Blended learning in selected journals: a content analysis using the Complex Adaptive Blended Learning Systems

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Editor's Note: This study of the literature finds many definitions of blended learning, and gaps in the research that need to be explored.

Blended learning in selected journals: a content analysis using the Complex Adaptive Blended Learning Systems

Mohd Azli Yeop, Kung Teck Wong and Noraini Mohamed Noh

Malaysia

Abstract

This study focuses on the content analysis method and its finding towards the Blended learning approach by means of literature review. It is carried out by using selected journals available online from the Education Resources Information Center (ERIC) which are then analysed with *Complex Adaptive Blended Learning Systems*, introduced by Wang, Han & Yang (2015). The authors are convinced that this method will systematically and accurately improve our overall understanding towards the blended learning approach based on literature review and produce a complete overview towards the research field related to this learning approach. This method will also lead to profound knowledge on the dynamic features and natural properties of the blended learning approach.

In this study, the content analysis research is conducted on 42 empirical studies from the current literature review. Findings show certain gaps in current practices and studies on blended learning that will further increases our insight into potential features that are less highlighted in this new learning approach. The result of this study intends to: 1) clearly explain the existing gap within the studies on blended learning in the education field; and 2) enhance our knowledge on previous findings as well as needs that must be achieved within the practices and studies on blended learning in Malaysia.

Keywords: blended learning, complex adaptive blended learning systems, content analysis

Introduction

Nowadays, every aspect of our lives depends so much on technology and its development has affected us socially, economically, politically, even in our culture and education. According to Kong et al. (2014), the development of computer technology is very dynamic and futuristic; therefore, many hardwares, softwares and changes to the technology have evolved to fulfil the needs of our lives in the 21st century. Changes to the technology's features, particularly the world-wide-web, have greatly enhanced the usage of technology. This has opened doors to educators to find the best method through technology in order to produce learning environments that can meet the various learning styles and needs of the learners; and hence, lead to meaningful learning. According to Kern & Rubin (2012), the usage of technology in teaching and learning is an undeniable need. The effective usage of technology in learning approaches will produce interesting and meaningful learning environments.

Studies have revealed that using technology in the process of learning would increase interest, motivation, improve attention span and produce positive mindset towards learning (Bitner & Bitner, 2002; Nguyen, 2015). Abdul Latif & Lajiman (2011) also agreed that using different methods and technology in the activity of learning could positively stimulate learners' acceptance towards the learning process and enable them to achieve the targeted scores. Moreover, the integration of web technology in the learning process would also improve learning efficacy (Alwehaibi, 2015; Briggs, 2014; Simelane & Mji, 2014). As such, the traditional practices in

schools must be change and transform to a more innovative learning approach, such as Blended learning.

What is Blended learning? Blended learning has been defined over and over again in previous studies. However, none of them gives a complete overview of the origin of blended learning and how each of the component comes together to achieve the intended result. Based on brief summarrization of the previous studies, most scholars defined blended learning as a combination of face-to-face instruction and online-mediated instruction (Briggs, 2014; Graham, 2006; Wong, Tatnall, & Burgess, 2014).

Singh (2003), describes blended learning as a combination of effective knowledge presentation methods in order to support meaningful learning processes to the learners. Mohamed Amin, Norazah, & Ebrahim (2014) on the other hand, defined blended learning in four ways: i) a combination of web-based technologies in the process of learning; ii) a combination of learning pedagogy approaches; iii) a combination of instructional technology and face-to-face instruction; and iv) a combination of instructional technology and learner's learning assignment.

Furthermore, Zaharah, Saedah, Ghazali, & Nur Hasbuna (2015), explain that blended learning is a combination of the conventional learning model and online learning. As such, learners are expected to actively involved in learning process until they personally identified a learning method that work best for themselves. In this process, teachers only function as mediator, facilitator or a companion to create a meaningful and conducive learning environment. It is convinced that blended learning will eventually enhance the conventional learning model by means of the advanced technology nowadays. The overview of blended learning concept is shown in Figure 1.

