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Factors of Learning towards Creating Blended Learning Curriculum Using Learning Management System in Higher Education during Covid-19

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Blended learning is a mix of online and face-to-face instruction. It refers to a variety of possibilities made available by integrating the internet and streaming media with traditional educational formats that necessitate the physical co-presence of teachers and students. While the Covid-19 pandemic is being referred to as the greatest challenge facing education systems around the world, it has prompted authorities to issue a drastic order requiring institutions to switch from face-to-face teaching to online teaching and virtual education for students. This present study aims to determine the model of integration between learning style and active learning towards enhancing blended learning curriculums among higher education students. A total of 208 students at a selected Malaysian higher education institution were selected randomly in this study. For data collection, this study used the quantitative approach and random sampling technique. The instrument was developed based on the literature review, and expert validation was obtained from various universities. The survey forms were distributed using an online medium (Google forms). Pearson Coefficient correlation (r) was employed to examine the relationship between variables, while Structural Equation Modelling (SEM) was utilized to examine the effect of the mediator variable. By dopting a two-stage method, the measurement model was first tested, followed by the structural model. Confirmatory Factor Analysis (CFA) is to test whether the data is compatible with the hypothesized measurement model as well as for the purpose of validation and construct reliability. The results show that the measurement model was a good fit for the data, and that the constructs were reliable and valid for testing the hypotheses based on the results. The assessment of the structural model, on the other hand, involved testing the hypothesized relationships about the direct effects. Four hypothesized direct paths were found to be statistically significant.

Keywords: active learning, blended learning, curriculum, learning style, education

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INTRODUCTION

The outbreak of Covid-19 is an epidemic and a global health issue that has a huge impact that has changed the entire daily routine of people worldwide (Adnan & Anwar, 2020). A phenomenon that is considered critical for all industry sectors, especially the higher education sector where there has been a sudden change from a face-to-face environment to a fully online learning environment (Toquero, 2020). According to Kaplan, Frias, dan McFall- Johnsen (2020), the chaos began when one-third of the world's population was quarantined as a precaution against the spread of Covid-19. As a result of these actions, people are socially isolated and lack social contact, including the closure of commercial companies and the exclusion of higher education institutions. Inevitably, the influence of Covid-19 is felt in the education sector. Nevertheless, the introduction of 5G and other technological advances have paved the way for unprecedented changes in the way people behave (Kaplan et al., 2020). In addition, Paraschi (2020) has mentioned, that "e-learning" may potentially be a substitute for learning sessions through electronic media such as the Internet, audio, and video that can build more comprehensive and interesting learning activities.

The growing number of learning management systems (LMS) is being utilized to support e-learning (Bansode & Kumbhar, 2012; Ismail, Mohd Ayub, Md Yunus, & Ab. Jalil, 2017). LMS is a system that provides a platform for students and instructors to have learning sessions and polish their skills anytime and anywhere at their convenience (Dalsgaard, 2006). The authors describe electronic learning as the use of communication technology to convey information for education and training (Sun, Tsai, Finger, Chen & Yeh, 2008). Furthermore, the literature on e-learning focuses largely on mixed learning or blended learning as it is combining physical and digital learning, as Nikou and Maslov (2021) noted that blended learning (BL) is becoming more popular and so, highly demanded. The emphasis on Blended Learning (BL) at the higher education level has three main obstacles in its implementation for the formation of academic disciplines. First, some elements that remain low include the availability and ability to operate digital technology, digital fluency among academics, or confidence and ability in using online technology (Johnson et al., 2014). Inadequacy in the selection of technology used in teaching as well as creating an effective learning environment is influenced by low academic technology abilities (Torrisi-Steele & Drew 2013). In addition, nowadays, in general, technology is used rapidly for the purpose of management and administration of the institution, instead, it is not used to help to learn, especially in the development of student curriculum (Razali, Manaf, Talib & Hassan, 2020; Palak & Walls, 2009; Su Luan, Ab Jalil, Mohd Ayub, Abu Bakar, K & Sai Hong, 2003).

Secondly, as according to Oliver and Trigwell (2005), BL is "poorly defined" and "inconsistently applied." Individuals' perceptions of the word often guide academic practice rather than a consistent approach throughout an institution (Hinrichsen & Coombs, 2013; Rami, Aziz, Razali & Ibrahim, 2020). Indeed, confusion surrounds the design, pedagogical techniques, time spent online vs face-to-face, the goal of combining classes, and technology's involvement. Garrison and Kanuka (2004), for example, argue that to integrate different modalities, the most desirable features of face-to-face and

online settings must be combined. Students commute time and resources are reduced as a result of BL. Institutions can save money on extra buildings and amenities since BL reduces the cost of developing and maintaining them (Bleed 2001). Procter (2003), on the other hand, argues that BL has a distinct design and delivery strategy than distant learning in its whole. Procter (2003) notes that BL involves a 'mix of diverse modalities of delivery, instructional methods, and learning styles.' This is founded on the idea that the quality of learning and teaching experiences has a positive influence on curriculum development.

The third obstacle is related to the tools that need to be used to help the implementation of BL and evaluating the course design for BL is very lacking (Smythe 2012). Although a framework is available for the purpose of designing and evaluating BL practices in terms of IT infrastructure, learning, and teaching, there are still deficiencies in designing academics, especially those that include the criteria and standards provided. As a result, each academic decides based on their understanding of the appropriateness, which can provide the main source of confusion in the implementation of BL. According to Oliver (2003), there are criteria and standards referred to are based on face-to-face teaching and not criteria from BL. The framework of Parsell and Collaborators (2013) provide criteria in general with an emphasis on aspects of learning and teaching by using technology as an additional component, rather than part of the learning process. Therefore, the inclusion of explicit and standard criteria in the implementation of BL will ensure that more flexible and dynamic learning can be created (Reed 2014).

