

Investigating the factors Influencing Blended Learning Success for System Analysis and Design Course

Saif Muttair, D.¹, Nor Hazlyna, H.², Mohamad Ghazali, H.³

¹Middle Technical University, Baghdad, Iraq

²School of Computing, College of Art and Sciences Universiti Utara Malaysia (UUM), Sintok Malaysia

³School of Technology Management & Logistics College of Business, Universiti Utara Malaysia

Abstract: System Analysis and Design (SAD) is one of the core courses offered in Bachelor's degree programme in Information Technology. 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. This study therefore aims to identify the effects of the identified 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, who took SAD as a course in UUM, using simple random sampling, and data collected were analysed with correlation and regression techniques. 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.

Key words: *System Analysis and Design, Blended learning model, Success factors, Academic success*

INTRODUCTION

System Analysis and Design (SAD) is one of the core courses offered in many Bachelor's degree programs in Information Technology [5]. In an ideal software engineering job chain, SAD would be done before the art of writing codes to instruct the computer functionalities. In other words, SAD presents a traditional, technical and international standard of analysing and communicating the functional and non-functional requirements to the entire software engineering team generally, and to the computer programmers specifically [3] [13].

Blended learning model improves the students' learning experience [5] [1], and reduces underachievement in Information Technology [2]. The implementation of blended learning is also reported to be positively related to students' achievement [9] [8]. This study therefore aims (1) to identify factors that influence 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.

BLENDED LEARNING MODEL'S SUCCESS FACTORS FOR SYSTEM ANALYSIS AND DESIGN

The success factors for SAD, as reviewed from extant literature, are presented in this section. These factors are attitude, technology usage level; access to technology, courseware quality, curriculum, learning system interface quality, lecture quality, and e-learning system comprehensiveness.

Attitude

Attitude of the learners has been suggested as a factor that influences successful learning experience [8] [15] [12]. This attitude could be either to the pedagogical model of the teaching and learning or to the technology used in the learning process [16] [12]. The

Corresponding Author: Saif Muttair Duhaim, Middle Technical University, Baghdad, Iraq, Iraq, Baghdad, al Rusafa, Street :954, No: 32, +9647711738846

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.

Technology Usage Level

Technology usage level of the learners is positively related and influences the success rate of online learning model [14] [16]. E-skills (such as ability to use appropriate technology and possession of requisite knowledge about e-learning) are reported to be instrumental to knowledge acquisition and construction [12]. Therefore, since online learning which is leveraged with technology is an integral part of the blended learning model. The school online learning systems and other associated IT tools are posited to influence the students' academic success.

Access to Technology

Learners' access to appropriate technology in a blended learning environment is a factor to successful implementation of the blended learning model [14] [16]. Also, [12] stated that the learners' access to technology must be all encompassing. This study therefore 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.

Courseware Quality

The learning resources, especially courseware materials, which are always designed to convey the learning deliverables of the studies influence learning success [16]. On this note, they must be success-oriented [16] reported that internet-based teaching pattern stresses rich teaching resources and computer aided instruction courseware. 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, courseware will be a factor for successful implementation of blended learning model for the teaching and learning of SAD.

Curriculum

The content of course curriculum is a factor that determines the success of the course and the entirety of the program [10] [6]. Curriculum of SAD, being part of Management Information System (MIS) programs, affects a wide range of issues like stable low enrolment [19]. The importance of SAD curriculum to positively

influence choice of advanced information technology courses is emphasized [12]. This 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.

Learning System Interface Quality

The quality of the interface of the learning system is said to be a factor in the successful usage of the system, and by extension, the enhanced learning experience [12]. Quality interface is an important factor in systems' usability and satisfactory users' experience [17]. This instructs that the end result of technology usage and its ability to achieve the set objectives, which is e-learning system is successful learning experience, depend on its interface. This study therefore argues that, with the essence of learning system interface quality in the usability, it determines the success of blended learning model which depends on the e-learning system for knowledge delivery.

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 [12]. 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.

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 [8]. This study therefore argues that, e-learning system for the teaching and learning of SAD must be comprehensive for successful implementation of the blended learning model.

