EXPLORING THE INFLUENCE OF ONLINE LEARNING MANAGEMENT SYSTEMS AND STUDENT PERCEPTIONS ON STUDENTS' ADOPTION OF BLOCK MODE TEACHING IN TERTIARY SECTOR

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ABSTRACT

Block mode of teaching, also called intensive mode of teaching, has received great recognition and interest from education sector. This mode of teaching is a compressed style of teaching in which classes are delivered in an intensive period of time. Block mode teaching has been found to have potential to enhance student performance. Although previous researchers have uncovered some factors which impact successful implementation of block mode, there is a lack of research which investigates the contributing factors that influence students' adoption of block mode and scrutinizes different facilitators and barriers to students' acceptance and engagement with the block mode of teaching. This study seeks to fill the gap by examining the impact of online learning management system design and usage as well as student perceptions on student utilization of block mode. This study adopts a positivist research approach and uses an online questionnaire as the data collection technique. Data were collected from undergraduate students studying in block mode at Victoria University. The results generally confirmed the positive impact of both groups of determinants on students' block mode utilization.

Keywords: *learning management systems, LMS, block mode of teaching, intensive mode of teaching.*

INTRODUCTION

Block mode teaching (BMT), also called intensive mode teaching, is a compressed style of teaching in which classes are delivered in an intensive period of time that could be as short as one week in which students usually take one subject at a time. There are different models of BMT based on days and hours of teaching used for credit-bearing university units or other courses, such as professional development courses, for postgraduate students or working in industry (Greer et al., 2016). BMT has the potential to enhance student performance (Karaksha et al, 2013) and is become

popular in developed countries such as Australia in recent years. The intensive mode of teaching has been associated with higher student satisfaction with their subjects (Burton and Nesbit, 2008). This mode of teaching has been extensively used by students of postgraduate courses who work full time or students who need time off campus for practical experiences (Davies, 2006).

In recent educational systems which rely more and more on the technology and distance learning where students can access learning materials online and take part in online asynchronous learning activities, the convenience of and opportunities

for intensive mode teaching has increased (Crispin et al., 2016). A Learning Management System (LMS) is one of the most important educational technologies used in the tertiary sector, providing an online platform for teaching, and for supporting student learning.

Successful implementation of BMT, as a mode of teaching which has received great popularity and interest in recent time, depends on many different factors. There are few recommendations in terms of learning and teaching strategies for the intensive mode, and the current literature mostly includes a comparison between intensive mode's efficacy or popularity and the traditional mode (Mitchell and Brodmer-kel, 2021). The common recommendations in the literature include how to structure assessment and how to motivate students to prepare for the intensive mode (Kuiper et al., 2015). Our research, however, focuses on investigating the factors that play crucial role on learners' acceptance and engagement with block mode teaching. The research question underlying this study is:

What is the impact of online learning management systems and learners' perceptions on their adoption and utilization of block mode teaching?

Our review of the literature revealed that there is a lack of research which investigates the contributing factors that influence students' adoption of BMT and scrutinizes different facilitators and barriers to students' acceptance and engagement with BMT. Moreover, although many higher education institutions across the world have utilized the LMS technology for their teaching and learning activities, there is a lack of research which examines the impact of LMS on BMT adoption. Despite the fact that some past studies have sought to address the success factors of BMT implementation (e.g., Czaplinski & Devine, (2017), or Murray & Palladino (2021)), there is a lack of research that investigated the impact of online learning management systems and students' perceptions on the success of BMT in terms of students' adoption of BMT. As such, our current study seeks to fill this gap by addressing the above-mentioned research question.

The remainder of this paper is as follows: following this introduction, we explain the research background and hypotheses development. Next, we introduce the research design followed by analysis and research results. Finally, we discuss the findings and present our conclusions.

RESEARCH BACKGROUND AND HYPOTHESES DEVELOPMENT

Literature Review

The common pattern in the traditional mode of teaching is that the students meet their learning instructor at least once per week over a teaching period (Wlodkowski & Ginsberg, 2010). However, there is a considerable variety in the alternatives discussed in the previous research (Serdyukov, 2008). Courses defined as nontraditional, intensive or block consist of different variations such as five or six successive full days or three hours a day for 18 days (Davies, 2006). As there is no clear distinction in the literature between nontraditional, intensive, or block courses, the term "block mode" is used in this study for the intensive format of teaching delivery which is consistent with the term used at the university.