Learners need a learning environment that is effective, efficient, and flexible. To evaluate a learning environment's efficiency and efficacy, it is critical to hear from ithe students. Learning styles, self-efficacy, attitudes, motives, active learning, and interests may all have an impact on students' perceptions of a learning environment. Consideration should be given to learner characteristics when deciding how to employ learning material. For the simple reason that no single instructional technique is ideal for everyone. One need to aware of the fact that not every student learns in the same manner. The way each person receives, and processes information is characterized by distinct preferences and strengths. When learning environments are modified or accommodated to individual characteristics, learners will be able to attain their learning goals more efficiently (Federico, 2000; Md. Yunus, Mohd Ayub, & Tan Tong, 2019). Therefore, this study also examines the learner's learning style, which is one of the most important qualities.

The fact that academic performance depends not only on a learner's intellectual capacity and aptitude, but also upon his or her learning style, has prompted many educators ito study this issue in more depth in recent years. No one teaching method is best for all students, as according to Razali (2021), adapting or accommodating students' unique characteristics can help them attain their learning goals more efficiently. A blended learning curriculum is difficult to create if there is no proper implementation planning done. Even though blended learning has been applied across a wide range of disciplines at various levels of educational institutions and in many parts of the world (Fong, Kwan & Wang, 2008) many are not well-versed in the implementation planning. Online or

hybrid learning environments are not typically linked with active learning. In non-face-to-face settings, active learning may be effectively incorporated and practiced via the use of thoughtful conversations, group work and the creation of a collaborative atmosphere that supports and nurtures a community of learners, among others. For a high degree of student involvement, it is important to weave active learning into the key components of an online or hybrid course, including conversations, assignments, and evaluations. It is the goal of this research to establish a theoretical foundation for the creation of blended learning curriculums. Hence, we aim to address this issue by assessing students' experience in their participation on e-learning based on how learning style and active learning influenced blended learning among higher education students.

Literature Review

Covid-19 and e-learning

Due of the unexpected shutdown of educational facilities, government has proposed emergency remote teaching to guarantee that students are not left unattended during the epidemic. As a result, for the time being (until further notice), traditional techniques (traditional face-to-face education) have been supplanted by online (e-learning). Almaiah, Al-Khasawneh and Althunibat (2020) recognized the major obstacles and aspects of the use of electronic learning systems during the Covid-19 pandemic. The COVID-19 pandemic poses a challenge to e-learning, which requires adaptation and creativity in higher education. Alea, Fabrea, Roldan and Farooqi (2020) investigated the opinions of instructors regarding the influence of Covid-19 and the quarantined community on remote learning and identified various problems connected to it, as well as individual concerns with readiness for providing distance learning. While students did not choose electronic learning over face-to-face education in times of lockdown, Abbasi, Ayoob, Malik & Memon (2020) noted that administrators and faculty members must take appropriate efforts to improve e-learning during lockdown. E-learning and Covid-19 quarantine is viewed as both a context-defining element that forces a person to engage only in remote e-learning, as well as an intervening variable that determines how the e-learning process is conducted. Students' opinions about e-utility learning's and usability have been extensively examined in comparable research in recent years (Almaiah et al., 2020). On the other hand, students' perceptions of online learning hurdles have been reported. Administrative concerns, academic skills, social interactions, technical skills, learner motivation, time and support for studies, affordability, and connection to the internet and technological problems (Aboagye, Yawson & Appiah 2020).

Learning Style

When processing and arranging information, individuals utilize different techniques to analyse and arrange it, and to react to external stimuli, as mentioned by Newby, Stepich, Lehmann, and Russel (2000). Keefe (1987) describes learning style as a 'mixture of cognitive, emotional, and psychological qualities of individuals that are, to some extent, consistent indications of how individuals perceive their environment, how they interact with, and react to learning media. As a concept in psychology and education, learning

styles are meant to determine how individuals learn best. There are four primary categories of learners, according to the VARK model. Visual learners, auditory learners, reading/writing learners, and kinaesthetic learners are the four main categories of learners. Students' learning styles, learning abilities, and preferences have long been debated. Another idea used in this study is the Zone of Proximal Development (ZPD). According to Vygotsky, ZPD refers to a spectrum of actions that are too tough for a student to accomplish on their own. These tasks, however, may be mastered with direction and support from educators or more-skilled peers as Lernen, according to Vygotsky, can lead to development if it occurs within a learner's ZPD (Santrock, 2004).

Active Learning

As in a face-to-face class, online courses should encourage active learning. In the words of Santrock (2004), active learning involves "searching out new knowledge, organizing it in a meaningful way, and having the opportunity to communicate it to others." Studies have demonstrated that students' learning and attitudes toward learning increase when these active learning approaches are used (Keefe, 1978; Frederico, 2000; Dalsgaard, 2006). Many instructors, however, still have difficulty integrating active learning into their lectures. Learning and teaching strategies must be explored and experimented with to build and adapt unique teaching methods for online courses (Razali et al., 2020; Rogers, 2010). Students must be actively involved in their learning, regardless of the media in which the courses given, and this may take extra work on their part. Comparing standard teaching techniques to those that involve active learning, knowledge of topics increased by 40 to 60 percent (Parsell & Collaborators, 2013; Ibrahim, Ayub, Yunus, Mahmud, & Bakar, 2019). Many studies have demonstrated that active learning techniques enhance student engagement and have a substantial influence on student learning when used properly throughout the course.

