the correlation and regression are presented in Tables 4.19 and 4.20 respectively below. This points that the hypothesis; SAD learning system comprehensiveness influences students' academic success, is not accepted.

Table 4.19: Correlation Result for Hypothesis 8

		Academic Success in System Analysis and Design
Learning System Comprehensiveness	Pearson Correlation	0.243
	Sig. (2-tailed)	0.003

Table 4.20: Regression Result for Hypothesis 8

Model	R	R Square	Sig.
Dependent Variable: Academic Success in System Analysis and Design	0.243	0.059	0.003
Predictor: Learning System Comprehensiveness			

4.4 Summary of the Chapter

This chapter shows the findings of this study. This entails the descriptive analysis of the respondents' profile which is basically the age, gender and program of study distribution. Pearson Correlation and Linear Regression were used as statistical techniques to check for the relationship between the variables, and the influence of each of the independent variables on the dependent variable. With or without any attention to the strength and direction of the relationship, and the strength of influence, the findings showed that all the eight hypotheses are accepted. In view of the hypotheses tested and results, the appropriate answers to the

research questions are provided in the next chapter of this study, which also serves as the conclusion.

CHAPTER FIVE

DISCUSSION AND CONCLUSION

5.0 Introduction

This chapter is the concluding part of this study. It contains the discussion of the findings, specifically their positions within the earlier discussed past related findings. This chapter argues the conclusion of this study from the results of the hypotheses testing, and collectively uses these to answer the research questions, and highlight the research objectives. Lastly, the limitations of the study are listed, and on this basis, suggestions on future researches are made.

5.1 Discussion

The population distribution of the respondents of this study are analysed based on gender and age, and the program of study. However, these demographic data are not contributory to any of the hypotheses tested but rather for complementary discussion only. The age distribution is skewed in favour of the 18 – 25 years range with 128 respondents (84.8%), while 23 (15.2%) respondents are within 26 – 35 years. This reflects in the program of study distribution of 134 (88.7%) for Bachelor degree and 17 (11.3%) for Master degree. the undergraduate students are mostly in the range of 18 – 25 years, and this reflects in the percentage distribution of the program of study.

On the other hand, the gender distribution of the respondents is 77 (51%) and 74 (49%) for the males and females respectively. This distribution presents a fairly gender balance. Also, the respondents are homogenous in the program of study because they are all students of Information Technology, either undergraduates or postgraduates. They have all taken SAD as

a course in their program of study, also. The homogeneity of respondents' the course of study –being all from IT department – and having taken SAD before strongly suggest the representativeness of the responses needed in determining the success factors of teaching and learning SAD. The discussion of the hypotheses' testing result, which is arguably the exclusive objectives of this study, is then presented in sections 5.1.1 to 5.1.8.

5.1.1 H_1: SAD students' attitude influences students' academic success

This study found that SAD students' attitude and students' academic success are positively and significantly related. The strength of the relationship, according to Cohen (1988), is medium and the influence of the strength is moderate. In specifics, this study found that SAD students' attitude significantly and moderately influences students' academic success in SAD. This finding is in consonance with the findings of Sharma and Barrett (2011), Konradt et al. (2003), Draffan and Peter (2006), Natasa, Mornar, and Boticki (2009), and Tang and Pan (2008) which all reported that attitude of the learners is a factor that influences successful learning experience, though with no highlight of the direction of the relationship and the strength of the effect. Also, these studies either measured attitude using pedagogical model of the teaching and learning (Sharma & Barrett, 2011; Konradt et al., 2003; Draffan & Peter R, 2006), or through attitude towards technology used in the learning process (Sharma & Barrett, 2011; Natasa, Mornar, & Boticki, 2009; Tang & Pan, 2008), and all presented that attitude influences academic success.

In this study, which apparently extended from the recorded measuring dimensions of previous studies, students' attitude towards the blended learning model, the students' attitude towards technology usage for learning, and the students' attitude towards the learning systems for cooperative and collaborative learning are used in measuring the learners' attitude, and equally found to be positively related and with moderate influence. This implies

that the students' attitude towards the use of blended learning model for the teaching and learning which includes the use of online and classroom teaching media must be gauged and understood. The students' perception of instructional technology usage for teaching and the role of collaborative learning (such as group work and collective assignment) for deeper understanding of the course and attainment of the learning deliverables must be well emphasized. As the findings suggests, a positive attitude in these dimensions will achieve positive academic results.