Even though BMT is not a new concept, it has limited adoption in universities and there is lack of information on how higher education sectors around the globe employ this mode of teaching. The current studies give typical suggestions and general recommendations for intensive mode implementation. To shed more light on the current literature and have a clear picture of the gaps, we categorized the current literature into four main groups: Block Mode (BM) impacts, BM success factors, technologies for BM, and BM risks and challenges.

BM Impacts

Most of the studies on Intensive Mode (IM) or Blocked Mode (BM) of delivery investigate the influence of the BM on different students' outcomes, such as Sidiroglou and Fernandes (2019). They adopted the BM for the first-year students under the 3.5 weeks-long intensive setting for a physics, face-to-face unit. They applied various blended learning initiatives, such as interactive HTML5 (H5P) rich video presentations, an open-access electronic textbook, and online simulations and quizzes. The results show that technology enabled learning can enhance student performance in the BM of teaching.

Klein et al. (2019) investigated the outcome of conducting BM for the repeating students who had previously failed the same unit in the traditional mode of delivery. Their findings demonstrated a significant increase in student performance (in

terms of pass rates and grades) and student satisfaction with BMT. Another example is Loton et al. (2020), who examined the implementation of the BM in 4-week blocks to first-year students. The findings suggest a significant increase in performance, particularly for low socio-economic students (LSES) and low prior academic achievement, non-English-speaking background (NESB). It also revealed that there was an increase in teaching satisfaction but a decrease in course satisfaction when considering the perceived reasonable workload.

Samarawickrema and Cleary (2021) reported on the application of the BM to the undergraduate cohort. The effort appeared to be a bold response to support all students including its high proportion of First- in-family (FiF), LSES, and non-English-speaking background NESB students. The study reported on preliminary results over two years of applying the BM and it showed that there was a higher improvement in the pass rates of LSES, NESB, and FiF students compared to the progress in the traditional cohorts of students.

Dixon and O'Gorman (2020) evaluated the changes in teaching delivery to the intensive mode for the first year of an undergraduate Tourism Management degree program at a university in the Northwest of England. They adopted a qualitative approach and collected data using an anonymous, online questionnaire, completed after one full year of block teaching. The results indicated that as the year progressed, block teaching negatively affected student attendance and hindered deep learning. They came up with some recommendations to address the issue such as fully integrated placement of assessment and the use of one intensive module to aid transition.

There are some researchers who study the employment of BM on the specific subjects, such as Male and Leggoe (2018), who explored the impact of BM on students' threshold capability development in a Computational Fluid Dynamics unit. The result showed that when the unit is well designed, students focused on the intended threshold learning. Another example is Reyna Zeballos (2017), who conducted a pilot study to explore online intensive mode as a delivery option in the Business and Economics faculty with the aim of supporting the academics to introduce pedagogical innovation, address internationalization, and create new opportunities for students who cannot enroll in full session units. The authors believed that the BM units would escalate the students' chance to fast-track their degree and increase flexibility.

Technologies for BM

In this category, there are few studies that focus on applying online tools or specific technologies to the BM delivery. For instance, Downie et al. (2019) carried out research on the implementation of online support tools to increase numeracy within a time-compressed, block teaching model in mathematics. The researchers collected data from around hundred students and the preliminary results show that perceived mathematical ability has increased, as well as actual performance, due to engagement with the provided support tools. As another example, Harkin and Nerantzi (2021) focused on the institution-wide implementation of an online BM at Manchester Metropolitan University in the United Kingdom to observe and reflect the experiences of undergraduate students and staff in the Department of Psychology.

BM Risks and Challenges

As the name suggests, papers in this category deal with risks and challenges with BM implementation. As an example of works in this category, Oraison et. al. (2020) investigated staff satisfaction and the challenges of transiting from traditional to BM delivery following the implementation of block mode as well as concerns about workload and related issues. Despite an increase in overall satisfaction, staff were concerned about rewards and recognition, level of decision-making involvement, and receiving support. Similarly, McCluskey, et al. (2019) found some concerns about staff's workload and associated challenges.

Nerantzi and Chatzidamianos (2020) conducted a study in a particular block teaching format in a UK post-1992 institution across its undergraduate and postgraduate courses. They attempted to address some of the learning and teaching concerns and improve flexibility of provision while avoiding disruption and interruption of study during the pandemic. Other challenges in the literature are the staff experience, including the expectations, perceived benefits and challenges, the level of student engagement, staff satisfaction, and the overall effectiveness and efficiency of the delivery model that were investigated by Czaplinski et al.

(2017). As another example, Tatum (2010) found that students seem to face very little or no risks when universities intend to implement BMT.