Learning Management Systems (LMS)

Many higher education courses now use video lectures, interactive films, discussion boards, etc. as methods of presenting material to students. Learning Management Systems (LMS) such as Moodle have become more popular in higher education institutions to organize and administer classes (Bhuasiri, Xaymoungkhoun, Zho, Rho, & Ciganek, 2012). These systems are transportable, will teach remote personnel, and will administer sessions in the absence of a connection to the internet. Social media integrations can be of assistance too in many ways. Live web tools for real-time video conferencing are required, as well as different login levels for online learners, teachers, and administrators. Automated LMS reporting is helpful, especially when it comes to designing the sort of summary that users would like to look at and, thus, read to completion. This report, after all, is a sort of training as well. Finally, it is vital to provide them the option to participate in online training classes so that they feel more empowered.

Over the past few years, the use of web-based technology has become an option for scientific research (Lee, Yoon, & Lee, 2009). Studies that approach the use of technology such as e-learning systems (Smythe 2012; Garrison & Kanuka, 2004),

course-related devices in websites (WebCT) (Nikou & Maslov, 2021), streaming media (Liu, Liao, & Pratt, 2009), online learning (Parsell & Collaborators, 2013), virtual learning environments (Van Raaij & Schepers, 2008), websites as educational aids (Bhuasiri, Xaymoungkhoun, Zho, Rho, & Ciganek, 2012), e-courses learning (Reed, 2014), online school management system (Yi & Hwang, 2003), discussion forum (Hinrichsen, & Coombs, 2014) and Learning Management System (LMS) (Murshitha & Wickramarachchi, 2016). Even so, a study to see the implementation of LMS in improving blended learning among higher education institutions will provide valuable references to the literature. Thus, this paper presents the integration model between learning style and active learning towards enhancing blended learning in curriculum development via LMS.

Many various theories and study models have been established in the literature to evaluate whether a person would adopt new technology. Consequently, establishing the degree to which the two components of the suggested research model are integrated is a difficult undertaking. Additionally, a comprehensive literature review was conducted (Fındık-Coşkunçay, Alkış & Özkan-Yıldırım, 2018), experts from academia have suggested for model development to provide better input. Hence, the model constructs were identified as Learning Style (LS) [consisting of sub-constructs namely Aural (A), Reading/writing (RW) and Kinesthetic (K)], Active Learning (AL) and Blended Learning (BL).

Research Objectives

1. To examine the direct influence for learning style, active learning, accessibility of learning towards blended learning in curriculum development via learning management system (LMS) among higher education students.
2. To examine the effect of accessibility of learning as a mediator towards enhancing blended learning curriculum development via learning management system (LMS) among higher education students.
3. To determine the significance of developing a structural model for learning style, active learning, and blended learning curriculum development via learning management system (LMS) among higher education students.
4. To determine the contribution of the integration model between learning style, active learning, and accessibility of learning towards enhancing blended learning in development curriculum via learning management system (LMS) among higher education students.

Hypotheses

H_1: There is significant influence between learning style and blended learning in curriculum development via learning management system (LMS) among higher education students.

H_2: There is significant influence between active learning and blended learning in curriculum development via learning management system (LMS) among higher education students.

H_3: There is a significant influence between accessibility of learning towards enhancing blended learning in curriculum development via learning management system (LMS) among higher education students.

H_4: There is significant influence between learning style towards accessibility of learning in curriculum development via learning management system (LMS) among higher education students.

H_5: There is significant influence between learning style towards accessibility of learning in curriculum development via learning management system (LMS) among higher education students.

H_6: Accessibility of learning as a mediator between learning style and blended learning in curriculum development via learning management system (LMS) among ihigher education students.

H_7: Accessibility of learning as a mediator between active learning and blended learning in curriculum development via learning management system (LMS) among higher education students.

H_8: There is a significance relationship of developing a structural model for learning style, active learning, accessibility of learning and blended learning curriculum development via learning management system (LMS) among higher education students.

METHOD

By examining the effect of independent variables on the dependent variable, this study is quantitative in nature. Surveys were utilized in this research to study the impact of accessibility of learning as a mediator towards learning style and active learning in enhancing blended learning curriculum among higher education students. This study was conducted at UPM that was used holistically teaching and learning via Learning Management Style (LMS) throughout the pandemic Covid-19 and the respondents were randomly chosen from year one until year four at each university. The sampling technique for this research was random sampling and instrument was developed through it. On the other hand, four expert validations from various universities such as UTM (Universiti Teknologi Malaysia), UPM (Universiti Putra Malaysia), UKM (Universiti Kebangsaan Malaysia) and UUM (Universiti Utara Malaysia) were used, whereas three experts were for content validity and another expert was for scale measurement. The data collection was done through an online survey when the government started from the closure announcement of all educational institution, specifically higher education in March 2020. In addition, this research used Structural Equation Modelling (SEM) for data analysis and generally, SEM requires large sample size. According to Kline (2011), a sample size of more than 200 respondents is considered a large sample size. As a result, the study with a sample size of 208 obtained an adequate sample size with estimated structural equation modelling so that the model could operate effectively and meet index appropriateness.