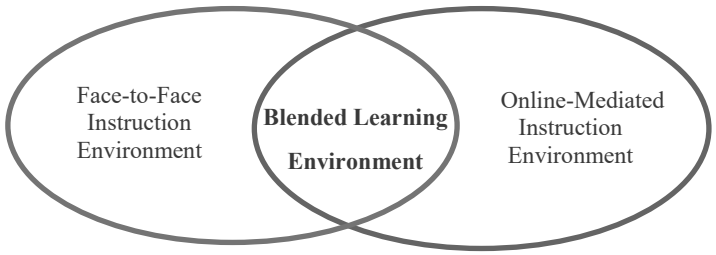


Figure 1 Concept of Blended Learning

In other words, blended learning is a learning process based on a combination of components which include various presentation methods and learning models compliance while fulfilling individual learning style (Mohd Azli, Wong, & Noraini, 2016). This process is conducted in a meaningful and interactive learning environment in order to achieve the objectives of learning.

Why need to conduct blended learning? According to Ozgen Korkmaz & Ufuk Karakus (2009), Yapici & Akbayin (2012), Almasaeid (2014) and VanDerLinden (2014), blended learning could produce abiding learning and increase the necessary skills required to survive in the 21st century globalization. Besides, it is also cost-effective while providing meaningful learning environment.

In this study, the analysis on literature review is based on reports related to blended learning in education dated from January 2015 until July 2016 and published online from the Education Resources Information Center (ERIC) database. The result of this study intends to clearly explain the gap of previous studies related to blended learning; gap in terms of the previous system analysis approach in understanding the practices and studies on blended learning. Besides, this study also aims to enhance our knowledge on previous findings as well as the necessary needs

that must be achieve within the practices and studies on blended learning. In order to achieve these, the content of those reports are analysed from different perspectives by using the Complex Adaptive blended learning Systems introduced by Wang, Han, & Yang (2015). There are actually plenty of issues to discuss related to blended learning in education.

Complex Adaptive Blended Learning Systems

The basic of the construction idea of Complex Adaptive Blended Learning Systems is from the Complex Adaptive Systems Framework which was initially constructed in physics, mathematics and chemistry. This system was used to enhance knowledge towards some dynamically complex themes and non-linear systems such as the nerves, ecology, galaxy and social systems (S. Chan, 2001).

> Complex adaptive systems are described as being living, open systems that "exchange matter, energy, or information across its boundaries and use that exchange of energy to maintain its structure" (Cleveland, 1994)

Based on the development of current technology, the learning systems nowadays are more complex and dynamic. Wang et al. (2015) suggested a six-dimensional subsystems for the learning system through Complex Adaptive Blended Learning Systems. These six subsystems would interact with each other in a non-linear and dynamic way, as in congruent with the other Complex Adaptive Systems. At the same time, each of these subsystems owned its features or characteristic, able to self-motivate while dependent on each other to maintain competitiveness. Moreover, each subsystem would have its own subsystems and they would interact with one another to form a blended learning system. Figure 2 below shows the six subsystems and their connection: learner; teacher; technology; content; learning support; and institution.