5.1.2 H_2: SAD students' technology usage level influences students' academic success

This study found that SAD students' technology usage level and students' academic success are significantly positively related. It also found SAD students' technology usage level influences on students' academic success with a medium significant effect. This aligns absolutely with Sharma and Barrett (2011) and Draffan and Peter (2006) findings which equally reported that technology usage level of the learners and academic success are positively related and that technology usage level influences the success rate of online learning model. It therefore shows that the positive relationship and effect, as found on online learning model, is also obtainable in blended learning model, and applicable to SAD academic success.

Online learning model is an integral component of blended learning model. It leverages essentially on technology for the virtual learning process to achieve the learning deliverables. Hence, there will be need for students being able to appropriately use these technologies and satisfactorily engage it for learning process. The rate at which the student can use the technology is thus logically proportional to success to be achieved therein. Therefore, the proposition that the ability of students learning SAD to use technology, school online

learning systems and other associated IT tools to positively influence the students' academic success is theoretically and empirically supported. It also implies that exposing students to technology must take front row in the educational training since the medium of learning is extensively becoming technological.

5.1.3 H_3: SAD students' access to technology influences students' academic success technology

This study found significant positive relationship between SAD students' access to technology and students' academic success. It also found that SAD students' access to technology positively influences students' academic success, though with weak strength. This result is supported by previous studies like Sharma and Barrett (2011) and Tang and Pan (2008) which also found that learners' access to appropriate technology, in a blended learning environment, is a factor for successful implementation of the blended learning model.

Sharma and Barrett (2011) pushed the boundary of investigating the role of technology for e-learning system to blended learning model. It hinted learners' access to technology must encompass web-based e-learning system, strong internet broadband, podcasts, and multimedia-PC-classroom setting, amongst others. These components are employed by this study's operationalization of technology that the students are expected to access. This finding, as earlier stated, showed a positive relationship and influence on students' academic success in SAD.

This implication of this result is that, even though students' technology usage level influences the academic success of the students, and specifically for SAD, the students must be able to access all varieties of technologies like e-learning system, strong internet broadband, podcasts, and multimedia-PC-classroom setting for a successful learning experience.

5.1.4 H_4: SAD students' courseware influences students' academic success technology

This study found that SAD students' courseware and students' academic success are positively related with medium strength. Also, it found that SAD students' courseware moderately influences students' academic success with significant effect. Both the relationship and the influence are positive. The finding that SAD students' courseware influences students' academic success equally aligns with similar previous findings of Sharma and Barrett (2011) and Tang and Pan (2008). Both studies reported that courseware materials, especially when designed to convey the learning deliverables of the studies, influence learning success. This study, just as Sharma and Barrett (2011) and Tang and Pan (2008), highlighted the essence of rich learning resources and support learning material blended learning model, as it is equally found in internet learning model.

This finding essentially addresses the importance of quality courseware materials which cannot and should not be relegated because of the shift of learning process to online medium. It equally underscores the importance of pedagogy which stipulates the comprehensiveness of courseware in delivering learning objectives.

5.1.5 H_5: SAD curriculum influences students' academic success

This study found that the relationship between SAD curriculum and students' academic success to medium positive. It also found that SAD curriculum influences (positive and moderate significance) students' academic success. This finding is supported by Guidry et al. (2011) and Draffan and Peter (2006) which are studies that equally stated course curriculum as a factor that determines the success of the course and the entirety of the programme.

Natasa, Mornar, and Boticki (2009) also stated that SAD curriculum positively influences the choice of advanced information technology courses. And, in a clear suggestion on the

experience of low enrolment in a particular Management Information System (MIS) programs, Wang and Wang (2014) stated that the curriculum of SAD is a factor. This study has further strengthened the empirical study on the positive influence of SAD curriculum on students' academic success. Generally, this study further supported the importance of curriculum as an important factor of academic success, and as stipulated by Natasa, Mornar, and Boticki (2009) and Wang and Wang (2014), SAD curriculum is a factor in students' success of the course. Apart from the general provision, this finding implies that SAD curriculum must be designed so as to enhance hands-on practical knowledge, compliance with blended learning model, and eventually address the employability problems of the graduate of IT which are arguably caused by lack of SAD knowledge.

5.1.6 H_6: SAD's learning system interface quality influences students' academic success

This study found that SAD learning system interface quality and students' academic success are positively related, with medium strength. It also found that SAD's learning system interface quality moderately influences students' academic success. This finding are supported by earlier results from Natasa, Mornar and Boticki (2009) and Tang and Pan (2008) which stated that the quality of the interface of the learning system is a factor in successful usage of the system, and by extension, the enhanced learning experience. The proposition that SAD's learning system interface quality influences students' academic success is built on this basis, and this is validated by this finding.