Gender

Table 1
The percentage of gender

	Frequency	Percent	Valid Percentage	Cumulative Percentage
Male	44	21.2 %	21.2 %	21.2 %
Female	164	78.8 %	78.8 %	100.0 %
Total	208	100.0 %	100.0 %	

There are 208 respondents who participated in this study. Out of the respondents, 164 (78.28%) were female, while 44 (21.2%) respondents were males. The average age of respondents was 18-22 years old and there were from semester one until four. 73 of them from semester 1 (35.1%), followed by 113 were from semester 2 (54.3%). There were 21 students from semester 4 (10.1%), while only one student represents semester 4 (0.5%).

Analysis of Data

Confirmatory factor analysis (CFA)

Structural Equation Modeling (SEM) was employed to assess the impact of learning style and active learning towards enhancing blended learning curriculum among higher education students. The modelling employed in this work is a combination of two techniques. To begin with, the researcher tested the measurement model using the pilot study data. Then, continued with analysis method, which was the entire structural model (Kline, 2011). This section will discuss related to the results of the analysis from the measurement model. CFA is a statistical analysis used to measure the influence between latent variables and indicators in the study (Byrne, 2010). During the field study, the researchers used CFA to measure the fit index value of the model (Table 4). Even so, among researchers, there is no agreement to choose the index that needs to be used (Zainuddin, 2015). Hair et al., (2010) have suggested the use of a fit index model with at least one, where it can be either an absolute or incremental index (Table 2).

The index for the Absolute fit category is RMSEA or GFI, and for incremental fit, the index can be referred to as CFI or TLI, and then for parsimonious fit, it is recommended to refer to the Chisq/df index (Hair et al., 2010). For the absolute fit category, it is often the researcher's main reference when the value of this index shows that the basic theory used is suitable for the study. Meanwhile, the comparative or relative fit index is used as an additional match for the study. A parsimonious Fit Index is used to ensure that the independent variables meet the specified fit index to form an optimal model structure. The indices included in the fit model are P-Value, RMSEA, CFI, TLI, and Chisq/df. Even so, each category of index fit that can be met indicates that the measurement model is acceptable and very good (Schreiber, Nora, Stage, Barlow, & King, 2006).

The results of the study have shown that the entire fit index outlined has been achieved, namely RMSEA, CFI, and Chisq/df for continuous data (Hu & Bentler, 1998). In fact, the study has also managed to achieve most of the index values from each category, namely P-value, Chisq, RMSEA, CFI, TLI, and Chisq/df based on the data of this study. Three types of fit indices are required: absolute fit, RMSEA, and covariance fit matrix. An indicator that is always used to determine the model's fit and the sample size is

called the "fit index." When the RMSEA index falls below 0.08, it indicates that the model and sample size of the research have been satisfactorily fitted by the index, which is recorded at 0.043. According to Hu and Bentler (1998), a lower RMSEA score indicates a better criteria value.

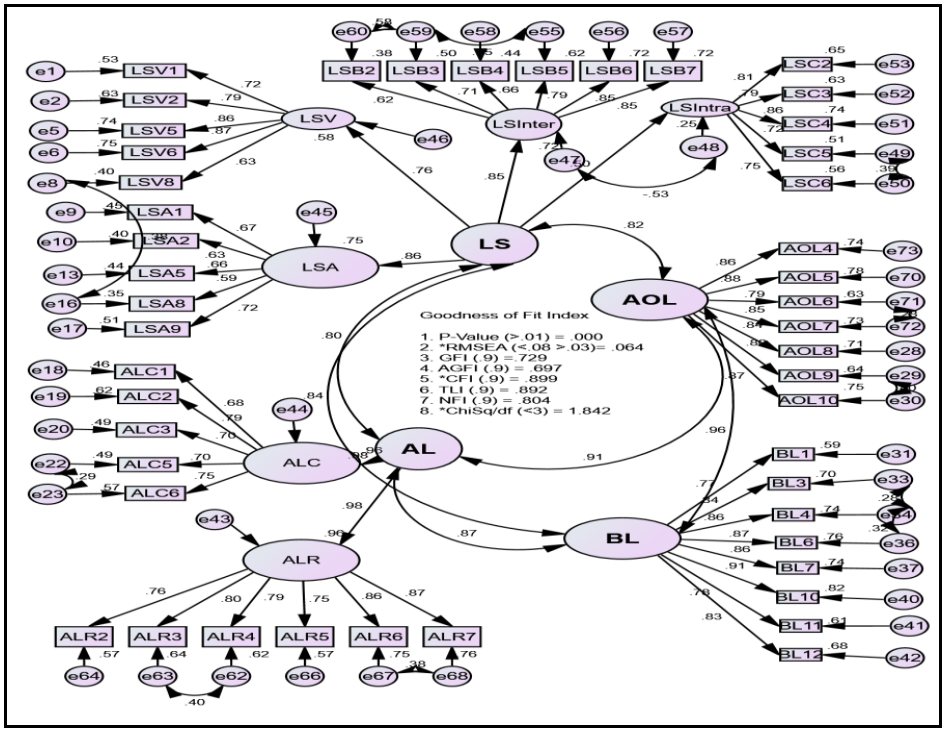

Figure 1
Measurement model (Confirmatory Factor Analysis)

The full measurement model was tested to determine the relationship between the items and their respective constructs before the next step i.e., the structural model was performed. At the final stage of the full measurement model, the Modification Indices (MI) were examined and checked to identify whether there were any overlapping items. This is because these overlapping items may cause the model to become mismatched. To achieve the consistency of the measurement model, all factor loads for each item must be statistically significant. The rule of thumb for factor loading to be considered statistically significant is that standardized loading estimates should be 0.5 and above or the ideal value should be 0.7 and above (Hair et al., 2010).