BM Success Factors

Reviewing the literature revealed that there are some studies which have focused on discussing the factors contributing to the successful implementation of BM. Czaplinski and Devine (2017), for example, investigated the contributing factors to boost students' engagement while emphasising collaboration and the development of individual learning skills. The findings demonstrate that the development of students' self-regulation and self-direction (metacognitive) learning strategies and self-efficacy (motivational) strategies are crucial success factors for flexible, personalised learning in intensive delivery mode. As another example, the principles for online instructors, students, and student support in intensive mode environment are explored by Roddy et al. (2017). Their findings show that the accelerated nature of intensive learning could cause additional demands on these groups. As another example, Murray and Palladino (2021) believed that BMT may have better effects on subjects that require more skill acquisitions than conceptual learning or both, such as screen production.

Although some past studies have sought to address success factors of BM implementation such as the development of students' self-regulation and self-direction (metacognitive) learning strategies and self-efficacy (Czaplinski and Devine. 2017), or subjects that require more skill acquisitions rather than conceptual learning (Murray & Palladino, 2021), there is a lack of research that has investigated the impact of online learning management systems and students' perceptions on the success of BM in terms of students' adoption of BM. As such, our study seeks to fill the above-mentioned gap by addressing the following research question: What is the impact of online learning management systems and learners' perceptions on their adoption and utilization of block mode teaching?

Hypothesis Development

Our literature review shows that there is a lack of research which investigates the factors that influence students' adoption of BMT and scrutinizes different facilitators and barriers to students' acceptance and engagement with the block mode of teaching. Therefore, the objective of this research is to explore factors which impact students' acceptance of and engagement with intensive mode of teaching. More specifically, this present study is interested in exploring the impact of online learning management systems (design and use) and learners' perceptions (attitude towards BMT, social identity, and perceived instructor's engagement ability) on their acceptance of BMT. Figure 1 shows the conceptual model underlying the present research.

Figure 1. The Conceptual Model for the Current Study
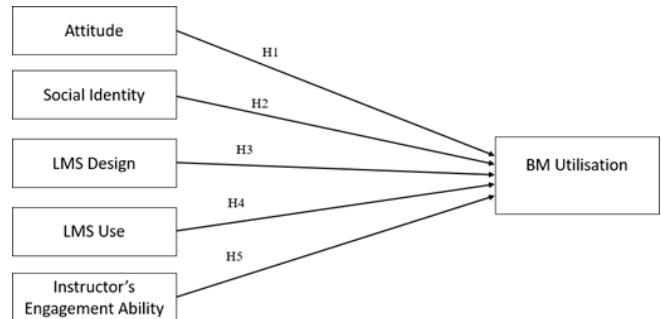
Hypothesis 1

According to the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1999; see Figure 2), which is a theory for predicting behavioural intention and extending predictions of attitude and predictions of behaviour, people's behavioural intention depends on their attitude towards behaviour and subjective norms. In other words, the attitude of a person towards a certain behaviour can directly impact their behavioural intention. Thus, the students' attitude towards block mode delivery directly influences their behavioural intention to use it in their learning. Based on the Technology Acceptance Model (TAM) (Davis, 1989), the behavioural intention to use a system affects the actual use of the system, which in this study context is block mode utilization. Combining these two theories, we hypothesized that:

H1: Learners' attitude towards block mode delivery positively impacts BM utilization.

Figure 2. The Theory of Reasoned Action (TRA)
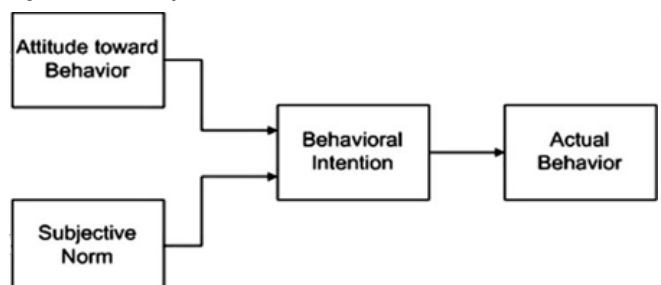
Hypothesis 2

In social science, sociology, psychology, and history, the term "identity" includes diverse concepts which are somehow different from the common usage of this term. Social identity is the self-concept that is derived from social group membership (Tajfel & Turner, 1979). In this study, "social identity" refers to who the people or students think they are based on their class group membership. Tajfeland Turner (1979) proposed a theory called social identity theory, which states an individual's self-concept is obtained from their perceived membership in a relevant group, and it proposes that social identity concept as a way in which to interpret inter-group behaviours. According to this theory, inter-personal behaviours sculpt the social behaviours and similarly their behavioural intentions. Again, based on the TAM model (Davis, 1989), the behavioural intention to use a system affects the actual use of the system, which in the context of this study is block mode utilization. Combining these two theories, we hypothesized that:

H2: Learners' perceived social identity positively impact their utilization of BM.