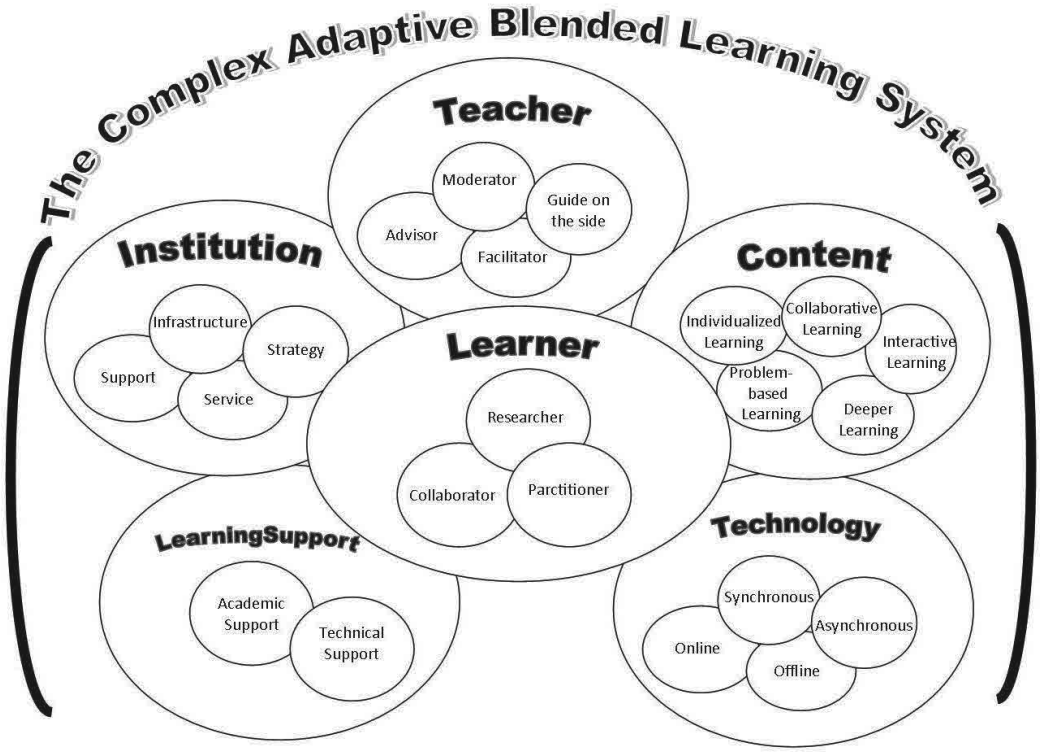


Figure 2 Complex Adaptive Blended Learning Systems (CABLS) Framework

Source: Adaptation of "Revisiting the Blended Learning Literature: Using a Complex Adaptive Systems Framework" by Yuping Wang, Xibin Han and Juan Yang, 2015, p.383.

According to Wang et al. (2015): **Learner in CABLS** refers to a complex subsystem in which learners would be interacting with other subsystems while carrying different roles. The environment of blended learning would switch the roles of learners from passive to actively involve in the learning process. This change is possible because of a dynamic environment and the different interaction ways among the subsystems within the blended learning approach.

Teacher in CABLS would have different roles along with the changes of the roles of learners. The interaction among the subsystems would give a new identity to the teacher either as a facilitator, a counselor, an advisor or an e-moderator.

Content in CABLS would be enriched and more dynamic, not as before. The interaction among the subsystems would foster a learning environment that encourages findings and generation of profound content.

Technology in CABLS with its latest features would aid the interaction among the subsystems. The interaction among technologies and also between technology and the environment would foster a meaningful learning environment.

Learning support in CABLS would focus on two specific learning supports, namely academic support and technical support. Academic support is offered to the learners in order to produce effective learning strategies; while technical support is offered to enhance learners' knowledge on technology while completing their assignments. These supports are channeled according to the specific needs of learners through the expertise of teachers, technology's usability and help from the institution.

Institution in CABLS refers to the roles of institution in offering support as well as policy, strategy and services planning to create a blended learning environment in schools. These roles would expand based on feedbacks received from the other subsystems. In other words, institution is the main subsystem which helps to build up and expand the other subsystems.

Objectives

This study aims to identify the articles related to blended learning from the online journals in the database of Education Resources Information Centre (ERIC). Based on analysis, the researcher intends to: i) identify the gap within the studies on blended learning in the education field; and ii) enhance our knowledge on previous findings as well as the necessary needs that must be achieve within the practices and studies on blended learning. Besides, the analysis on findings also intends to give a thorough overview on studies related to blended learning and its trend within the latest decade. As such, this study serves as a stepping stone to other researchers so as to expand or increase studies which would be exploring the combination of new subsystems concerning issues and theme related to blended learning, particularly in the education system of Malaysia.

Methods

Blended learning is a new issue or a new theme in the education of Malaysia; hence, the scope of this study is conducted within limited available resources. Besides, the content analysis process is also a new method, unlike the usual methods used in the other studies or article writing within the same level. The method used in the content analysis of this study is called the Complex Adaptive Blended learning Systems (CABLS) introduced by Wang et al. (2015). The process of content analysis which involved summarizing and writing the findings began with articles selection from available resources, followed by categorization according to the subsystems and combination of

subsystems. Finally, report writing is based on the research scope according to the format suggested within the content analysis method.

Data accumulation

Literature review is carried out by using the data accumulated online from the Education Resources Information Center (ERIC) database. Scope of data was fixed for the period of January 2015 until July 2016 with specification for articles labeled "peer reviewed only". The search was performed by using "blended learning" as the search keyword with "Instructional Design" as the descriptor. As a result from the search, 42 journal articles are generated and ready to be analysed.