Any item with a factor loading below the value of 0.5 is dropped. The final model is shown in Figure 1. Another condition to be observed is that the accuracy of the final model using goodness of fit index shows a satisfactory match i.e., in this case the index value of $\chi 2$ (df = 1.842, p = 0.000) was significant, the value of $\chi 2$/df = 969.726/363 was less than 5, while the index values of CFI = 0.899, TLI = 0.892 all exceeded 0.8 as

well as the value of RMSEA = 0.064, i.e., less than 0.08. Therefore, this measurement model has been found suitable to be continued with reliability analysis and validity analysis.

Table 2
Fitness Index for measurement model before and after modification Learning Style, Active Learning, Accessibility of Learning and Blended Learning.

Name of Category	Name of Index	Level of acceptance	Measurement model (Before modification)	Measurement model (After modification
1. Absolute Fit	P-Value	> 0.01	.00	.00
	*RMSEA	< 0.08	.083	.064
	GFI	> 0.90	.512	.729
2. Incremental Fit	AGFI	> 0.90	.481	.697
	*CFI	> 0.90	.739	.899
	TLI	> 0.90	.730	.89
	NFI	> 0.90	.626	.804
3. Parsimonious Fit	*Chisq/df	< 3.0	2.417	1.842

Fitness Index recommended by (Hair et al., 2010)and result obtained from measurement model for Learning Style, Active Learning, Accessibility of Learning and Blended Learning.

To determine the validity and reliability of constructs, the CFA process must be completed. According to the following techniques, the measuring model of this study is valid and accurate.

Assessing validity and reliability for the measurement model

Unidimensionality

By deleting items with low factor loading, researchers were able to meet this criterion. Once the new model has been run, it is repeated until the fitness indexes have been raised to the desired level.

Validity

The following processes were used to meet this need:

i) *Convergent validity* : AVE ≥ 0.50, Refer to the following table (Table 2).
Average Variance Extracted, **AVE** = ΣK^2 / n, where
K = factor loading of every item
n = number of items in a model

ii) *Construct validity* : For the model, all fitness indexes are within acceptable limits

iii) *Discriminant validity* : There is no redundant item for any of the constructs involved, and the correlation between all constructs is less than 0.85 (Table 3)

Reliability

In order to meet these criteria, the following steps were taken:
i) *Internal reliability*: Cronbach alpha ≥ 0.70, refer to Table 3
ii) *Composite reliability* (C.R): C.R ≥ 0.6, refer Table 3,

CR = $(\Sigma K)^2 / [(\Sigma K)^2 + (\Sigma 1 - K^2)]$, where K = factor loading of every item and n = number of items in a model

Table 3
All constructs' confirmatory factor analysis (CFA) summary

Construct	Component	Item	Factor Loading	Cronbach Alpha (> 0.7)	CR i (≥ 0.6)	AVE i (≥ 0.5)
Learning Style (LS)	Visual	LSV1	.72	.88	.89	.66
		LSV2	.79			
		LSV3				
		LSV4				
		LSV5	.86			
		LSV6	.87			
		LSV7				
		LSV8	.63			
	Audio	LSA1	.67	.80	.79	.43
		LSA2	.63			
		LSA3				
		LSA4				
		LSA5	.66			
		LSA6				
		LSA7				
		LSA8	.59			
		LSA9	.72			
	Interpersonal	LSB1		.89	.89	.57
		LSB2	.62			
		LSB3	.71			
		LSB4	.66			
		LSB5	.79			
		LSB6	.85			
		LSB7	.85			
	Intrapersonal	LSC1		.89	.89	.62
		LSC2	.81			
		LSC3	.79			
		LSC4	.86			
		LSC5	.72			
		LSC6	.75			
Active Learning (AL)	Readiness	ALR1		.92	.92	.65
		ALR 2	.76			
		ALR 3	.80			
		ALR 4	.79			
		ALR 5	.75			
		ALR 6	.86			
		ALR 7	.87			
		ALR 8				
		ALR 9				
	Consistency	ALC1	.68	.85	.85	.53
		ALC 2	.79			
		ALC 3	.70			
		ALC 4				
		ALC 5	.70			
		ALC 6	.75			
		ALC 7				
		ALC 8				
		ALC 9				
		ALC10				
Accessibility of learning (AOL)		AOL1		.95	.95	.73
		AOL 2				
		AOL 3				
		AOL 4	.86			
		AOL 5	.88			
		AOL 6	.79			
		AOL 7	.84			

	AOL 8	.85			
	AOL 9	.89			
	AOL10	.87			
Blended Learning (BL)	BL1	.77			
	BL2				
	BL3	.84			
	BL4	.86			
	BL5				
	BL6	.87	.95	.95	.71
	BL7	.86			
	BL8				
	BL9				
	BL10	.91			
	BL11	.78			
	BL12	.83			

*Colored box represents item deleted due to the low factor loading.

CFA is the initial phase in information readiness in SEM. CFA is applied for the individual development of Learning Style, Active Learning, Accessibility of Learning and Blended Learning. The three significant motivations behind CFA are to Test for Model Fit Index, Test for focalized legitimacy and develop unwavering quality. In the model fit test, a few fit indexes can be utilized to test for model fit. Hair et al., (2010) recommended three fit Indexes be utilized with at any rate one list from every category. The categories are Parsimony Fit, Incremental Fit and Absolute Fit.