Considering the context of e-learning system, Draffan and Peter (2006) posited that e-learning interactivity and usability issues can affect user experience. Arguably, when the user experience from the usage of such e-learning system is negative, there will be negative influence on the usage success, i.e. academic success, since the e-learning system is for

academic purposes. This study, with measures that border on system interactivity, text readability, page navigation and usability compliance, found that SAD e-learning system interface quality positively influences the academic success.

This implies that the usability issues of any e-learning system to be used for the virtual learning environment must be fixed. Also, the dimensions of designing user experience to achieve interactive, communication, loading time, and others, must be incorporated so that the e-learning system can be usable for the learning purposes. In so doing, it will be instrumental for the academic success it is intended to achieve.

5.1.7 H_7: SAD Lecture quality influences students' academic success

This study found SAD lecture quality and students' academic success to be positively related, with medium strength of relationship. Also, it found that SAD lecture quality significantly and positively influences students' academic success, though with weak strength of effect. This finding agrees with Tang and Pan's (2008) findings that lecture delivery mode combines the various pedagogical approaches to produce an optimal learning outcome. This is argued to be a success factor in teaching and learning, with or without an educational technology.

This finding addresses the importance of the human input in the teaching and learning of SAD. The lecture quality is mainly lecturer-driven. It therefore points that, even though instructional technology is a success factor in the learning of SAD, the quality of the lecture delivered is also one. This lecture could be recorded or live. The important attention, however, is that the instructor delivers the lecture with utmost attention to details, simplicity and results. This will influence students' understanding of the course and subsequently the academic success.

5.1.8 H_8: Learning System Comprehensiveness influences students' academic success

This study found that SAD learning system comprehensiveness and students' academic success are positively related. SAD learning system comprehensiveness also has weak and significant influence on students' academic success. This finding also supports Tang and Pan (2008) which noted that learning system must be comprehensive enough for the blended learning model to be successful.

Learning system comprehensiveness addresses the component features of the learning system and the constituents. An online learning system must have functional requirements that are more than just downloading and uploading materials. Functions like group discussion, online resource link, teleconferencing, among others, must be rightly involved to expand the functionalities of the e-learning system.

5.2 Revisiting the Research Questions and Objectives

This study earlier posed three research questions it sets to answer, and their three respective research objectives it sets to achieve. These are revisited in sections 5.2.1 to 5.2.3 below.

5.2.1 The Success Factors of Blended Learning Model for the Teaching and Learning of SAD

The first research question is "What factors effect the success of blended learning model for the teaching and learning of SAD?" And, the first research objective is "To identify factors that effect the success of blended learning model for the teaching and learning of SAD". The findings from the hypotheses testing can be summarized to answer the research question, and thus suggests that the first research objective is accomplished.

The factors that affect the success of blended learning model for the teaching and learning of SAD, as shown in this study, are students' attitude, students' technology usage level, students' access to technology, courseware, curriculum, learning system interface quality, lecture quality and e-learning system comprehensiveness.

5.2.2 The Relationship between the Success Factors and Academic Success of SAD

The second research question is "What are the relationship between the success factors and academic success of SAD?" And, the second research objective is "To identify the relationship between the success factors and academic success of SAD". The findings from the hypotheses testing can equally be summarized to answer the research question, and this therefore suggests that the second research objective is accomplished. The relationship between the blended learning success factors of SAD and the academic success are characterized by the direction (positive or negative), strength (small, medium or large) and the significance or insignificance level.

First, all the proposed blended learning success factors for SAD (students' attitude, students' technology usage level, students' access to technology, students' courseware, curriculum, learning system interface quality, lecture quality, E-learning system comprehensiveness) are related to academic success in SAD. Second, all these factors are positively and significantly related with academic success. Third, the strength of the relationship between academic success with students' access to technology and E-learning system comprehensiveness is small, while that with students' attitude, students' technology usage, students' courseware, and learning system interface quality, and lecture quality is medium. Fourth, which is the last characterization; all the factors (students' attitude, students' access to technology, students' courseware, learning system interface quality, lecture quality and E-learning system

comprehensiveness, students' technology usage level and curriculum) have significant relationship with the independent variable, i.e. students' academic success.

