



An analysis of causal factors of blended learning in Thailand

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Abstract

In the contemporary educational milieu, blended learning (BL) has emerged as a pivotal modality, especially amidst the global shift towards digitalization. This research aimed to scrutinize the acceptance levels and influential factors of BL among administrators, teachers, and students within Thai primary education, employing the Technology Acceptance Model (TAM) as a theoretical framework. Through a methodological lens involving quantitative data collection and analysis, the study unveiled a significant divergence in BL acceptance levels across the participant groups, with administrators and teachers showcasing higher acceptance compared to students. Notably, perceived enjoyment emerged as a crucial factor influencing BL acceptance across all groups, aligning with extant literature. The findings underscore the necessity to enhance BL acceptance among students, potentially through strategies that amplify perceived usefulness and enjoyment. The study contributes to the burgeoning literature on BL, providing insights that could inform the development and implementation of BL strategies in primary education, particularly in contexts similar to Thailand. Future research avenues include exploring additional variables influencing BL acceptance and devising targeted interventions to enhance student acceptance and engagement with BL.

Keywords Blended learning · Technology acceptance model · Primary education · Perceived enjoyment · Perceived usefulness · Digital learning · Educational technology · Thailand

1 Introduction

In the contemporary educational landscape, online learning has burgeoned into a prevalent modality across all echelons of the Thai educational system, with projections indicating a continued upward trajectory. Technology, serving as a pivotal conduit, has redefined individual learning and teaching paradigms, proffering expansive

Extended author information available on the last page of the article

opportunities and autonomy for learners and educators to access learning ubiquitously and at any time (Xu et al., 2013). Amidst the pandemic epoch, blended learning has emerged as a predominant learning and teaching strategy in Thai schools, and its prevalence is anticipated to persist and potentially amplify in the ensuing future.

In a strategic endeavor, the National Strategy Secretariat (2018) has advocated for the Thai citizenry to immerse in lifelong learning, unbounded by geographical and temporal constraints. The national blueprint underscores a requisite for the Thai educational system to augment its flexibility, thereby amplifying opportunities for learners to access resources and engage in learning and teaching activities. Blended learning, in this context, is posited as a viable solution to actualize these plans.

Blended learning, first introduced in 2001, is conceptualized as a learning approach that amalgamates face-to-face and online learning, occasionally being referred to as hybrid learning (Milheim, 2006). Thorne (2003) delineated blended learning as online learning programs akin to distance learning, wherein learners engage in both online and offline activities and information assimilation. Bonk and Graham (2004) encapsulated the definitions of blended learning into three distinct categories: a meld of instructional modalities, instructional methods, and a blend of online and face-to-face instructions.

The merits of blended learning are multifaceted. Oh and Park (2009) highlighted that blended learning fosters flexibility, thereby enabling learners to allocate more time with teachers in engaging in activities within a traditional classroom setting. It facilitates a profound understanding by proffering a plethora of digital resources through technological utilization (Chen & Jones, 2007), and can serve as a mechanism to enhance learners' confidence and competence, thereby elevating the quality of learning subsequently (Azizan, 2010).

In the Thai context, blended learning has been employed to instruct students at primary education levels, especially during pandemic-induced physical separations between students and teachers. The advantages of blended learning to Thai Education are manifold, including enhancing learning flexibility, saving time, and fostering participation among students and teachers within a classroom setting. From a pedagogical perspective, blended learning propels teachers towards enhanced digital competency, particularly in identifying and utilizing apt technologies to refine their instructional methodologies. These advantages align with the objectives of the 11th National Educational Development Plan of the Ministry of Education in Thailand, which accentuates the enhancement of learning and teaching quality through technological utilization (Thungkanai, 2021).

Nonetheless, despite its advantages, blended learning implementation is not devoid of challenges. Almahasees et al. (2021) elucidated that challenges in blended learning application pivot around students' negative perceptions and non-acceptance of online learning, coupled with insufficient self-regulation among students. For teachers, identified technology access and its utilization for teaching as predominant challenges encountered in blended learning. Furthermore, challenges pertaining to appropriate instructional technology and efficacious teacher training support are currently being navigated by educational institutions and administrations.

Given that blended learning is poised to become a common learning approach in the Thai education system imminently, and considering that technological factors pose challenges to successful blended learning—particularly technology acceptance among all educational stakeholders (Bekele, et al., 2022)—this study seeks to explore the levels of blended learning acceptance in Thai education. This includes investigating factors and their impact on blended learning acceptance among administrators, instructors, and learners in Thai primary education.

In this study, the researchers have employed the Technology Acceptance Model (TAM) as a framework for data collection. The model encapsulates four principal components that depict how users accept blended learning approaches in specific situations (Silva, 2015). The outcomes of this study are anticipated to be instrumental in developing an educational development plan that could augment the implementation of blended learning in primary education in Thailand. This, in turn, could be a genuine pathway to propel Thai society towards recognition and enhancement, enabling individuals to immerse in lifelong learning subsequently.