Hypothesis 3

The Unified Theory of Acceptance and Use of Technology (UTAUT; see Figure 3) developed by Venkatesh et al. (2003) suggests that performance expectancy, effort expectancy, social influence, and facilitating conditions are direct determinants of behavioural intention and use behaviour. This model has been widely scrutinized in educational systems and learning technologies (Almaiah et al., 2019; Altalhi, 2021; Bakheet and Gravell, 2020; Šumak et al., 2010). Hence, the model has been proven to be successful in a wide range of educational situations, and it has been employed in this study as a guiding principle. Based on this model, we consider LMS design as one of the factors of the facilitating conditions that can directly influence the use behaviour. Thus, we hypothesized that:

H3: LMS design positively impacts BM utilization.

Figure 3. The Unified Theory of Acceptance and Use of Technology (UTAUT) Model
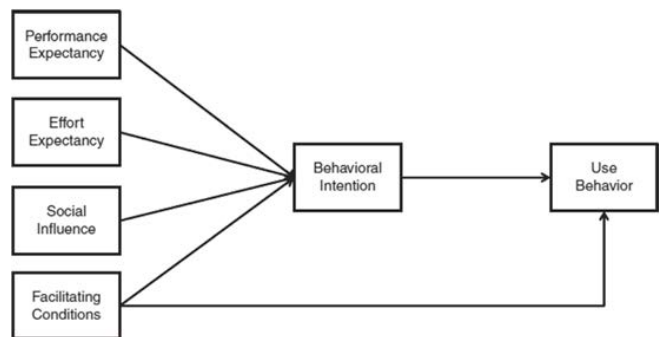
Hypothesis 4

The Information Systems Success model by DeLone and McLean (1992), introduces six dimensions that contribute to an information system's success, including information quality, system quality, service quality, usage intentions, system use, and user satisfaction. Based on the information system success model, system use impacts net benefits, and students' usage of LMS positively impacts net benefits in terms of students' utilization of block mode. Thus, we hypothesized that:

H4: Learners' LMS use positively impacts their BM utilization.

Figure 4. The IS Success Model (DeLone & McLean, 1992)
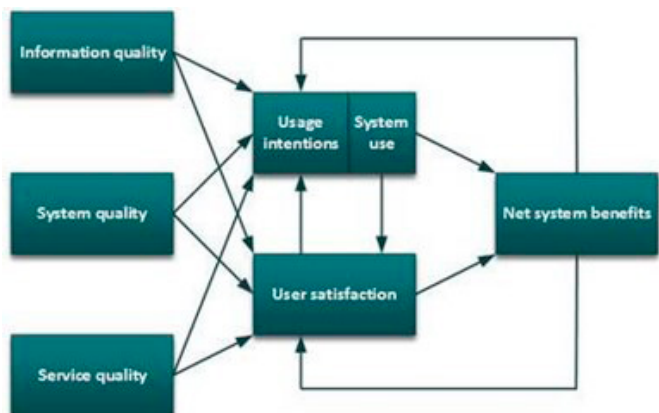


Hypothesis 5

According to Social Cognitive Theory (SCT), which is used in psychology, education, and communication, there is a reciprocal interaction between human behaviours, cognitive personal factors, and environmental factors (Bandura, 1977, 1986). According to Schunk (1989), this theory declares that environmental factors can influence individuals' behaviour (Figure 5). The engagement

ability of the instructors, lecturers, or teachers, which is one of the vital skills in education, could be considered an important external factor of the educational system for the learners. Hence, considering it as an external factor, and based on SCT theory, this factor can influence learners' behaviour and as stated in the TAM or UTAUT models, it can influence the use behaviour of the BM. Thus, we hypothesized that:

H5: Instructor's engagement ability positively impacts learners' BM utilization.

Figure 5. Social Cognitive Theory
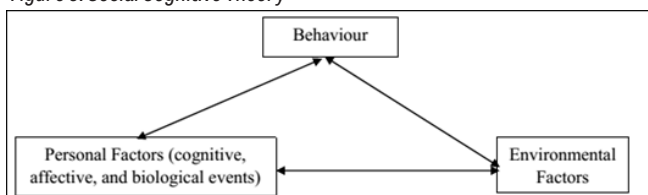
RESEARCH METHODOLOGY

In the field of Information Systems (IS), design science, interpretivism, and positivism are the three main research approaches (Orlikowski & Baroudi, 1991). The design science approach deals with an existing issue within a problem area by developing creative approaches or methods (von Alan et al., 2004). The interpretivist approach mainly considers the social aspect of life and focuses on constructing meaning in natural settings and the process of developing and employing information systems (Willcocks & Mingers, 2004). One of the best definitions for the positivist approach is given by Neuman (2006) "an organized method for combining deductive logic with precise empirical observations … in order to discover and confirm a set of probabilistic causal laws" (p. 65).