This shows that all the factors proposed are related to academic success of SAD. The positive relationship implies that an increase in the attainment and fulfilment of any of the proposed factor will achieve increase in the attainment of academic success of SAD which is the independent variable. The significant level shows that these relationships are important. In the order of preference, this should be followed by Curriculum, students' technology usage, students' attitude, Courseware Quality, learning system interface quality, and lecture quality. Students' access to technology and E-learning system comprehensiveness are the least.

5.2.3 The Effects of the Success Factors on Academic Success of SAD

The third research question is "What are the effects of the success factors on academic success of SAD?" And, the third research objective is "To identify the effects of the success factors on academic success of SAD". The findings from the hypotheses testing can equally be summarized to answer the research question, and this therefore suggests that the third research objective is accomplished.

First, the characteristics of the effect are into direction (positive or negative), strength (weak, moderate and substantial) and the significance or insignificance level. All the factors are of significant effect on the independent variables, and this suggests the acceptance of all the hypotheses. Second, all the factors others (attitude, students' technology usage level, students' access to technology, students' courseware, curriculum, learning system interface quality, lecture quality) are of positive influence. Third, students' access to technology, lecture quality and E-learning system comprehensiveness are of weak effect. Students' attitude, students' technology usage level, students' courseware, curriculum and learning system interface quality are of moderate effect on academic success.

This result implies that aside the same level of significance that all the factors have academic success, and positive direction. This, in order of sequence, is followed by students' attitude, students' technology usage level, students' courseware, curriculum and learning system interface quality of medium strength. Lastly, the lowest are students' access to technology, lecture quality and E-learning system comprehensiveness. This order of strength is important for education policy makers, and specifically the SAD course coordinator and administrators in higher education institutions to prioritize policy implementation that will achieve the factors that lead to academic success of SAD.

5.3 Contributions of the Study

The main objective of this study is identifying the academic success factors of SAD in implementing blended learning model for its teaching and learning. Both practical and theoretical contributions are delivered by this study. The examination of the elicited success factors of SAD in the implementation of blended learning model is the main contribution. The findings deliver empirically-supported factors that must be taken into consideration by education policy makers and administrators in the implementation process of blended learning model for the teaching of SAD. This study's contribution to practice is the guideline it proffers for the policy makers in improving students' academic success in learning SAD.

The findings of this study showed that students' attitude, students' technology usage level, students' access to technology, students' courseware, curriculum, learning system interface quality, lecture quality and e-learning system comprehensiveness are to be considered as factors for the academic success of SAD. The research instrument developed –presented in Appendix B –by this study is equally usable by other future related studies.

5.4 Limitations of the Study

Although the study had provided significant findings for the factors that lead to academic success, however, the study is not without limitation. The first limitation of this study is the scope of the study. It is for the reason that this study examined the students only at UUM. Thus, no comparison has been made between other institutions because the study was specifically focus only on student in UUM.

Another limitation is that this study used only quantitative method. Qualitative method using interviews to collect data were not part of the study, though interviews could have provided insight from different perspectives and additional information could have brought significant results. Moreover, this study is cross sectional study that only captures the student's opinion. While, teacher's perceptions also can aim to generate different factors that impact on the learning process.

5.5 Recommendation for Future Research

Future researches are recommended in terms of reconceptualization of the constructs that should be investigated for blended learning success model, expansion of the population distribution to enhance generalizability of the model, and employment of more sophisticated statistical technique. These are further discussed as follows.

a. Academic successes measures should, in future researches, include graduate career growth, employability, among others. This will result in inclusion of working graduates as part of the respondents.
b. The respondents should be expanded beyond the undergraduate students and postgraduate, to graduates seeking employments, and possibly Alumni. And other institutions not only UUM. This will avail the opportunity of involving more

measures of academic success and also a larger population size to draw respondents from.

c. SEM using Partial Least Square or AMOS should be employed by future researches to test the strength of the model, especially the causal link and path analysis.

5.6 Conclusion of the Study

This research was conducted to identify the success factors that influence academic success of SAD through the implementation of blended learning model. The data is collected from students of Universiti Utara Malaysia who have taken or presently taking SAD as a course in either the BSc or MSc programs. The findings, from the hypotheses testing, showed that students' attitude, students' technology usage level, students' access to technology, students' courseware, curriculum, learning system interface quality, lecture quality, E-learning system comprehensiveness are positively related to academic success in SAD and positively influence it. These factors are therefore concluded to be necessary for consideration in the implementation of blended learning model.