2 Objectives

The study aimed to:

1. Examines levels of blended learning acceptance among administrators, instructors, and learners in primary education in Thailand
2. Explore casual factors of blended learning acceptance among administrators, teachers, and learners in primary education in Thailand.
3. Examines impacts of casual factors to blended learning acceptance among administrators, teachers, and learners in primary education in Thailand.

3 Research questions

1. What were levels of blended learning acceptance among administrators, instructors, and learners in primary education in Thailand?
2. What were casual factors of blended learning acceptance among administrators, teachers, and learners in primary education in Thailand?
3. How did casual factors impact to blended learning acceptance among administrators, teachers, and learners in primary education in Thailand

4 Literature reviews

4.1 Blended learning: A multifaceted approach

Blended Learning (BL), as defined by Bekele et al. (2022), amalgamates online and offline informational and activity components, presenting a learning approach

that epitomizes the evolution of 21st-century learning. It facilitates knowledge exchange across diverse cultures and time zones (Thorne, 2003), offering myriad advantages such as enhanced accessibility, flexibility, personalized learning experiences, and active engagement, while also fostering the development of digital literacy skills. However, the effectiveness of BL is contingent upon meticulous design and implementation, with a focus on digital equity to ensure all learners possess requisite access to technology and the skills for effective utilization (Alammary et al., 2014).

A successful BL environment, as supported by Thorne (2003), should be motivating and designed as a learning community that fosters development in both cognitive and affective domains. It should not only support students in knowledge acquisition but also enhance their self-awareness, regulation, motivation, empathy, and social skills (Bekele et al., 2022). Furthermore, Thorne (2003) emphasizes that successful BL should provide a genuine learning experience, thereby necessitating the implementation of personalized learning when designing BL courses (Sullivan, 2021).

4.2 Technology Acceptance Model: A Framework for Understanding Technology Adoption

The Technology Acceptance Model (TAM), developed by Fred D. Davis in 1986, has been widely utilized to explore and measure factors influencing decisions regarding the acceptance or rejection of information technology. Recognized as one of the most influential and predictive models of technology adoption (Venkatesh & Bala, 2008), TAM has been employed to indicate technology trends in education (Fathema et al., 2015) and to analyze digital tools or learning approaches adoption in digital education.

In the context of blended learning, TAM has been utilized to examine factors influencing the acceptance of this approach. For instance, Ghani et al. (2022) employed TAM to examine the acceptance of blended learning among learners in Early Childhood Education, revealing that recognition of usefulness was pivotal for increasing acceptance. Similarly, Nadlifatin et al. (2020) applied TAM to assess the behavioral intention of using blended learning among university students in Taiwan and Indonesia, uncovering that the perception of enjoyment was a determinant factor indicating readiness for blended learning.

TAM underscores three pivotal components leading to behavioral intention in technology use: Perceived Ease of Use (PEU), Perceived Usefulness (PU), and Perceived Enjoyment (PE). Harryanto et al. (2018) elucidate these components as follows:

Perceived Ease of Use (PEU): Defined as the degree to which individuals believe that technology is straightforward to learn and use for completing specific tasks or situations.

Perceived Usefulness (PU): Refers to the recognition or perception of the advantages of employing technology in specific tasks or situations, often stemming from the perception of ease of use.

Perceived Enjoyment (PE): Highlighted by Davis et al. (1992) as the extent to which the activity of using technology is perceived to be enjoyable in its own right, irrespective of the performance consequences that may be anticipated.

Behavioral Intention (BI): The final component of TAM, referring to the intended behaviors of individuals in using technology in specific tasks or situations, necessitating perceptions of ease of use, usefulness, and enjoyment.

5 Participant consent

Before initiating the study, all participants were thoroughly informed about its purpose, methodology, and use of collected data. A detailed consent form, highlighting the voluntary nature of participation and assurance of anonymity and data confidentiality, was provided. Explicit written consent was obtained from each participant, and for those under 18, additional parental consent was secured. The research adhered strictly to ethical guidelines, ensuring the dignity and rights of the participants were respected throughout the study.

6 Research methodology

The study was conducted as a survey study and a total 236 participants participated in this study. All participants were school administrators ($n=48$), teachers ($n=86$), and students ($n=102$). The first group contained 48 school administrators who worked in primary education schools ($n=34$, 70.8%). More than half of them completed master degrees ($n=27$, 56.3%) and they had 1–2 year and more than 5-year related working experience in a blended learning environment ($n=17$, 35.4%). Moreover, most participants indicated that they used to manage and design 3–5 blended learning courses ($n=14$, 29.1%) (See Table 1).