In this study, the ultimate purpose is to explain causal relationships between concepts and constructs. This paper explores the impact of attitude towards BMT, social identity, LMS design, LMS usage, and instructor's engagement ability on students' BM utilization, which is consistent with positivist epistemology. The main objective of this research is to identify and examine the impact of these variables. To fulfil this purpose, a conceptual model (Figure 1) was designed and developed. A quantitative research approach was employed to validate the conceptual model and test the

hypotheses. Survey was the research method used in this study and the research technique used to collect data was an online questionnaire. An ethical clearance was obtained for this study as well.

Data Collection

To measure, investigate, and validate the proposed research hypotheses was one of the main objectives of this quantitative research study. The pool of respondents included undergraduate students from the Engineering and Science Department of Victoria University, who were studying in block mode at the time of data collection. The concept-based questions were used in the survey. The survey captured the participants' level of agreement with various questions based on a five-point Likert scale (Matell & Jacoby, 1971). The questions used in the questionnaire were taken from already validated questions in the literature. The survey instrument can be found in Appendix 1.

Students were given an electronic questionnaire and were asked to fill it out at the end of a block of study. The survey instrument included two sections: (a) an informed consent letter to present the research summary, the expected benefits of the research, participants' confidentiality, risks to participants, agreement to participate voluntarily, and a privacy statement; and (b) the questionnaire. If the participants responded to all the survey questions, that survey was considered complete.

Overall, 75 students completed the survey, which is about the minimum acceptable sample size. According to Goodhue et al. (2012), the minimum acceptable sample size to enable Partial Least Squares (PLS) analysis is 40. Data inspection resulted in removal of one response due to incompleteness, resulting in 74 full responses. Apart from that one response, no anomaly was observed in the data set. The respondents responded to the survey in a 15 day period (although the survey was open for a couple of months, no response was received past day 15).

Table 1 shows some demographic statistics about the respondents. The majority of students were male and studied full time, and 62.7% of the respondents were domestic students and 37.3% were international students. Among all participants, 26.7% of the respondents were aged 18 to 20, 40% were aged 21 to 25, and 33.3% were 25 or older.

Table 1. Summary of Participants' Demography

	Male	Female		
Gender	81.3%	18.7%		
	Under 18	18-20	21-25	25 and over
Age	0	26.7%	40%	33.3%
	Domestic	International		
Student Type	62.7%	37.3%		
	Full-time	Part-time		
Enrolment Status	97.3%	2.7%		

Data Analysis Technique Used

We used PLS in this research for analyzing the data. This method was employed due to its ability to predict the variability of the dependent construct and to manage reflective measures (Eikebrokk and Olsen, 2007). The main reason behind this selection was the fact that this method can predict the interrelationship between multiple independent and dependent variables while supporting unobserved or undefined variables (Gefen et al., 2000).

DATA ANALYSIS AND RESULTS

This section presents the measurement model first and investigates the validity of the instrument used for collecting data. The next section provides the findings of the study and the structural model resulted from the analysis and hypothesis testing.

Measurement Model

We used PLS in this research for analyzing the data. This method has been employed due to its ability to predict the variability of the dependent construct and to manage reflective measures (Eikebrokk & Olsen, 2007). The main reason behind this selection was the fact that this method can predict the interrelationship between multiple independent and dependent variables while supporting unobserved or undefined variables (Gefen et al., 2000).

Confirmatory Factor Analysis (CFA), which is a special form of factor analysis, is used to evaluate the consistency of the measures of a construct or factor with the understanding of the nature of that construct. The main objective of confirmatory factor analysis is to use factor loading to find out whether the data fits a hypothesized measurement model (Brown, 2015). Based on Chin et al. (2003) and Hulland (1999), the factor loadings assessment is the first criterion to decide whether to include or exclude an indicator in the CFA. Indicators' loading on their associated factor should normally be higher than 0.70 or above, which shows that each indicator explains at least 50% of the variance of the corresponding latent variable. Table 2 provides the information of the results of CFA for the proposed model. As it shows, all the indicators had loadings above 0.7, which means that all of them are accepted at this stage. Moreover, composite reliability for all constructs was above 0.8, indicating a reliable measurement model.