This study achieves its main objective which is to identify factors that influence the success of blended learning for teaching and learning SAD, and presents its significance in both the practical and theoretical fold. The findings, as presented, will be useful for theory and practice, the education policy makers and administrators in the implementation process of blended learning model for the teaching of SAD.

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Appendix A: Sample Size Decision Table (Krejcie and Morgan, 1970)

N = Population size S = Recommended sample size

N	S	**N**	S	**N**	S
10	10	**220**	140	**1,200**	291
15	14	**230**	144	**1,300**	297
20	19	**240**	148	**1,400**	302
25	24	**250**	152	**1,500**	306
30	28	**260**	155	**1,600**	310
35	32	**270**	159	**1,700**	313
40	36	**280**	162	**1,800**	317
45	40	**290**	165	**1,900**	320
50	44	**300**	175	**2,000**	322
55	48	**320**	181	**2,200**	327
60	52	**340**	191	**2,400**	331
65	56	**360**	196	**2,600**	335
70	59	**380**	205	**2,800**	338
75	63	**400**	210	**3,000**	341
80	66	**420**	217	**3,500**	346
85	70	**440**	226	**4,000**	351
90	73	**460**	242	**4,500**	354
95	76	**480**	248	**5,000**	357
100	80	**500**	260	**6,000**	361
110	86	**550**	265	**7,000**	364
120	92	**600**	274	**8,000**	367

130	97	**650**	278	**9,000**	368
140	103	**700**	169	**10,000**	370
150	108	**750**	186	**15,000**	375
160	113	**800**	201	**20,000**	377
170	118	**850**	214	**30,000**	379
180	123	**900**	234	**40,000**	380
190	127	**950**	254	**50,000**	381
200	132	**1,000**	269	**75,000**	823
210	136	**1,100**	285	**1,000,000**	384

Appendix B: SURVEY INSTRUMENT

INVESTIGATING THE FACTORS INFLUENCING BLENDED LEARNING SUCCESS FOR SYSTEM ANALYSIS AND DESIGN IN UNIVERSITI UTARA MALAYSIA

Introduction

Dear Respondents,

This survey is to collect your responses in view of investigating the factors that influence the success of blended learning model for System Analysis and Design (SAD). You are chosen as a valid respondent because you have taken or presently taking System Analysis and Design (SAD) as one of the courses for your undergraduate or postgraduate program in Universiti Utara Malaysia (UUM). Since UUM is relatively utilizing blended learning model, i.e. using both e-learning management system and traditional classroom for teaching and learning, we seek to identify the factors that influence the success of this model for the teaching and learning SAD. Your responses will help us in determining the success factors towards the improvement of teaching and learning SAD using blended learning model. Hence, your responses are to be as objective as possible.

If you need any clarifications or have any recommendations, feel free to contact the researcher through the details listed below.

Thank you for your willingness to participate in this survey.

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PART A: DEMOGRAPHIC INFORMATION

The following items aim to obtain your demographic and background information. Please answer by placing a check (√) in the appropriate bracket below:

1	**Gender :**	[ ] Male [ ] Female
2	**Age:**	[ ] 18 – 25 years old [ ] 26 – 35 years old [ ] 36 – 40 years old [ ] Above 40 years old
3	**Program of Study:**	[ ] Bachelor's Degree (IT) [ ] Master's Degree (IT)

PART B: ACADEMIC SUCCESS IN SYSTEM ANALYSIS AND DESIGN.

Items		**Please tick (√)**				
		Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
1	I do not get less than Bs in my System Analysis and Design course.					
2	I secured/am securing internship due to my proficiency in System Analysis and Design.					

3	I won a competition based on my performance in System Analysis and Design.					
4	I got an award because of my excellent understanding of System Analysis and Design.					
5	I got a job due to my proficiency in System Analysis and Design.					
6	My proficiency in System Analysis and Design has positive effect in my programming					
7	My proficiency in System Analysis and Design has positive effect in my software development					

PART C: BLENDED LEARNING MODEL SUCCESS FACTORS FOR SYSTEM ANALYSIS AND DESIGN.

a. Attitude

Items		**Please tick (√)**				
		Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
1	I feel it is important to be able to learn online					