The second group of participants contained 86 teachers. Most of them were teaching in middle and high-school levels ($n=54$, 62.8%) and they completed master's degrees ($n=40$, $n=46.5\%$). Regarding related experience in blended learning environment, most of teachers indicated that had 1–2 year working experience in a blended learning environment ($n=37$, 43%) and they used to teach 2–3 blended learning courses ($n=41$, 47.7%). Most of them stated that they used computers as the main tools for teaching in blended learning courses ($n=80$, 93%) (See Table 2).

The last group of participants contained 102 students who studied at secondary and high-school levels ($n=85$, 83.3%). More than half of students had learning experience in a blended learning environment for 1–2 years ($n=48$, 74.1%) and they had studied in blended learning courses more than 5 courses ($n=46$, 45.1%). Most of them used mobile phones as their main learning tools in blended learning courses ($n=92$, 90.2%) (See Table 3).

Table 1 Background information of school administrators

Participant background information	Numbers	Percentage
Institution levels		
Primary education	34	70.8
Middle and high school levels	30	62.5
College levels	1	2.1
Others	5	10.4
Educational background		
Middle-high school levels	3	6.2
Undergraduate degree	1	2.1
Master degree	27	56.3
Doctoral degree	17	35.4
Related experiences in blended learning env		
None	6	12.6
Less than 1 year	4	8.3
1–2 years	17	35.4
3–5 years	4	8.3
More than 5 years	17	35.4
Managing and designing blended learning courses		
None	8	16.7
At least 2 courses	13	27.1
3–5 courses	14	29.1
5–10 courses	12	25.0
More than 10 courses	1	2.1

n = 48

6.1 Research instrument

In this study, the researchers reviewed related documents about TAM model and blended learning principles to develop survey questions. The researchers developed three surveys that were used for collecting data from three groups of participants which were school administrators, teachers, and students.

All survey questions were divided into 2 parts. The first part contains 5 questions that aimed to collect participant background information such as educational background, institution levels, related experiences in blended learning, and digital tools. The second part contained 24–26 questions that aimed to examine factors and levels of blended learning acceptance among participants. All questions were related to four components of the TAM model which were Perceived Usefulness (PU), Perceived Ease of Use (PEU), Perceived Enjoyment (PE), and Behavioral Intention (BI). In this part, participants were asked to evaluate their attitudes, knowledge, and skills in learning, teaching, and working within a blended learning environment through a 5-point scale from Strongly Agree (5) to Strongly Disagree (1).

Table 2 Background information of teachers

Participant background information	Numbers	Percentage
Teaching levels		
Primary levels	26	30.2
Middle and high school levels	54	62.8
Vocational diploma	3	3.5
College levels	3	3.5
Subject Teaching Areas		
Science and Technology	19	22.1
Social Science and Humanity	19	22.1
Others	48	55.8
Educational background		
High-school levels	5	5.8
Undergraduate degree	39	45.3
Master degree	40	46.5
Doctoral Degree	2	2.4
Related experience in Blended Learning env		
None	8	9.3
Less than 1 year	16	18.6
1–2 years	37	43.0
3–5 years	11	12.8
More than 5 years	14	16.3
Teaching in blended learning courses		
None	11	12.8
1 course	21	24.4
2–3 courses	41	47.7
4–5 courses	10	11.6
More than 5 courses	3	3.5
Digital teaching tools used in blended learning course		
Computer	80	93.0
Tablets	44	51.2
Mobile phones	61	70.9

$n = 86$

Before started data collection, the researchers sent those surveys to three experts in Educational Technology area who had research studies and experiences in blended learning to validate all survey questions by using scales of index of item objective congruence (IOC) that indicated the appropriateness of questions with the objectives of the study. The results of IOC's index of questions of three surveys from experts ranged from 0.67–1.00 which represents good content validity (Pengruck et al., 2019) and they were accepted by the experts for using to examine factors of blended learning acceptance among school administrators, teachers, and students in Thailand.

Table 3 Background information of students

Participant background information	Numbers	Percentage
Learning levels		
Primary education	7	6.9
Secondary-high school	85	83.3
College level	7	6.9
others	3	2.9
Experience in blended learning env		
No experience	17	16.7
Less than 1 year	30	29.4
1–2 years	48	47.1
3–5 years	7	6.9
Learning in blended learning course		
1 course	25	24.5
2 courses	16	15.7
3–5 courses	15	14.7
More than 5 courses	46	45.1
Digital learning tools used in blended learning course		
Computers	45	44.1
Tablets	33	32.4
Mobile phones	92	90.2

n = 102

The reliability testing was also conducted in which Cronbach's alpha from three surveys were more than 0.70. Therefore, it clearly demonstrated that all survey instrument of this study had high internal consistency and they were all reliable and accepted to collect the data (See Table 4).