RESEARCH METHODOLOGY

A quantitative research design was employed. The population of these students is 300 based on available statistics of students that took SAD as a course in UUM University for three consecutive semesters. The

sample size is drawn from this population size using the random sampling method. The sample size for this study was determined through the sample size decision table [11], with a confidence level of 95%, 175 was the sample size. However, only 151 respondents returned the filled questionnaire.

FINDINGS

The findings of this study are reported under each heading of the hypotheses tested.

Testing the Research Hypotheses

The hypotheses' testing is done using regression as statistical technique for the investigation of the effect of each of the independent variables on the dependent variable [7]. The [4] guideline of interpreting Regression result (i.e. R^2) was used. This suggests that, 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.

H1: SAD students' attitude influences students' academic success

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. This points that the hypothesis; SAD students' attitude influences students' academic success, is accepted.

H2: SAD students' technology usage level influences students' academic success

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. This points that the hypothesis; SAD students' technology usage level influences students' academic success, is accepted.

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

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. This points that the hypothesis; SAD students' access to technology influences students' academic success, is accepted.

H4: SAD students' courseware influences students' academic success

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. This points that the hypothesis; SAD students' courseware influences students' academic success, is accepted.

H5: SAD curriculum influences students' academic success

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. This points that the hypothesis; SAD curriculum influences students' academic success, is accepted.

H6: SAD's learning system interface quality influences students' academic success

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. This points that the hypothesis; SAD's learning system interface quality influences students' academic success, is accepted.

H7: SAD Lecture quality influences students' academic success

The regression analysis gives the value of R as 0.349 and R² 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. This points that the hypothesis; SAD lecture quality influences students' academic success, is accepted.

H8: SAD E-Learning System Comprehensiveness influences students' academic success

The regression analysis gives the value of R as 0.243 and R² 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. This points that the hypothesis; SAD learning system comprehensiveness influences students' academic success, is not accepted.

DISCUSSION

H1: SAD Students' Attitude Influences Students' Academic Success

The strength of the influence of students' attitude on academic success, according to [4], is moderate. This finding is in consonance with the findings of [12], [18], [16], [10], 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 [12], [7], [10], or through attitude towards technology used in the learning process [18], [16], [12], and all presented that attitude influences academic success.

H2: SAD Students' Technology Usage Level Influences Students' Academic Success

This study found that SAD students' technology usage level influences students' academic success with a medium significant effect. This aligns absolutely with findings of [8] and [16] 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.

H3: SAD Students' Access to Technology Influences Students' Academic Success Technology

This study found that SAD students' access to technology positively influences students' academic success, though with weak strength. This result is supported by previous studies like [8] and [16] 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.

H4: SAD Students' Courseware Influences Students' Academic Success Technology

This study found that SAD students' courseware moderately influences students' academic success with significant effect. SAD students' courseware influences students' academic success equally aligns with similar previous findings [16]. Both studies reported that courseware materials, especially when designed to convey the learning deliverables of the studies, influence learning success. This study, just as [8] and [12], highlighted the essence of rich learning resources and support learning material blended learning model, as it is equally found in internet learning model.

H5: SAD Curriculum Influences Students' Academic Success

This study found that SAD curriculum influences (positive and moderate significance) students' academic success. This finding is supported by [8] and [6]. They equally stated course curriculum as a factor that determines the success of the course and the entirety of the programme. And, in a clear suggestion on the experience of low enrolment in a particular Management Information System (MIS) programs, [19] 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. The importance of curriculum as an important factor of academic success, as stipulated by [12] and [19], is supported. Apart from the general provision, this finding implies that SAD curriculum must be designed so as to enhance hands-on practical knowledge and compliance with blended learning model.

H6: SAD's learning system interface quality influences students' academic success

This study found that SAD's learning system interface quality moderately influences students' academic success. This is supported by earlier results from [8] and [12] 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. 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.

H7: SAD Lecture Quality Influences Students' Academic Success

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.

H8: Learning System Comprehensiveness influences students' academic success

This study found that SAD learning system comprehensiveness has weak but significant influence on students' academic success. This finding also supports [8] 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. Functions like group discussion, online resource link, teleconferencing, among others, are suggested to be involved to expand the functionalities of the e-learning system.