The model fit indices recommended and frequently used by researchers for each category are as follows (Hair et al., 2010):

- Absolute fit: RMSEA or GFI
- Incremental fit: CFI or TLI
- Parsimonious fit: Chisq/df

The model that achieves the appropriateness index for the absolute fit category shows that the measurement model has superiority and gives a strong indication that the basic theory used in the study is compatible with the findings of the study. Meanwhile, for the incremental fit category, it gives a clear picture that a comparison or relative index is consistent with the study data. Next, the model that achieved the fit index for Parsimonious fit showed that the model had an ideal construct for measuring the dependent variables of the study by meeting the pre-determined fit index values. Therefore, the CFA analysis performed has a positive influence between the study variables, namely learning style, active learning, accessibility of student learning on the formation of blended learning in distance learning by using the LMS platform fully (refer Table 4).

Table 4

Correlation between variables/constructs in measurement model (AMOS output)

Construct	Estimate
LS <--> AL	.80

*Correlation between construct (<0.85) (Awang, 2012; Awang et al., 2015)

Hypotheses Testing

H_1: There is significant influence between learning style and blended learning in curriculum development via learning management system (LMS) among higher education students.

Table 5
Analysis learning style towards blended learning

Construct			Estimate	S.E.	C.R.	P	Result
LS	→	BL	.208	.077	2.699	.007	Significant

Table 5 shows that there is a significant influence between Learning Style (LS) and Blended Learning (BL) which is ($\beta = 0.208$, $p < 0.01$).

H_2: There is significant influence between active learning and blended learning in curriculum development via learning management system (LMS) among higher education students.

Table 6
Relationships between active learning and blended learning

Construct			Estimate	S.E.	C.R.	P	Result
AL	→	BL	-.067	.116	-.576	.565	Not Significant

However, the Table 6 has shown there is no significant influence between active learning (AL) and blended learning (BL) with ($\beta = -0.067$, $p < 0.01$).

H_3: There is significant influence between accessibility of learning towards enhancing blended learning in curriculum development via learning management system (LMS) among higher education students.

Table 7
Analysis accessibility of learning towards enhancing blended learning

Construct			Estimate	S.E.	C.R.	P	Result
AOL	→	BL	.806	.117	6.863	.001	Significant

Table 7 results show that there is a significant influence between accessibility of learning (AOL) and blended learning (BL) with ($\beta = 0.806$, $p < 0.01$).

H_4: There is positive relationship between learning style towards accessibility of learning in curriculum development via learning management system (LMS) among higher education students.

Table 8
Analysis learning style towards accessibility of learning

Construct			Estimate	S.E.	C.R.	P	Result
LS	→	AOL	.286	.094	3.040	.002	Significant

Table 8 shows that there is a significant influence between Learning Style (LS) and accessibility of learning (AOL) which is ($\beta = 0.286$, $p < 0.01$).

H_5: There is significant influence between learning style towards accessibility of learning in curriculum development via learning management system (LMS) among higher education students.

Table 9
Analysis learning style towards accessibility of learning

Construct			Estimate	S.E.	C.R.	P	Result
AL	→	AOL	.833	.106	7.826	.001	Significant

Table 9 shows that there is a significant influence between active learning (AL) and accessibility of learning (AOL) which is ($\beta = 0.833$, $p < 0.01$).

Mediating Testing

To test the hypotheses proposed in the model, structural equation modelling (SEM) adopting the maximum likelihood estimation method was performed using AMOS, and the results as below.

H_6: Accessibility of learning as a mediator between learning style and blended learning in curriculum development via learning management system (LMS) among higher education students.

a) LS – AOL – BL

Table 10

Partial mediation towards enhancing blended learning

Construct			Estimate	S.E.	C.R.	P	Result
LS	→	BL	.193	.072	2.680	.007	Significant
LS	→	AOL	.920	.097	9.458	.001	Significant
AOL	→	BL	.770	.079	9.731	.001	Significant

Result: Partial Mediation

The findings (Table 10) of the analysis state that mediator for Accessibility of Learning had revealed a significant path, which involves the partial mediating role of Accessibility of Learning as a mediator between Learning Style and Blended Learning. In the intermediate test as shown in Figure 4, the value of the beta coefficient (estimated) is .193. The model has maintained a significant p-value between learning style and blended learning of students. Next, the values for the mediator (indirect influence effect) for LS → AOL, ($\beta = .920$, $p = .001$) and AOL → BL, ($\beta = .770$, $p = .001$) were isignificant. The model for testing the mediating effect of Accessibility of Learning was exhibited in Figure 2.

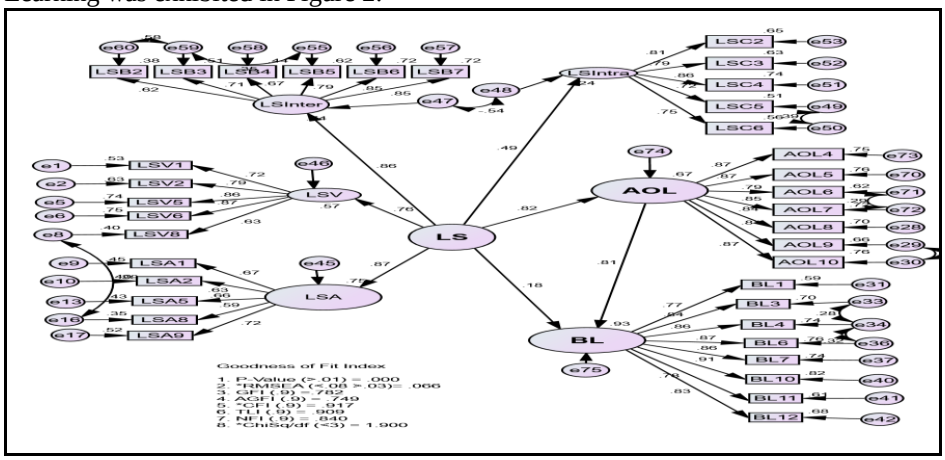

Figure 2

Relationship between Learning Styles and Blended Learning using Accessibility of Learning as a mediator

b) AL – AOL – BL

H_7: Accessibility of learning as a mediator between active learning and blended learning in curriculum development via learning management system (LMS) among higher education students.