7 Data collection procedure

The researchers started collecting the data after IRB approval. The researchers created and sent official invitation letters to several primary educational institutions located in Bangkok and Metropolitan areas for asking participation from school administrators, teachers, and students. The letter included descriptions of objectives of research study, participant confidential, survey links, and contact information of researchers. The researchers collected the data for two months and took three months to analyze the data and write a report on this study.

Data analysis According to the objectives and research questions, there were three statistical methods used for analyzing data in this study. For the first objective, a descriptive analysis was used for exploring levels of blended learning acceptance in four component of TAM model among school administrators, teachers, and students. Moreover, the researchers used One-Way ANOVA for comparing levels of blended learning acceptance among three groups of participants. The results from One-Way

Table 4 Reliability testing

Survey	Variables	Cronbach Alpha	Standard Cronbach Alpha	Results
School administrators	Perceived Usefulness (6)	0.75	> 0.70	Reliable
	Perceived Ease of Use (9)	0.704	> 0.70	Reliable
	Perceived Enjoyment (7)	0.77	> 0.70	Reliable
	Behavioral Intention (4)	0.90	> 0.70	Reliable
	Total 26 questions	0.84	> 0.70	Reliable
Teachers	Perceived Usefulness (6)	0.71	> 0.70	Reliable
	Perceived Ease of Use (9)	0.72	> 0.70	Reliable
	Perceived Enjoyment (7)	0.76	> 0.70	Reliable
	Behavioral Intention (4)	0.75	> 0.70	Reliable
	Total 26 questions	0.88	> 0.70	Reliable
Students	Perceived Usefulness (5)	0.70	> 0.70	Reliable
	Perceived Ease of Use (8)	0.71	> 0.70	Reliable
	Perceived Enjoyment (6)	0.70	> 0.70	Reliable
	Behavioral Intention (4)	0.81	> 0.70	Reliable
	Total 24 questions	0.83	> 0.70	Reliable

ANOVA would not only present the differences of blended learning accepted levels in three groups of participants, but it also indicated different levels in each factor of blended learning acceptance among participants.

The researchers also applied Confirm Factor Analysis (CFA) to examine impacted factors of blended learning acceptance and used Structural Equation Modeling (SEM) for conducting a path analysis in order to examine their impacts to blended learning acceptance levels among participants.

8 Results

8.1 RQ1: What were levels of blended learning acceptance among administrators, instructors, and learners in primary education in Thailand?

The results from Table 5. showed levels of blended learning acceptance among school administrators, teachers, and students in Thailand. According to the results, behavioral intention of blende learning acceptance from school administrators was at the highest level ($\bar{x} = 4.25$, $SD = 0.73$) which clearly showed that school administrators highly accepted to implement a blended learning approaches and work within a blended learning environment. The results also presented that school administrators perceived usefulness of blended learning approaches ($\bar{x} = 3.82$, $SD = 0.65$), its ease of use ($\bar{x} = 3.74$, $SD = 0.46$), and enjoyment in working within a blended learning environment ($\bar{x} = 3.67$, $SD = 0.49$).

Table 5 Means, standard deviation of blended learning acceptance among school administrators

Blended Learning Acceptance Level	$\bar{x}...$	SD	Meaning
School administrators ($n=48$)			
Perceived Usefulness	3.82	0.65	High
Perceived Ease of Use	3.74	0.46	High
Perceived Enjoyment	3.67	0.49	High
Behavioral Intention	4.25	0.73	Highest
Teachers ($n=86$)			
Perceived Usefulness	3.59	0.59	High
Perceived Ease of Use	3.59	0.47	High
Perceived Enjoyment	3.55	0.52	High
Behavioral Intention	3.90	0.69	High
Students ($n=102$)			
Perceived Usefulness	3.00	0.88	Average
Perceived Ease of Use	3.17	0.75	Average
Perceived Enjoyment	3.11	0.86	Average
Behavioral Intention	2.99	1.05	Average

For teachers, the results of Table 5 showed that teachers had behavioral intention in teaching and working within a blended learning environment at the high level ($\bar{x} = 3.90$, $SD=0.69$) which meant that those teachers highly accepted and used a blended learning approaches into their work. The results also showed that most teachers perceived usefulness of blended learning approaches ($\bar{x} = 3.59$, $SD=0.59$), its ease of use ($\bar{x} = 3.59$, $SD=0.47$) and enjoyment in teaching with a blended learning environment at high level ($\bar{x} = 3.55$, $SD=0.52$).

However, the results showed that Thai students only had behavioral intention of using and accepting blended learning approaches at averaged level ($\bar{x} = 2.99$, $SD=1.05$) which meant that they neither particularly accepted or not accepted to study within a blended learning environment. The results also showed that students perceived usefulness ($\bar{x} = 3.00$, $SD=0.88$), ease of use ($\bar{x} = 3.17$, $SD=0.75$), including their enjoyment in learning within the blended learning environment at average levels ($\bar{x} = 3.11$, $SD=0.86$).