Table 2. Item Loadings and Composite Reliability

Construct	Indicator	Factor Loading	Composite Reliability
Attitude	ATT1	0.938	0.938
	ATT2	0.943	
Social Identity	SI1	0.873	0.826
	SI2	0.803	
LMS Design	LMSD1	0.944	0.943
	LMSD2	0.944	
LMS Use	LMSU	1	1
Instructor's Engagement Ability	IENG	1	1
BM Utilization	BMU1	0.946	0.951
	BMU2	0.959	

Table 3. Discriminant Validity

	Attitude	BM Utilization	Ins. Eng. Ability	LMS Design	LMS Use	Social Identity
Attitude	0.94					
BM Utilization	0.653	0.952				
Ins. Eng. Ability	0.314	0.518	1.000			
LMS Design	0.577	0.631	0.398	0.944		
LMS Use	0.164	0.427	0.301	0.251	1.000	
Social Identity	0.293	0.422	0.424	0.066	0.216	0.839

Table 3 demonstrates the discriminant validity of the model.

Structural Model

We adopted PLS in this study as a statistical method that brings some relationship to principal components regression and could model latent constructs under conditions of nonnormality. PLS is a component-based technique that "focuses on maximizing the variance of the dependent variables explained by the independent ones instead of reproducing the empirical covariance matrix" (Haenlein & Kaplan, 2004, PP. 290). Smart PLS 2.0 M3 was used to appraise the parameters of the model with the number of cases being 74. Table 4 shows correlation between constructs.

The outcome of hypothesis testing is depicted in Table 5. Moreover, path coefficient, which indicates the strength of the interrelationships between the independent and dependent latent variables (Hair et al., 2011) and *t*-values for each hypothesis are also presented in Table 5.

Figure 6 shows the result of hypothesis testing. Overall, 66.3% of the variance in the dependent variable, BM utilization, is explained by the five independent variables. As per Table 6 above and Figure 6 below, all the hypotheses of this research were confirmed. Hypothesis 1 was confirmed at a confidence level of 0.01, indicating that Attitude towards Block Mode Delivery has a substantial positive effect on BM Utilization. Hypothesis 2 was also confirmed at 0.05 confidence level,

Table 4. Latent Variables Correlations

	Attitude	BM Utilization	Ins. Eng. Ability	LMS Design	LMS Use	Social Identity
Attitude	1.000	0.653	0.314	0.577	0.164	0.293
BM Utilization	0.653	1.000	0.518	0.631	0.427	0.422
Ins. Eng. Ability	0.314	0.518	1.000	0.398	0.301	0.424
LMS Design	0.577	0.631	0.398	1.000	0.251	0.066
LMS Use	0.164	0.427	0.301	0.251	1.000	0.216
Social Identity	0.293	0.422	0.424	0.066	0.216	1.000

Table 5. Summarized Results of the Hypotheses Testing

	Hypothesis	Path Coefficient	T Value	Confirmed/ Not conformed
H1	Attitude >> BM Utilization	0.333***	3.203	Confirmed
H2	Social Identity >> BM Utilization	0.199**	1.986	Confirmed
H3	LMS Design >> BM utilization	0.317***	3.317	Confirmed
H4	LMS Use >> BM Utilization	0.207**	2.049	Confirmed
H5	Instructor's Engagement Ability >> BM Utilization	0.140*	1.800	Confirmed

* significant at 0.1 level; ** significant at 0.05 level; *** significant at 0.01 level; **** significant at 0.001 level

demonstrating that Social Identity can positively impact BM Utilization. Moreover, Hypothesis 3 was confirmed at a confidence level of 0.01, showing that LMS Design has a significant positive effect on BM Utilization. As for Hypothesis 4, it was confirmed at a confidence level of 0.05, indicating that Using LMS has a positive direct impact on BM Utilization. Finally, Hypothesis 5 was confirmed at a confidence level of 0.1, showing that Instructor's Engagement Ability positively impacts BM Utilization.