2	I feel it is important to be to access internet anytime I want					
3	I feel it is important to explore details of any learning technology I come across					
4	I believe technology makes learning easy.					
	When you think of learning System Analysis and Design, how often do you feel the following:	Never 1	Rarely 2	Some-times 3	Often 4	Always 5
5	Happy					
6	Excited					
7	Ambitious					

b. Technology Usage Level

Items		**Please tick (√)**				
How often do you do the following using PC or mobile phone connected to the internet?		Never 1	Rarely 2	Some-times 3	Often 4	Always 5
1	Listen to lecture podcast					
2	Watch lecture videos					
3	Answer quizzes					
4	Submit assignment report					
5	Ask questions from the instructor					

6	Participate in discussion forum					
7	Guide co-students through a particular lesson					

c. Access to Technology

Items		**Please tick (√)**				
How can you rate your access to the following technologies for purpose of learning:		Poor 1	Fair 2	Good 3	Very Good 4	Excellent 5
1	Mobile phone					
2	Internet					
3	Laptop					
4	Multimedia					
5	Software					
6	Podcast					
7	Portable Digital Assistant					

d. Courseware Quality

Items		**Please tick (√)**				
		Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
1	I get useful learning material on System Analysis and design					

2	The study textbook guides in building my System Analysis and design skill.					
3	Lecture notes are available for all lessons taken on SAD					
4	Lecture notes provided simplifies the difficult lessons in System Analysis and design					
5	The study textbook teaches current lessons in System Analysis and design skill					
6	The study textbook contains practical-oriented exercises and projects in System Analysis and design skill					
7	The lecture notes provide connection between System Analysis and design and my programming lessons.					

e. Curriculum Content

Items		**Please tick (√)**				
How often do you experience the following content of System Analysis and Design curriculum		Never 1	Rarely 2	Some-times 3	Often 4	Always 5
1	Requirements Analysis					
2	UML Design models					

3	Preparation and design of Use Case diagrams					
4	Sequence and Communication Diagrams					
5	Activity Diagram					
6	Class Diagram					
7	Implementation process					

f. Learning System Interface Quality

	Items	**Please tick (√)**				
		Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
1	The e-learning system interface text is readable					
2	The e-learning system interface supports sound					
3	The e-learning system interface can navigate					
4	The e-learning system interface links the learning modules					
5	The e-learning system interface graphics are readable					
6	The e-learning system interface has					

	good combination of colours					
7	The e-learning system interface is interactive					

g. Lecture Quality

Items		**Please tick (√)**				
		Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
1	The lectures are relevant to the course's objectives					
2	The lectures are up-to-date					
3	The course outline are met					
4	The lecture is skill-building					
5	The course assignments are related to the course outcome					
6	The assessment processes for this course are fair					
7	The feedback provided during the course is helpful					

h. Learning System Comprehensiveness

Items		Please tick (√)				
		Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
1	I need my user identity to log-in into the e-learning system					
2	I can discuss with my course mates using the e-learning system					
3	I can receive feedback from by lecturer through the e-learning system					
4	The e-learning system allows the lecturer to upload our assessment marks					
5	The e-learning systems automatically calculates our course scores					
6	Each of my courses has its separate section in the e-learning system					
7	I can download my courseware from the e-learning system					

Appendix C: ASSESING NORMALITY

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Academic success	149	2	5	3.50	.835	.166	.199	-.544	.395
Academic success	149	1	5	3.34	.867	-.395	.199	.445	.395
Academic success	149	1	5	3.07	.977	-.356	.199	-.136	.395
Academic success	149	1	5	3.11	.916	-.216	.199	-.110	.395
Academic success	149	1	5	3.18	.973	-.372	.199	.028	.395
Academic success	149	1	5	3.49	.890	-.436	.199	.072	.395
Academic success	149	1	5	3.56	.896	-.259	.199	-.415	.395
Attitude	149	1	5	3.81	.828	-.420	.199	.130	.395
Attitude	149	2	5	3.99	.834	-.270	.199	-.877	.395
Attitude	149	1	5	3.93	.894	-.430	.199	-.348	.395
Attitude	149	1	5	3.33	1.165	-.149	.199	-.914	.395
Attitude	149	2	5	3.62	.867	.073	.199	-.733	.395
Attitude	149	2	5	3.52	.835	.123	.199	-.552	.395
Attitude	149	1	5	3.52	.859	.012	.199	.002	.395
Tech usage level	149	1	5	3.34	.844	-.106	.199	.253	.395
Tech usage level	149	1	5	3.43	.799	.032	.199	-.022	.395
Tech usage level	149	2	5	3.50	.802	.108	.199	-.442	.395