Table 6. represented the results of one-way ANOVA which showed that participants in all three groups had different levels of blended learning acceptance in all four components at a significant level of 0.5.

The results of Table 7. represented the pairing comparison in each factor of blended learning accepted levels among three groups of participants. The results clearly showed that there was no significant difference in perceiving usefulness, ease of use, and enjoyment of blended learning between school administrators and teachers. However, there were significant differences in perceiving usefulness, ease of use, and enjoyment of blended learning between those groups of participants and students at the significant level of 0.5. The results revealed that school administrators and teachers recognized usefulness, ease of use, and enjoyment of blended learning approaches more than students.

Table 6 Results of one-way ANOVA of difference among four components of blended learning acceptance among groups of participants

Blended Learning Acceptance	School administrators and instructional designers (n = 48)		Teachers (n = 86)		Students (n = 102)		<i>F</i>	<i>p</i>
	$\bar{x}...$	SD	$\bar{x}...$	SD	$\bar{x}...$	SD		
Perceived Usefulness	3.82	0.65	3.59	0.59	3.00	0.88	25.218*	0.000
Perceived Ease of Use	3.74	0.46	3.59	0.47	3.17	0.75	18.244*	0.000
Perceived Enjoyment	3.67	0.49	3.55	0.52	3.11	0.86	15.020*	0.000
Behavioral Intention	4.25	0.73	3.90	0.69	2.99	1.05	42.923*	0.000

* $p < 0.05$ **Table 7** Comparisons of blended learning acceptance among participants

Blended Learning Acceptance	Participants	$\bar{x}...$	(1)	(2)	(3)
Perceived Usefulness	School administrators (1)	3.82			*
	Teachers (2)	3.59			*
	Students (3)	3.00			
Perceived Ease of Use	School administrators (1)	3.74			*
	Teachers (2)	3.59			*
	Students (3)	3.17			
Perceived Enjoyment	School administrators (1)	3.67			*
	Teachers (2)	3.55			*
	Students (3)	3.11			
Behavioral Intention	School administrators (1)	4.25		*	*
	Teachers (2)	3.90			*
	Students (3)	2.99			

* $p < 0.05$

For behavioral intention, the results showed that there was difference regarding level of behavioral intention among school administrators, teachers, and students at the significant level of 0.5 in which school administrators had the highest level of behavioral intention in implementing and accepting blended learning approaches compared with groups of teachers and students at the significant level of 0.5.

8.2 RQ2: What were casual factors of blended learning acceptance among administrators, teachers, and learners in primary education in Thailand?

Table 8. showed the results of multicollinearity among four components of blended learning acceptance among participants. For school administrators, the

Table 8 Analysis of multicollinearity among the components of blended learning acceptance of participants

Factors	PU	PEU	PE	BI
School administrators				
Perceived Usefulness (PU)	1			
Perceived Ease of Use (PEU)	0.573**	1		
Perceived Enjoyment (PE)	0.762**	0.578**	1	
Behavioral Intention (BI)	0.611**	0.414**	0.628**	1
Teachers				
Perceived Usefulness (PU)	1			
Perceived Ease of Use (PEU)	0.519**	1		
Perceived Enjoyment (PE)	0.561**	0.446**	1	
Behavioral Intention (BI)	0.517**	0.507**	0.510**	1
Students				
Perceived Usefulness (PU)	1			
Perceived Ease of Use (PEU)	0.742**	1		
Perceived Enjoyment (PE)	0.825**	0.792**	1	
Behavioral Intention (BI)	0.769**	0.636**	0.812**	1

** $p < 0.01$

significant correlations of those factors ranged from 0.414 ($r = 0.414$, $p < 0.01$) to 0.762 ($r = 0.762$, $p < 0.01$). For teachers, the significant correlations ranged from $r = 0.446$ ($p < 0.01$) to $r = 0.561$ ($p < 0.01$). For students, the significant correlations ranged from $r = 0.636$ ($p < 0.01$) to $r = 0.825$ ($p < 0.01$). Therefore, all the results showed that intercorrelations among components from each group of participants were not exceeding 0.85 and they were appropriated for conducting a path analysis (Kline, 2005).

Structural equation modeling (SEM) was performed for analyzing path analysis. The results from Fig. 1, 2 and 3 revealed that all the data from school administrators, teachers, and students supported the structural model well, as indicated by Chi-square = 0, $df = 0$, $p = 0.51$, GFI = 1, AGFI = 1 (See Figs. 1, 2, and 3).