Figure 6. PLS Result Model
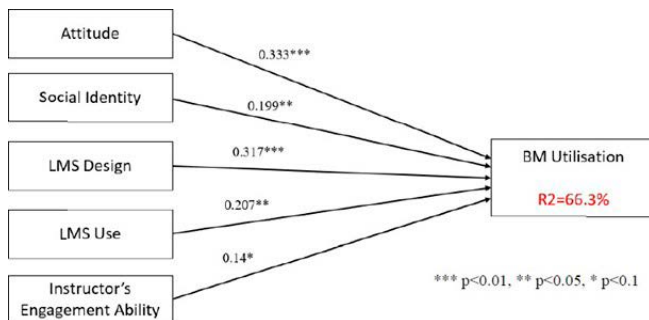
DISCUSSION

The goal of this research was to investigate the role of students' perceptions (including attitude towards BM, students' social identity, and students' perceived instructor's engagement ability) as well as online learning management system (including LMS design and LMS use) on students' Block Mode utilization in educational systems. The results demonstrate that LMS design and LMS use have a positive impact on students' BM utilization. The findings also show that students' perceptions in terms of their social identity, attitude towards BM, and perceived instructor's engagement ability positively impact BM utilization. In what follows have we explain the implications of our findings to both theory and practice.

Implications of Findings for Theory

One of the contributions of this study is the findings of the structural model and how they relate to the research hypotheses. This study shows the impact of student's attitude and social identity, LMS design, LMS use, and instructor's engagement ability on learners' adoption of BM. The findings prove that all the variables that we examined have a positive and significant impact on students' BM utilization which is one of the goals of intensive mode developers. The previous research has investigated the BM impacts on students' learning outcomes and satisfactions (e.g., Klein et al., 2019; Loton et al., 2020; Samarawickrema & Cleary, 2021), BM success factors (e.g., Czaplinski & Devine, 2017; Murray & Palladino, 2021; Roddy et al., 2017), technologies for BM (e.g., Downie et al., 2019, Harkin & Nerantzi, 2021), and BM risks and challenges (e.g., Nerantzi & Chatzidamianos 2020; Oraison et al., 2020; Tatum, 2010). To fill the gap identified in the literature, this study focused on the impact of students' perceptions such as attitude towards BM, social identity, and perceived instructor's engagement ability, and the influence of LMS

Design and LMS Use on students' utilization of BM. Therefore, the results of the current study are valuable for increasing student's adoption of BM, and they substantially contribute to student's academic achievements and outcomes.

Our findings regarding the impact of students' attitude towards block or intensive mode on BM utilization is highly aligned with the findings of Finger and Penney (2001). They found that when it comes to the BM of teaching, students are more concerned with the time commitment and value for their money. Some students may find the time commitment for BMT classes is too extreme, while some other students may believe that universities do not deliver the value they have paid for. Our findings are aligned with Finger and Penney's work, as students' perceived time commitment and value for money of BM are examples of parameters which demonstrate students' attitude towards BM, and thus a better attitude towards BM can influence students' utilization of BM deliverables.

Our findings regarding the impact of perceived instructor's engagement ability on BM utilization is highly aligned with the findings of Lu and Wu (2018), who conducted research regarding an integrated evaluation approach of teaching and learning. They found that students can learn better in BM as compared to traditional mode because in BM students can learn a lot from opened discussion, interactions with teachers, and so on. Our findings here are consistent with Lu and Wu's (2018) findings, because instructor's engagement ability forms the main driving force for students' interaction with teachers, and the higher the instructor's engagement ability the higher students' utilization of BM classes. This finding is also aligned with Karjanto and Yong (2009), who found that BM can give students and teachers the opportunity to build their relationship, because instructor's engagement ability is one of the main drivers of student-teacher relationship building.

This research also opens new avenues for researchers' future work such as investigating the impact of certain administrative and course design factors. Moreover, future researchers can verify the influence of the proposed characteristics on other BM initiatives such as BM structured guidelines for design and development, scheduling and time management, and curriculum design and subject connection. These can be addressed in future research and be investigated with different data sets and examined with other research participants to add value to our findings.

Implications of Findings for Practitioners

The findings of this research can benefit many groups of practitioners across the globe, including instructors, curriculum developers, educational providers, students, government, and LMS development companies. This study found that both LMS design and LMS use have a positive, significant impact on BM utilization by students. An implication of these findings for subject instructors, designers, and conveners is that they can ensure an improved student adoption of the block mode delivery through: (a) making sure the LMS space for the subject is well designed, well organized, and includes required features and resources in a visually attractive and clear format; (b) employing strategies that contribute to an increased student usage of the LMS space for the subjects. Such strategies can include, but are not limited to, stressing the importance of using the LMS space in the class, monitoring students' usage of the LMS space, sending reminders, and so on.