Data analysis

The data is categorized and analysed by using content analysis method. The articles are categorized based on the research's focus into six subsystems within the CABLS, namely learner (L), teacher (T), content (C), technology (Te), learning support (LS), and institution (I).

Findings from literature review towards blended learning

Based on the CABLS framework, this study will describe: 1) Identification of the subsystems and their relationship based on literature review; and 2) Evaluation on the effect of the relationship (the achievements) between the subsystems within the study; and to identify the gap within the practices and studies related to blended learning.

Identification of subsystems and their relationship

The amount of studies conducted which are related to each of the subsystems must be identified in order to capture the complete overview of the latest trend and development of studies on blended learning since 2015. Figure 3 below shows the amount of studies related to each of the subsystems with a total of 42 articles. Based on literature review, each of those articles is related to more than one subsystem. The most popular with 56.8% (25) studies each, focused on the subsystems of learner and learning support; followed by technology subsystem with 38.6%, content subsystem with 20.5% and institution subsystem with 15.9%. Teacher subsystem was the least focused subsystem with 11.4% (5) studies only.

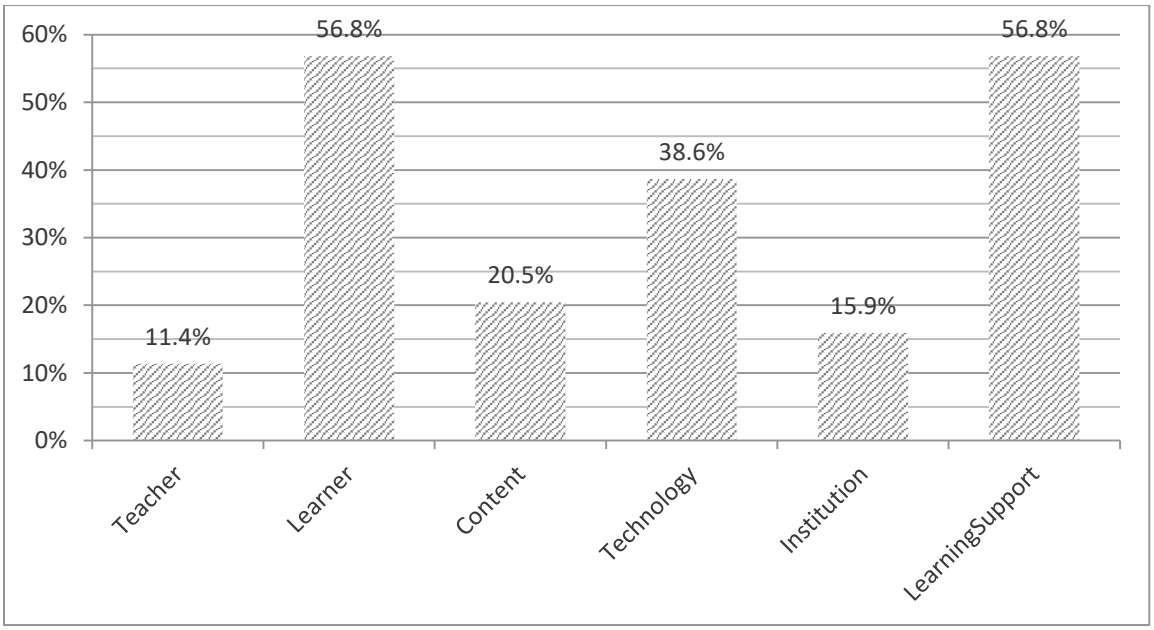
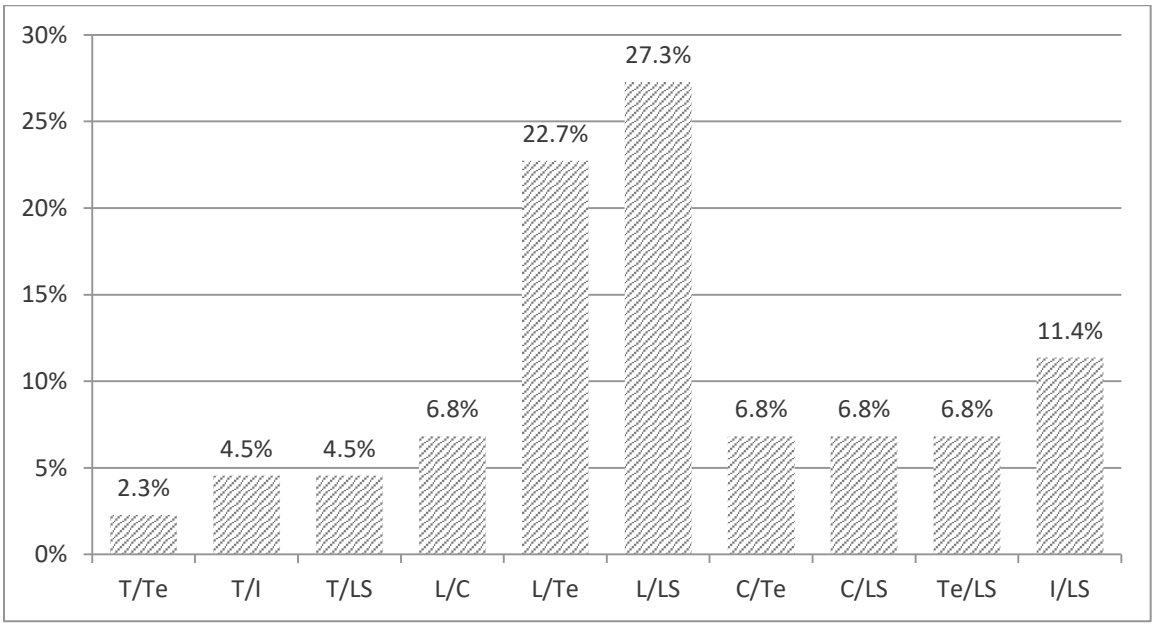