CONCLUSION

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

The factors that influence 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.

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. 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.

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 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.

REFERENCES

- [1] Al-Otaibi, M. F., Nouby, A. M., Abdul Azizi, H. A., & Alagab, A. M. (2012). Effect of Multimedia Activities in Blended Learning on Listening Skills and Satisfaction in a College English Language Course. *Journal of Human Capital Development*, 5 (1), 99 – 115.

- [2] Behjat, F., Yamini, M., & Bagheri, M. S. (2012). Blended Learning: A Ubiquitous Learning Environment for Reading Comprehension. *International Journal of English Linguistics*, 2 (1), 97 – 106.
- [3] Bennett, S., McRobb, S., Farmer, R. (2005). *Object-Oriented Systems Analysis and Design Using UML*. 4th Edition: McGraw Hill, United Kingdom.
- [4] Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2013). *Applied multiple regression/correlation analysis for the behavioral sciences*. Routledge.
- [5] Emre, E. (2014). A Critical Inquiry: Teaching System Analysis and Design Beyond 2015. 5th annual conference of Computing and Information Technology Research and Education New Zealand (CITRENZ2014)
- [6] Guidry, B. N., Stevens, D. P., & Totaro, M. W. (2011). Preview the systems analysis and design course: an educators' assessment of the importance and coverage of topics, *Journal of Information Systems Education*, 22 (4), 331-345.
- [7] Hair, J., Black, W., Babin, B. y. A., Anderson, R., & Tatham, R. (2010). *RE Multivariate Data Analysis. A Global Perspective*. Pearson Prentice Hall: UK
- [8] Huang, D., Leon, S., Hodson, C., La Torre, D., Obregon, N., Rivera, G. (2010). Preparing Students for the 21st Century: Exploring the Effect of Afterschool Participation on Students' Collaboration Skills, Oral Communication Skills, and Self-Efficacy. The Publication of the National Center for Research on Evaluation, Standards, and Student Testing
- [9] Kim, Hea-Suk. (2014). Effects of using mobile devices in blended learning for English reading comprehension, *Multimedia-Assisted Language Learning*, 17(2), 64-85.
- [10] Konradt, U., Filip, R. & Hoffmann, S. (2003) Flow experience and positive affect during hypermedia learning, *British Journal of Educational Technology*, 34(3), 309–327.
- [11] Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and psychological measurement*, 30(3), 607-610.
- [12] Natasa, H-B., Mornar, V., & Boticki, I. (2009). A Blended learning Approach to Course Design and Implementation, *IEEE Transaction on Education*, 52 (1), 19 – 30
- [13] Rob, M. A. (2006). Development of Project Documentation: Key Ingredient in Teaching Systems Analysis and Design. *Issues in Information Systems*, 7(1), 83-87.
- [14] Rosen, L. D., Whaling, K., Carrier, L. M., Cheever, N. A., Rokkum, C. (2013). The Media and technology Usage and Attitude Scale: An Empirical Investigation. *Computers in Human Behavior*, 29 (2013) 2501–2511
- [15] Sakaran, S. R., Sakaran, D., & Bui, T. X. (2000). Effect of Student Attitude to Course Format on Learning Performance: An Empirical Study in Web vs. Lecture Instruction. *Journal of Instructional Psychology*, 27 (1), 66 – 70
- [16] Sharma, P., & Barrett, B. (2011). Blended Learning: Using Technology in and beyond the Language Classroom, *Language, Learning & Technology*, 13 (1), 33 – 39
- [17] Shneiderman, B. (2010). *Designing the user interface: strategies for effective human-computer interaction*. Pearson Education India.
- [18] Tang, X., & Pan, Q. (2008). Study on the Application of Blended Learning in the College English Course 2008 International Seminar on Future Information Technology and Management Engineering, pp. 133 – 136
- [19] Wang, S., & Wang, H. (2014). Redesigning the Information System Analysis and Design Course: Curriculum Renewal, *Journal of Computer Information Systems*, pp. 30 – 39.