Tech usage level	149	1	5	3.70	.868	-.377	.199	-.139	.395
Tech usage level	149	2	5	3.48	.835	.089	.199	-.535	.395
Tech usage level	149	1	5	3.34	.914	-.088	.199	-.461	.395
Tech usage level	149	1	5	3.39	.942	-.166	.199	-.147	.395
Access to Tech	149	2	5	3.72	.878	-.021	.199	-.836	.395
Access to Tech	149	2	5	3.95	.841	-.256	.199	-.819	.395
Access to Tech	149	2	5	4.01	.801	-.492	.199	-.193	.395
Access to Tech	149	2	5	3.62	.684	.016	.199	-.222	.395
Access to Tech	149	1	5	3.52	.802	-.038	.199	-.028	.395
Access to Tech	149	1	5	3.33	.866	-.377	.199	.451	.395
Access to Tech	149	1	5	3.42	.909	-.377	.199	.048	.395
Courseware Quality	149	2	5	3.69	.667	.031	.199	-.262	.395
Courseware Quality	149	1	5	3.36	.924	-.213	.199	-.329	.395
Courseware Quality	149	1	5	3.64	.839	-.013	.199	-.278	.395
Courseware Quality	149	1	5	3.54	.889	.062	.199	-.458	.395
Courseware Quality	149	1	5	3.52	.802	-.175	.199	.390	.395
Courseware Quality	149	1	5	3.55	.792	-.250	.199	.504	.395
Courseware Quality	149	1	5	3.69	.829	-.160	.199	-.147	.395
Curriculum content	149	1	5	3.54	.767	-.103	.199	.168	.395
Curriculum content	149	1	5	3.61	.769	-.198	.199	.219	.395
Curriculum content	149	1	5	3.62	.826	-.222	.199	-.067	.395
Curriculum content	149	1	5	3.64	.814	-.172	.199	-.041	.395
Curriculum content	149	2	5	3.53	.818	.089	.199	-.506	.395
Curriculum content	149	1	5	3.62	.827	-.200	.199	-.087	.395
Curriculum content	149	1	5	3.64	.782	-.209	.199	.161	.395
Interface quality	149	2	5	3.64	.648	-.100	.199	-.118	.395
Interface quality	149	2	5	3.67	.672	-.174	.199	-.040	.395
Interface quality	149	2	5	3.58	.727	.078	.199	-.301	.395

Interface quality	149	2	5	3.63	.800	-.196	.199	-.360	.395
Interface quality	149	2	5	3.50	.851	.111	.199	-.590	.395
Interface quality	149	1	5	3.50	.835	.095	.199	-.196	.395
Interface quality	149	1	5	3.56	.808	-.132	.199	-.033	.395
Lecture quality	149	2	5	3.69	.761	-.064	.199	-.372	.395
Lecture quality	149	2	5	3.70	.769	-.056	.199	-.410	.395
Lecture quality	149	2	5	3.57	.791	.014	.199	-.428	.395
Lecture quality	149	2	5	3.59	.870	-.158	.199	-.614	.395
Lecture quality	149	2	5	3.60	.830	.009	.199	-.562	.395
Lecture quality	149	2	5	3.57	.832	.023	.199	-.558	.395
Lecture quality	149	2	5	3.63	.817	.098	.199	-.609	.395
System comprehensiveness	149	2	5	3.77	.772	.062	.199	-.690	.395
System comprehensiveness	149	1	5	3.53	.785	-.059	.199	.063	.395
System comprehensiveness	149	1	5	3.62	.785	-.566	.199	.803	.395
System comprehensiveness	149	1	5	3.72	.839	-.401	.199	.041	.395
System comprehensiveness	149	2	5	3.60	.778	-.047	.199	-.380	.395
System comprehensiveness	149	2	5	3.74	.857	.012	.199	-.839	.395
System comprehensiveness	149	2	5	3.78	.845	-.036	.199	-.816	.395
Valid N (listwise)	149								

Appendix D: RESULTS FOR THE HYPOTHESES TESTING

H_1: SAD students' attitude influences students' academic success

Correlations

		Total Academic Success	Total Attitude
Total Academic Success	Pearson Correlation	1	.457**
	Sig. (2-tailed)		.000
	N	149	149
Total Attitude	Pearson Correlation	.457**	1
	Sig. (2-tailed)	.000	
	N	149	149