Figure 3 Percentages graphs of the study based on subsystems

The analysis-approach technique in CABLS is used to investigate the relationship between the different subsystems in order to elaborate the findings. Statistically, there are supposed to be 15 one-to-one relationships between these subsystems in this analysis. However, there are only 10 relationships identified (existed) from the 42 articles. Figure 4 below clearly shows the relationships between these subsystems. Based on the graphs in Figure 4, learner – learning support (L-LS) is the most studied subsystems relationship with 27.3% (12) articles from 42 articles; followed by learner – technology (L-Te) subsystems relationship with 22.7% (10) articles; while teacher – technology (T-Te) is the least studied subsystems relationship with only 2.3% (1) article.

Both Figure 3 and Figure 4 indicate that the teacher subsystem and its relationship to the others are the least studied relationship. Moreover, there is no trace of research focusing on the relationships between teacher – learner, teacher – content, learner – institution, content – institution and technology – institution based on literature review. Contrary to that, these relationships are no less important, which could have comprehensively explain and determine the factors of success of the practices of blended learning approach. Furthermore, this analysis has found out that there is not only one-to-one relationship between the subsystems but there are also one-to-various relationships or even various relationships occurred between the subsystems in CABLS which are not analysed or elaborated in this study. The writing of this study is focused on one-to-one relationship between the subsystems because of the scope limit within this study eventhough the other relationships are also important. In conclusion, the findings in Figure 4 are a combination of the findings in Figure 3. The combination of both findings directly indicates the complete overview of the research landscape of current blended learning. As such, as mentioned earlier, the identification of subsystems and their relationships are able to enhance our knowledge on the gap or differences as well as the existed focuses within the studies and practices on blended learning.



Indicator: T=Teacher; L=Learner; C=Content; Te=Technology; LS=Learning Support; I=Institution

Figure 4 Percentages graphs of study based on relationships between subsystems

In this part, the study would elaborate on the interaction between each subsystem based on literature review. The focus would be the main issue related to each subsystem.

Learner subsystem in blended learning

Based on literature review, most of the previous studies which had focused on the learner subsystem in blended learning mainly involved the combination of learner – content subsystems, learner – technology subsystems, and learner – learning support subsystems (refer Figure 4). Overall, the studies mainly focused on two main issues which involved learning effectiveness, and the perception of learners towards blended learning.