This study found that students' perceptions in terms of their social identity, attitude towards BM, and perceived instructor's engagement ability positively impact BM utilization by students. An implication of these findings for subject instructors, lecturers, and conveners is that they can ensure an improved student adoption of their block mode (intensive mode) delivery through: (a) adopting strategies which enhance students' attitude towards BM delivery style (e.g., by providing clear instructions, planning reasonable time for subject content and assessment, providing timely feedback, using ample examples and case studies, and so on); (b) employing strategies to enhance students' perceived social identity in the subject (e.g., adopting appropriate two-way communication strategies, using instructive class discussions, ensuring proper use of group assignments, letting students comment on each other's contributions to the class discussions, making sure students introduce themselves to their peers in the first class, and so on); (c) using various strategies to make sure students are engaged with the class (e.g., by encouraging two-way communication, welcoming questions, including hands-on practices such as workshops

and case studies, using instructive class discussions, and so on).

Educational providers are a group that can benefit from this study and implement the findings to their BM design and developments or current practices. These educational providers can be universities or colleges that are interested in implementing this teaching model or the universities that have already implemented it and need to review their practices. They can create or modify some general methods and guidelines to increase the sense of identity in their learning environments by creating more group activities to promote the socialization of the students and apply some pedagogical practices to help them to be identified in the community. For universities which are about to decide whether or not to implement BMT, they can use the information provided herewith regarding the factors that help enhance the success of BMT implementation at universities. Factors that we studied in this research such as instructor's engagement ability could give universities an edge when they are recruiting instructors by asking them to employ some techniques which would reveal the skills of the candidates.

Another group that can benefit from this research is students who are about to enter a university or have already started their course in a university. As there are different higher education sectors that have successfully implemented BMT around the world, students may find it hard to choose between institutions with different teaching methods. As tertiary education is usually lengthy and expensive, the decision must be made after a great deal of consideration. Such students can use the result of this study to amplify their learning outcomes of studying in the BM of teaching learning environment to avoid falling behind the block units.

Another group that can benefit from this research is governments. Many governments have been striving to improve the quality of their tertiary education systems as education is one of the most important industries contributing to an economy. With many universities becoming interested in BMT, governments need to consider how to make the model more beneficial for their educational environment. The findings of this study can assist them to provide a set of guidelines that could be applied to their higher education sector when implementing BMT.

RESEARCH LIMITATIONS

One of the limitations of this study is that we focused only on certain perceived characteristics. Important psychological factors, such as motivation, problem solving, and self -efficacy, or administrative factors such as technical support, econnectivity, and pedagogical support, were not included. Another limitation of this research is the data collection, which was constrained to one higher education institution and therefore could not embrace other learning settings. Although the sample size of this study was sufficiently large for statistical analysis, including more institutions could improve the findings of the research. Moreover, we focused only on the undergraduate students from the Engineering and Science Department, while studying other educational streams such as health or business could add more value to the future work. Another limitation is that it focusses only on quantitative data due to our limited resources. Future researchers are invited to employ qualitative methods such as interviews and focus groups to conduct exploratory research in order to uncover more aspects of block mode implementation and its success drivers.

CONCLUSION

The current study examined the impact of learning management systems as well as students' perceptions on students' utilization of the block mode teaching. The results show that LMS design and students' level of LMS usage significantly and positively impact their adoption of block mode. Moreover, we found that students' perceptions in terms of their social identity, attitude towards BM, and perceived instructor's engagement ability, positively and significantly influences their adoption of block mode. These findings have important implications for various stakeholders such as managers, learning designers, subject designers, coordinators, and lecturers at universities.

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APPENDIX 1: SURVEY INSTRUMENT

Related Demographic Questions:

Gender (male/female)?

Age (under 18 / 18–20 / 21–25 / 25 or older)?

Enrolment status (full time, part time)?

Domestic/International?

Related Multiple-choice Questions:

Please rate the following questions regarding your experience with block mode in this current semester.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5
Construct	Questions		Reference (Adapted from)	
Attitude Toward Block Mode	Block mode makes learning more interesting I like studying my units in block mode.		Adopted from Ng (2012)*	
LMS Space Design	I believe that overall, the LMS space for this unit was well-organized and well-designed.		Adopted from Ghapanchi et al. (2020)*	
	I believe that overall, the LMS space for this unit included required features and resources.			
LMS Use	I have used the LMS several times a week during this block.		Adopted from Venkatesh et al. (2008)*	
Instructor's Ability to Engage	The unit lecturer was an engaging instructor.		Developed herein	
Social Identity	In this unit, I felt I was a valued member of my group. In this unit, my contribution was sometimes acknowledged by other students.		Adopted from Moon et al. (2006)*	
Block Mode Utilization	In this unit, I have utilized everything that the block model of teaching provided to support my learning. In this unit, I have made practical and effective use of block model of teaching.		Adopted from Ghapanchi & Talei-Khoei (2018)*	

* Adopted with some modifications