The results from Table 9 represented the correlation and impacts of casual factors within the model. For school administrators, factors of Perceived Enjoyment (PE) impacted the component of Behavioral Intention (BI) at the significant levels of 0.1 and 0.05 respectively, and it also standardized regression weight (B) between 0.38–0.65. However, the result showed that the factors of Perceived Ease of Use (PEU) had no impact on Perceived Usefulness (PU) and Behavioral Intention (BI) at the significant level of 0.05, and Perceived Usefulness (PU) had no impact on Behavioral Intention (BI) at the significant level of 0.5.

For teachers, the results revealed that variables had a significant level of 0.05 in which Perceived Ease of Use (PEU) impacted the components of Perceived Usefulness (PU) and Behavioral Intention (BI) at the significant level of 0.01. In addition, Perceived Enjoyment (PE) impacted Perceived Usefulness (PU) and Behavioral Intention (BI) at the significant level of 0.1 and Standardized Regression Weight (B) between 0.23–0.41.

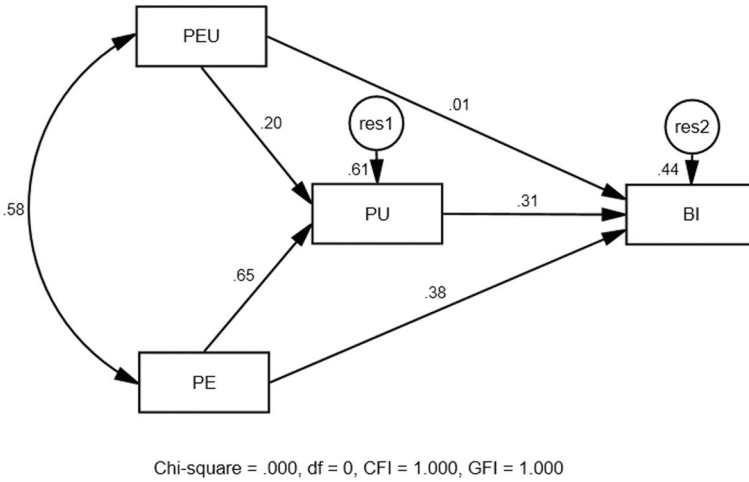


Fig. 1 Model of path analysis of blended learning acceptance among school administrators

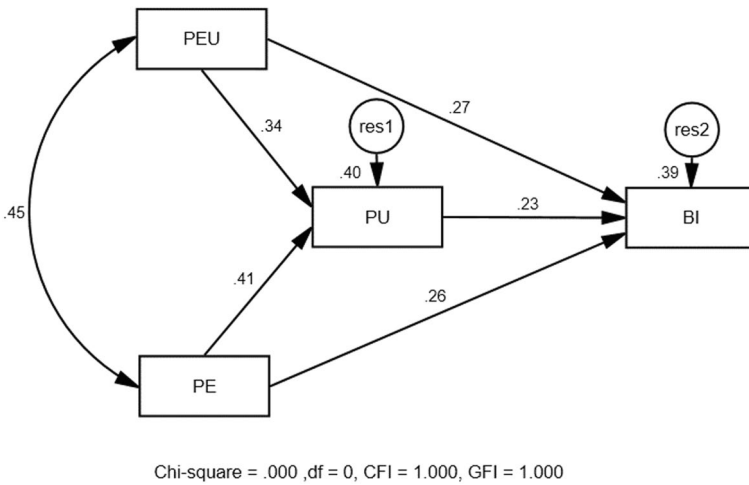


Fig. 2 Model of path analysis of blended learning acceptance among teachers

For students, factors of Perceived Enjoyment (PE) impacted Perceived Usefulness (PU) and Behavioral Intention (BI) at a significant level of 0.01. Furthermore, factors of perceived Ease of Use (PEU) impacted Perceived Usefulness (PU) at a significant level of 0.01, and factors of Perceived Usefulness (PU) impacted Behavioral Intention (BI) at a significant level of 0.01 by Standardized Regression Weights between 0.24 -0.64. However, factors of perceived Ease of Use (PEU) had no impact on Behavioral Intention (BI) at the significant level of 0.05.