Most findings of the studies discussed on: 1) the effectiveness of blended learning approach towards learners' achievement; 2) Blended learning had contributed to the enhancement of new learning skills among the learners; and 3) positive feedbacks (attitude and characters) of learners towards blended learning approach. Study by Costley and Lange (2016) for example, indicated that learning effectiveness was highly influenced by the satisfaction of learners (learners' need fulfilled). On the other hand, Chen & Yao (2016) agreed that the positive perception of learners towards learning would result in positive impact to the learning outcome. Furthermore, Chan and Leung (2016) stressed that blended learning had improved the learners' involvement in learning activities; hence, indirectly helped them achieved the targeted scores in learning. In other words, most findings of the studies indicated positive feedbacks from learners towards blended learning (Akgunduz & Akinoglu, 2016; Chen & Yao, 2016; Moskal, Thompson, & Futch, 2015; Yapici, 2016).

Teacher subsystem in blended learning

Teacher subsystem is the least studied and discussed subsystem in the context of blended learning (refer Figure 4) with only 11.4%. Besides, the combination of subsystems which involved teacher subsystem, namely teacher – technology subsystems, teacher – institution subsystems and teacher – learning support subsystems are also the least studied (Figure 4). Mirriahi, Alonzo, McIntyre, Kligyte, & Fox (2015) explained that the roles of teachers in the process of learning have changed along with the changes in technology which had also introduced new learning approaches. Moreover, their studies also suggested that institution plays an important role in the development of teachers' competency while discussing the relationship of teacher – institution subsystems relationship.

Content subsystem in blended learning

Based on the overall analysis of this study, studies related to the content subsystem involved the combination of learner – content subsystems, content – technology subsystems, and content – learning support subsystems with the same total of 6.8% each. In general, studies related to content discussed on issues concerning the design of curriculum, its presentation and the effectiveness of interaction between content and learner. Study by Tsurutani & Imura (2015) found out that the design of online assignment for Japanese language have encountered some set-backs which had affected the learning process. Those set-backs were caused by some technical problem within the computer system. Besides, the technical aspect of a computer system could also hinder the creativity of learners in building sentences while acquiring a new language. However, the online design has assisted teachers and save their time in checking the assignments.

Mazur, Brown, and Jacobsen (2015) summarized that blended learning is able to maximize the presentation of learning content and offer a variety of delivery methods. Learners could learn according to their own ability (autonomy), more motivated, while able to improve learning effectiveness (Banditvilai, 2016). The changes in the concept of content delivery of blended learning approach from the concept of traditional delivery to online learning has directly improved the standard and success of learning process; therefore, lead to positive achievement (Banditvilai, 2016; Challob, Nadzrah, & Hafizah, 2016; Yapici, 2016).

Wang et al. (2015) stated that by using this analysis system approach, the transformation of content subsystem can be seen clearly when it interact with learner subsystem, technology subsystem and learning support subsystem. Any flaw in these subsystems relationships would cause the content delivery process to be less effective.

Technology subsystem in blended learning

Literature review indicated that technology subsystem has the most interaction with the other subsystems. Besides, this is also the most important subsystem which has contributed to the success of blended learning approach (Wang et al., 2015). Study by Pima, Odetayo, and Iqbal (2016) explained that: 1) a flexible, durable and user friendly technology system; and 2) excellent infrastructures provided by the technology system are the important factors in the success of blended learning. Based on the relationships between teacher – technology subsystems and learner – technology subsystems, findings indicated that both teacher and learner shared a very positive perception towards technology (Banditvilai, 2016; Campbell, 2015; Chen & Yao, 2016; Hariadi, Dewiyani, & Sudarmaningtyas, 2016). Study by Mills (2015) also found out that teachers have high confidences in the effectiveness of technology in the process of learning.

Institution subsystem in blended learning

Institution subsystem is another least studied component, after teacher subsystem. Besides, the subsystems relationship involving institution such as institution – teacher subsystems and institution – learning support subsystems are also the least studied (only two interactions).

Amrien Hamila and Mohamed Amin (2016) explained that support from institution is essential to teachers in order to ensure the success of blended learning approach. There are plenty of ways in which institutions could support the teachers; amongst them are by offering human resources training, technical support, technology utility equipments, institutionalization of learning and the practices of accurate and suitable curriculum design. Besides, institution is also the main subsystem in determining the direction of the education system. The change of strategy within the education system which is in accordance with the current changes will be a success if every component shares the same objectives and work together (Meier, 2016).