Table 11
Full mediation towards enhancing blended learning

Construct			Estimate	S.E.	C.R.	P	Result
AL	→	BL	-.004	.118	-.036	.971	Not Significant
AL	→	AOL	1.060	.084	12.620	.001	Significant
AOL	→	BL	.901	.118	7.644	.001	Significant

Result: Full Mediation

Table 11 shows the analysis of mediator for Accessibility of Learning had revealed a significant path, which involves the full mediating role of Accessibility of Learning as a mediator between Active Learning and Blended Learning. In the intermediate test as shown in Figure 4, the value of the beta coefficient (estimated) is .004 (refer to Table 12). The model shows no significant p-value between active learning and blended learning of students. Next, the values for the mediator (indirect influence effect) for AL → AOL, (β = 1.060, p = .001) and AOL → BL, (β = .901, p = .001) were significant. The model for determination of mediation effect was exhibited in Figure 3.

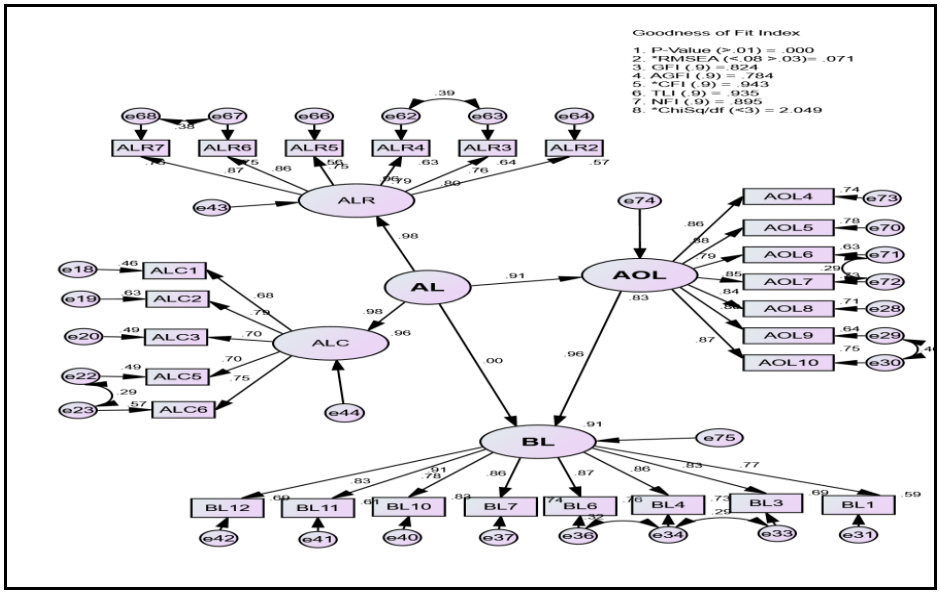

Figure 3
Relationship between Active Learning and Blended Learning using Accessibility of Learning as a mediator

Structural Model

H_8: There is a significance relationship of developing a structural model for learning style, active learning, accessibility of learning and blended learning curriculum development via learning management system (LMS) among higher education students.

The significance of developing a structural model for learning style, active learning, and blended learning in curriculum development via learning management system (LMS) among higher education students had proved that the models fit the sample data. As recommended by Hair et al. (2019), the structural model assessment was performed. After four sub-samplings, the sample was bootstrapped to determine the path coefficient between endogenous and exogenous construct types. The overall results for testing the structural model and its related hypotheses are shown in the Figure 4. The evaluation of the goodness of fit index (GoF) for the structural model was found to comply with the set threshold values. Specifically, the value of $\chi 2$ (df = 1.842, p = 0.000) was significant, the value of $\chi 2$/df = 969.726/363 was less than 5, while the values of CFI = 0.899, TLI = 0.892 all exceeded 0.8 as well as the value of RMSEA = 0.064, i.e., less than 0.08. This model is consistent with the study data obtained and further confirms the reliability of the structural model in this study. Hence, the researcher hypothesized that:

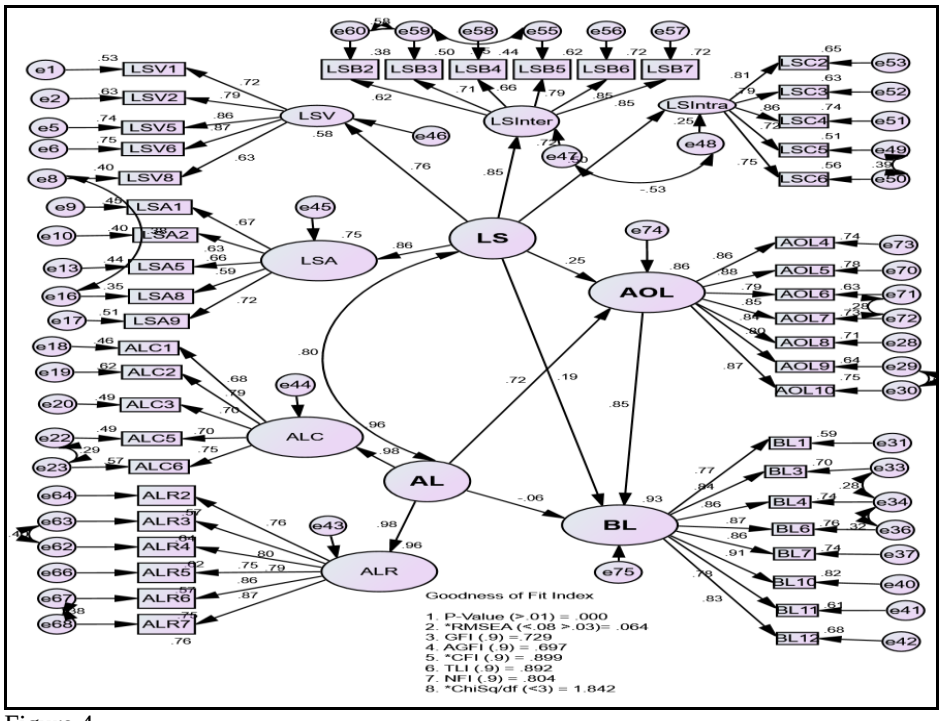

Figure 4
Structural Model

Multiple squared correlation (R^2)

To determine the causal effect between exogenous and endogenous variables, the squared multiple correlation (R^2) must be considered. For example, the R^2 for Learning Style (LS) to Blended Learning (BL) is .439 (refer Table 12). It is estimated that the predictors of BL explain 43.9% of its variance. In other words, the contribution of Learning Style in estimating Blended Learning is 43.9%. Based on the findings, the contribution of Accessibility of learning in estimating the Blended Learning is 80.6%, Active learning in estimating the Blended Learning is 60.5% and the R^2 for Learning Style (LS) and Active learning (AL) to Accessibility of learning (AOL) is 85.7%. In sum, the overall effect or contribution in estimating Blended Learning is 92.5%. According to Kline (2011) study effect sizes> 0.3 were large. Thus, the selected variables have had a significant impact on the formation of learning with a blended learning approach among students of higher learning institutions throughout the COVID-19 pandemic. Therefore, the analysis has answered the fourth objective of the study which is: To determine the contribution of the integration model between learning style, active learning, and accessibility of learning towards enhancing blended learning in development curriculum via learning management system (LMS) among higher education students.

Table 12
The standardized regression weights for every path and its r^2 value for the model

Construct			Standardized Estimate	R^2		
LS	→	BL	.191	.439		
AOL	→	BL	.855	.806	.925	
AL	→	BL	-.061	.605		.925
LS	→	AOL	.248	.833	.857	
AL	→	AOL	.715	286		

FINDINGS AND DISCUSSION

Due to the Covid-19 pandemic, university students' education has been disrupted. Therefore, e-learning has emerged as an instant option to deal with the disruptions in higher education due to the current circumstances (Nikou, Maslov, 2021). Learning management systems (LMS) are e-learning software's that may be used to empower the instructors to improve students' learning and are increasingly being utilized to assist e-learning (Bansode & Kumbhar, 2012; Al Soub, Alsarayreh, & Amarin, 2021). LMS is a sophisticated software system that improves learning by automating course content distribution and measuring students' learning progress (Dalsgaard, 2006; Razali, Sulaiman, Ayub & Majid, 2022). Thus, a growing number of higher education professionals are now aware of blended learning's relevance (Garrison & Vaughan, 2008), especially as the digital world continues to change.

This study looked at the higher education students' experience in their participation on e-learning based on how learning style and active learning influenced blended learning while Covid-19 stay-at-home orders. Hence, findings from the current study revealed the

significance integration between learning style, active learning, and blended learning in curriculum development via learning management system (LMS) among higher education students throughout the Covid-19 pandemic. The positive integration of the research findings means that students are in proximity, peer reference material, and well-being in the subject of students, this is closely related to the use of LMS that is considered useful, while it can affect the intention of students to use LMS. The model formed in this study shows that the frequency of the LMS platform used has increased the positive effect of its use among students in higher education institutions and that effect is becoming more significant during the Covid-19 pandemic and is believed to also affect the sustainability of LMS use for the future. This point is supported by the study of Muhaimin, Mukminin, Pratama, and Asrial (2019) found the significant use of web 2.0 for future learning. Additionally, this study also predicts that a user-friendly LMS will have a positive impact on blended learning among students, especially during the Covid-19 pandemic. This statement is also supported by previous researchers related to the use of virtual technology and teaching (Muhaimin et al., 2019; Ramirez-Correa, Arenas-Gaitan & Rondan-Cataluna, 2015; Zhang, Zhao, & Tan, 2008). Therefore, the use of LMS can facilitate the implementation of blended teaching and learning, especially during the Covid-19 pandemic, which is an initiative that cannot be disputed anymore.

CONCLUSION

In conclusion, this study has proven the significant integration between learning style and active learning towards enhancing blended learning curriculums among higher education students. However, the implementation of a new approach needs to align with a willingness of students to change a learning style. From there, the students themselves can access and apply active learning method with two-ways communication. For the acculturation and characteristics components of the framework, educators and support personnel must also be aware of the students' expectations and past experiences while designing the curriculum. On the other hand, students, and educators perhaps would be able to conquer the excellent achievement with a blended learning approach. Future research may use the conceptual model created in this study to investigate further findings in different situations. What motivates students to participate in e-learning iand the education institution preparation (both instructors and schools) does not explain for increased intention to participate in e-learning are just two examples. It is also possible to investigate qualitatively the students' perspectives following this research.

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