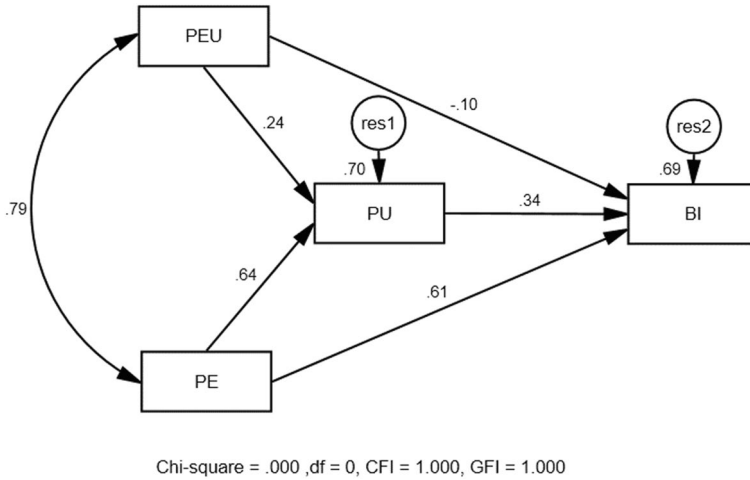


Fig. 3 Model of path analysis of blended learning acceptance among students

Table 9 Regression weight of model

Participants	TAM Components	Regression Weights				Standardized Regression Weights Estimate	Result
		Estimate	Estimate	C.R	P		
School Administrators	PEU --> PU	0.29	0.16	1.779	0.075	0.20	Not Significant
	PE --> PU	0.86	0.15	5.765	0.000**	0.65	Significant
	PEU --> BI	0.02	0.22	0.101	0.920	0.01	Not Significant
	PU --> BI	0.35	0.20	1.775	0.076	0.31	Not Significant
Teachers	PE --> BI	0.58	0.26	2.191	0.028*	0.38	Significant
	PEU --> PU	0.42	0.12	3.595	0.000**	0.34	Significant
	PE --> PU	0.47	0.11	4.398	0.000**	0.41	Significant
	PEU --> BI	0.40	0.15	2.679	0.007**	0.27	Significant
Students	PU --> BI	0.27	0.13	2.097	0.036*	0.23	Significant
	PE --> BI	0.35	0.14	2.47	0.014*	0.26	Significant
	PEU --> PU	0.28	0.11	2.676	0.007**	0.24	Significant
	PE --> PU	0.66	0.09	7.144	0.000**	0.64	Significant
	PEU --> BI	-0.147	0.13	-1.057	0.290	-0.10	Not Significant
	PU --> BI	0.40	0.12	3.332	0.000**	0.34	Significant
	PE --> BI	0.75	0.14	5.536	0.000**	0.61	Significant

PU=Perceived Usefulness, PEU=Perceived Ease of Use, PE=Perceived Enjoyment, BI=Behavioral Intention

* $p < 0.05$, ** $p < 0.01$

8.3 RQ3: How did casual factors affect blended learning acceptance among administrators, teachers, and learners in primary education in Thailand?

According to Table 9 and 10, for school administrators, the results revealed that the data supported the structural model well, as indicated by fit indices, $\chi^2(1, N=48)=0.00$, $\chi^2/df=0$, $p=0.51$, $GFI=0$, $AGFI=0$. In line with the hypotheses, the findings showed that perceived enjoyment ($\beta=0.65, p<0.01$) was a significant positive predictor of perceived usefulness. Besides, perceived enjoyment ($\beta=0.38, p<0.01$) was a significant positive predictor of behavioral intention.

For teachers, the results revealed that the data supported the structural model well, as indicated by fit indices, $\chi^2(1, N=86)=3.49$, $\chi^2/df=0$, $p=0.00$, $GFI=0$, $AGFI=0$. The findings showed that perceived enjoyment ($\beta=0.41, p<0.01$) was a significant positive predictor of perceived usefulness. Besides, perceived ease of use ($\beta=0.34, p<0.01$) and perceived usefulness ($\beta=0.23, p<0.05$) were significant positive predictors of behavioral intention.

For students, the results showed that the data supported the structural model well, as indicated by fit indices, $\chi^2(1, N=102)=1.75$, $\chi^2/df=0$, $p=0.00$, $GFI=0$, $AGFI=0$. The findings showed that perceived enjoyment ($\beta=0.64, p<0.01$) was a significant positive predictor of perceived usefulness. Besides, perceived enjoyment ($\beta=0.61, p<0.01$) was a significant positive predictor of behavioral intention. Moreover, perceived usefulness ($\beta=0.34, p<0.01$) was a significant positive predictor of behavioral intention.

Table 10 Standardized parameter estimates (Direct, Indirect, and Total Effects) for the structural model of the blended learning for the administrator, teacher, and student samples

Independent variable		Dependent variable					
		Perceived usefulness			Behavioral intention		
		DE	IE	TE	DE	IE	TE
School Administrators	Perceived ease of use	0.20	-	0.20	0.1	0.06	0.08
	Perceived enjoyment	0.65**	-	0.65**	0.38**	0.20	0.58*
	Perceived usefulness	-	-	-	0.31	-	0.31
Teachers	Perceived ease of use	0.34**	-	0.34**	0.27**	0.08	0.35*
	Perceived enjoyment	0.41**	-	0.41**	0.26*	0.10*	0.35*
	Perceived usefulness	-	-	-	0.23*	-	0.23*
Students	Perceived ease of use	0.24**	-	0.24**	-0.10	0.08	-0.02
	Perceived enjoyment	0.64**	-	0.64**	0.61**	0.21**	0.83**
	Perceived usefulness	-	-	-	0.34**	-	0.34**

* $p<0.05$, ** $p<0.01$ DE represents Direct effect; IE represents Indirect effect; TE represents Total effect

9 Discussion

Navigating through the intricate landscape of blended learning acceptance within Thailand's primary education framework, this study has unearthed pivotal insights that necessitate a meticulous discussion, especially when placed in parallel with existing scholarly works.