Learning support subsystem in blended learning

Learning support is another essential component in order to ensure success in the process of learning. Based on literature review, learning support subsystem is the most studied subsystem with equal amount of percentages with learner subsystem. Most studies have involved learning support subsystem as the main issue in the effort to identify the best practices for blended learning approach. Amongst them are study by Arwa Ahmed and Gandla (2016) which explained the roles of learning support to the teachers in order to ensure success in the process of learning by using the blended learning approach. Nanclares and Rodríguez (2016) also explained that the need to master the skills and usage of technology utility would help learners to achieve their learning objectives. Furthermore, Heckman, Østerlund, and Saltz (2015) and Carré (2015) also agreed that institution plays important roles in preparing the exact learning support to teachers and learners in order to ensure success in the institutionalization of blended learning.

Wang et al. (2015) explained that learning support must be improve based on the needs of learners, according to the skills of teachers, and in accordance with the advancement of technology while getting full support from institution to ensure its success. The firm relationships among the subsystems which involved the learning support subsystem would determine the accomplishment of blended learning.

Conclusion

In order to describe the concept of blended learning approach, Wang et al. (2015) explained blended learning approach as: 1) complex – involving lots of learning components to ensure the success of blended Learning approach; 2) adaptive – flexible adjustment in which blended learning is an easily modified approach in order to fulfil the needs of current learning (aspects of content, learner, teacher, and instructional strategy); 3) dynamic – an approach which is able to change in accordance with the advancement of technology and current learning issues; 4) "self-organizing" – a structurable approach to suit its interaction relationship with the other learning components; and v) "co-evolving" – an approach which could develop in accordance with the development of new learning characteristics, current technology, latest skills based on the teachers' background and improvement of learning objectives.

Based on the framework of CABLS, literature review of this study has identified some gaps within the studies and practices of current blended learning approach. Firstly, literature review has found out that no study has ever discussed the issue of blended learning which involved all six subsystems together. Secondly, the framework of CABLS has identified several subsystems and the relationship between some subsystems which needed attention in future studies. Amongst them are subsystems related to teacher – technology, and the interaction between institutions with other institutions, and between subsystems with the other subsystems. Thirdly, the research has found no study on issues related to the relationships between teacher – learner subsystems, teacher – content subsystems, learner – institution subsystems, content – institution subsystems, and technology – institution subsystems whereby these relationships are of no less importance and must be explored in order to find out the effect of their interactions. Fourthly, the analysis occupying the framework of CABLS has revealed the future possible research regarding blended learning to the public, such as a study on the effect of interaction of the relationships between one-to-various subsystems and the relationships between various subsystems. These possibilities would make ways for future researchers to explore new issues concerning the related subsystems.

In conclusion, it is our hope that this study has enhanced the overall knowledge accurately on the features, characteristics and quality of the practices of current blended learning; while revealing the gaps which must be fulfil within the practices and studies of blended learning approach in the future. Finally, based on the trend and development of such dynamic instructional design, complete preparation is essential in order to handle future challenges to fulfil the needs of 21st century learning.

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About the authors

Mohd Azli, Yeop, Master in Instructional Design and Technology Education. Currently, he is a Doctor of Philosophy (Instructional Technology Education) candidate in Faculty of Education and Human Development, Sultan Idris Education University (UPSI), Perak, Malaysia. His research is related to the Blended Learning acceptance in Education. Mohd Azli is interested in teaching strategies (Strategies in instructional technologies).

Email: azliyeop@gmail.com

Kung-Teck, Wong is a Associate Prof. at Faculty of Education and Human Development, Sultan Idris Education University (UPSI), Malaysia. Prior to joining UPSI, he was a senior teacher in government schools. He completed his Ph.D. from University Malaysia Sabah and Post-Doctoral at University of South Australia, Australia (UniSA). He has published extensively in local and international journals. He also serves as reviewer of several local, ISI, and SCOPUS indexed journals. In the past five years he has secured many public and private research funding. Wong is interested in statistic studies and also the application of SPSS and AMOS -structural equation modelling in his writing articles and research.

Email: thomas@fppm.upsi.edu.my

Noraini, Mohamed Noh is a senior lecturer at Faculty of Education and Human Development, Sultan Idris Education University (UPSI), Perak, Malaysia. She holds a doctorate degree from Universiti Kebangsaan Malaysia majoring in resource and information technology. Her research interest are school library media centre, technology adoption, dan learning environment.

Email: noraini.mn@fppm.upsi.edu.my

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