**. Correlation is significant at the 0.01 level (2-tailed).

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.457[a]	.209	.203	3.93034	.209	38.745	1	147	.000

a. Predictors: (Constant), Total Attitude

b. Dependent Variable: Total Academic Success

H_2: SAD students' technology usage level influences students' academic success

Correlations

		Total Academic Success	Total tech usage level
Total Academic Success	Pearson Correlation	1	.462**
	Sig. (2-tailed)		.000
	N	149	149
Total tech usage level	Pearson Correlation	.462**	1
	Sig. (2-tailed)	.000	
	N	149	149

**. Correlation is significant at the 0.01 level (2-tailed).

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.462[a]	.213	.208	3.91847	.213	39.871	1	147	.000

a. Predictors: (Constant), Total tech usage level

b. Dependent Variable: Total Academic Success

H_3: SAD students' access to technology influences students' academic success

Correlations

		Total Academic Success	Total Access to tech
Total Academic Success	Pearson Correlation	1	.272**
	Sig. (2-tailed)		.001
	N	149	149
Total Access to tech	Pearson Correlation	.272**	1
	Sig. (2-tailed)	.001	
	N	149	149

**. Correlation is significant at the 0.01 level (2-tailed).

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.272[a]	.074	.068	4.25140	.074	11.749	1	147	.001

a. Predictors: (Constant), Total Access to tech

b. Dependent Variable: Total Academic Success

H_4: SAD students' courseware influences students' academic success

Correlations

		Total Academic Success	Total courseware
Total Academic Success	Pearson Correlation	1	.446**
	Sig. (2-tailed)		.000
	N	149	149
Total courseware	Pearson Correlation	.446**	1
	Sig. (2-tailed)	.000	
	N	149	149

**. Correlation is significant at the 0.01 level (2-tailed).

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.446[a]	.199	.193	3.95507	.199	36.429	1	147	.000

a. Predictors: (Constant), Total courseware

b. Dependent Variable: Total Academic Success

H_5: SAD curriculum influences students' academic success

Correlations

		Total Academic Success	Total curricullum
Total Academic Success	Pearson Correlation	1	.497**
	Sig. (2-tailed)		.000
	N	149	149
Total curricullum	Pearson Correlation	.497**	1
	Sig. (2-tailed)	.000	
	N	149	149

**. Correlation is significant at the 0.01 level (2-tailed).

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.497[a]	.247	.242	3.83275	.247	48.324	1	147	.000

a. Predictors: (Constant), Total curricullum

b. Dependent Variable: Total Academic Success

H_6: SAD's learning system interface quality influences students' academic success

Correlations

		Total Academic Success	Total Interface Quality
Total Academic Success	Pearson Correlation	1	.419**
	Sig. (2-tailed)		.000
	N	149	149
Total Interface Quality	Pearson Correlation	.419**	1
	Sig. (2-tailed)	.000	
	N	149	149

**. Correlation is significant at the 0.01 level (2-tailed).

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.419[a]	.176	.170	4.01159	.176	31.297	1	147	.000

a. Predictors: (Constant), Total Interface Quality

b. Dependent Variable: Total Academic Success

H_7: SAD Lecture quality influences students' academic success

Correlations

		Total Academic Success	Total Lecture quality
Total Academic Success	Pearson Correlation	1	.349**
	Sig. (2-tailed)		.000
	N	149	149
Total Lecture quality	Pearson Correlation	.349**	1
	Sig. (2-tailed)	.000	
	N	149	149

**. Correlation is significant at the 0.01 level (2-tailed).

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.349[a]	.122	.116	4.14033	.122	20.381	1	147	.000

a. Predictors: (Constant), Total Lecture quality

b. Dependent Variable: Total Academic Success

H_8: SAD Learning System Comprehensiveness influences students' academic success

Correlations

		Total Academic Success	Total System comprehensiveness
Total Academic Success	Pearson Correlation	1	.243**
	Sig. (2-tailed)		.003
	N	149	149
Total System comprehensiveness	Pearson Correlation	.243**	1
	Sig. (2-tailed)	.003	
	N	149	149

**. Correlation is significant at the 0.01 level (2-tailed).

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.243[a]	.059	.053	4.28539	.059	9.241	1	147	.003

a. Predictors: (Constant), Total System comprehensiveness

b. Dependent Variable: Total Academic Success

Appendix E: Details of the Experts consulted for the Content Validity of the Survey Instrument

Name	Title	Area of Expertise
DR. WAN ROZAINI SHEIK OSMAN	Assoc. Prof	Information System Research, E-Government
DR SITI SAKIRA KAMARUDDIN	Senior Lecturer	System Analysis and Design