RQ1: Dissecting Levels of Blended Learning Acceptance.

A striking disparity in acceptance levels among administrators, teachers, and students has been spotlighted, with the latter group showcasing a moderate acceptance level. This discrepancy is pivotal, inviting a comparative analysis with Al-Fraihat et al. (2020), who underscored the significant influence of perceived usefulness and ease of use on students' blended learning acceptance. The moderate acceptance level among students in the current study signals a potential gap in recognizing the utility and accessibility of blended learning, which could be attributed to diverse factors such as technological proficiency, resource accessibility, or intrinsic motivation, warranting further exploration in subsequent research.

RQ2: Unveiling Causal Factors of Blended Learning Acceptance.

The causal factors, notably perceived enjoyment, ease of use, and usefulness, have played a crucial role in shaping acceptance levels across the participant groups. The pronounced impact of perceived enjoyment across all groups aligns with Nadlifatin et al. (2020), affirming the instrumental role of enjoyment in determining blended learning success and enhancing motivation. The nuanced disparities in how these factors influenced each group, especially the non-significant impact of perceived ease of use on administrators, invite further exploration, potentially examining the distinct roles, responsibilities, and interactions with blended learning platforms.

RQ3: Probing the Impact of Causal Factors on Blended Learning Acceptance.

The causal factors exhibited varied impacts across participant groups. For instance, while perceived enjoyment significantly influenced perceived usefulness and behavioral intention among administrators, its impact was more pronounced among students, resonating with Sullivan (2021) that emphasized the centrality of motivation in successful blended learning. The differential impacts of these factors across groups underscore the necessity of tailoring blended learning environments to the specific needs and preferences of each stakeholder group to enhance its acceptance and efficacy.

10 Conclusion

In the evolving landscape of education, the adoption and acceptance of blended learning (BL) have become pivotal, especially in the context of the Thai educational system. This study embarked on a journey to explore the levels and influential factors of

blended learning acceptance among various stakeholders – administrators, teachers, and students – in Thai primary education. Through the lens of the Technology Acceptance Model (TAM), the research illuminated the nuances of perceived ease of use, perceived usefulness, and perceived enjoyment in shaping the behavioral intentions towards BL adoption among the participant groups.

The findings underscored a notable divergence in acceptance levels and the impact of causal factors across administrators, teachers, and students. While administrators and teachers demonstrated a higher acceptance level, students showcased a moderate level, indicating a potential gap in recognizing the intrinsic and utilitarian value of BL. The significant role of perceived enjoyment across all participant groups, aligning with the findings of Nadlifatin et al. (2020), highlighted the imperative of embedding enjoyment and motivation within the BL environments to foster positive attitudes and higher acceptance levels.

Moreover, the study brought to light the nuanced impacts of causal factors across different stakeholder groups, revealing the necessity to tailor BL environments to cater to the specific needs, preferences, and challenges encountered by each group. The comparative analysis with existing literature, such as the works of Sullivan (2021), provided a rich context, enabling the study to weave its findings into the broader tapestry of BL research.

11 Limitations and future directions

While the study provides valuable insights, it is not without limitations. The generalizability of the findings might be constrained due to the specific demographic and geographic focus on Thai primary education. Additionally, the study predominantly hinged on self-reported data, which might be subject to bias.

Future research could delve deeper into exploring the specific barriers and challenges encountered by students in embracing BL, with a focus on devising targeted interventions to enhance their perceived usefulness and enjoyment. Moreover, exploring additional variables, such as technological self-efficacy, social influence, and facilitating conditions, could provide a more holistic understanding of the dynamics shaping BL acceptance among various stakeholders.

12 Pedagogical implications

The study underscores the imperative to enhance the acceptance of BL among students, potentially through strategies aimed at amplifying their perceived usefulness and enjoyment derived from BL environments. Tailoring BL environments to cater to the distinct needs, preferences, and challenges of each stakeholder group is pivotal to enhance its acceptance and efficacy. Furthermore, educators and policymakers might consider devising strategies and interventions that address the specific challenges and barriers encountered by students in embracing BL, thereby fostering an inclusive and equitable educational environment.

In conclusion, this study contributes to the burgeoning body of literature on blended learning acceptance, providing valuable insights and directions for educators, policymakers, and future researchers in navigating the complexities and nuances of implementing blended learning, especially in the context of primary education in Thailand.

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