IMPLEMENTATION OF COMPUTER TECHNOLOGY IN BLENDED LEARNING MODELS: EFFECTS ON SELF-DIRECTED LEARNING AND ACADEMIC ACHIEVEMENT IN ACCOUNTING STUDENTS IN THE SOUTHERN ZONE OF MALAYSIAN SECONDARY SCHOOLS

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Abstract

This study was conducted to identify the influence of computer technology in blended learning on the achievement in the Principles of Accounting subject through of self-directed learning. The research also assessed the relationship of the elements of blended learning on student achievement. Despite the encouragement by the Ministry of Education for the use of computer technology in education, there is a lack of research on a measurable and testable model of the influence of computer technology. In reality, various aspects such as schools, teachers, content, and technology exist to provide and utilize computer technology through learning in Malaysia. A quantitative study using a correlational design was conducted on 400 Form Four students in secondary schools in the Southern Zone of Malaysia, namely in the states of Johor, Melaka, and Negeri Sembilan, to identify the influence of computer technology in blended learning on achievement. Data were collected using adapted and modified questionnaires from previous studies. Descriptive data analysis was performed using SPSS version 28, while inferential analysis was conducted using the Smart PLS analysis technique. Smart PLS version 4.0 software was utilized to test the mediator relationships in the study. The results of the study showed high minimum scores for blended learning through computer technology and self-directed learning, as well as achievement. The influence of blended learning elements also had a significant relationship with student achievement in the Principles of Accounting subject. This study is expected to contribute to the effectiveness of blended learning through information technology on the achievement in the Principles of Accounting subject by enhancing self-directed learning among students. The development of this conceptual model is hoped to serve as a guide for policymakers, the Ministry of Education, teachers, students, and other stakeholders in ensuring that blended learning practices can be implemented more effectively. Furthermore, it is hoped that the achievement and interest in the Principles of Accounting subject can be improved by applying computer technology in learning.

Keywords: Computer Technology; Blended Learning; Student Achievement.

1.0 INTRODUCTION

The current educational landscape has undergone rapid transformation in line with the demands of the 21st-century education. Various opportunities have been seized to renew and enhance the current state of education. According to Fatihah Osman [1], the education of the 21st century has brought about changes through improvements in teaching and learning, synonymous with learning and facilitation skills using computer technology and communication skills.

The Ministry of Education Malaysia (MOE) has implemented various changes in pedagogy and curriculum to achieve the goal of transformation. The emphasis on educational transformation in the country is outlined in the Malaysian Education Development Plan (PPPM) 2013-2025 (MOE, 2013). To assist and introduce 21st-century learning initiatives, MOE launched a pilot program in 2014 and expanded it nationwide in 2015 (PADU, 2015). MOE emphasizes the need for educational change to boost student achievement by introducing new approaches with computer technology to enhance 21st-century skills such as critical thinking, creativity, and holistic student development (MOE, 2013).

These skills aim to prepare Malaysians to face the challenges of the new world in the fourth industrial revolution. The changes in teaching and learning processes, aligned with educational transformation, make computer technology a benchmark in the development of the education system in Malaysia [2]. This is because learning information using computer technology in various engaging methods can be implemented with a blended learning approach, combining computer and conventional technologies in the classroom. According to Mohd Hashim [3], the use of computers and technology has shaped knowledge and the selection of teaching and learning techniques suitable for the changing landscape of education. It can also overcome the shortcomings of traditional learning practiced in schools for so long [4].

Blended learning has the potential to create a conducive environment for teaching and learning, and students can experience the transformation of 21st-century education [5]. Blended learning is an effective and extensive continuous learning process. The concept of blended learning is a learning process that combines a variety of delivery methods and the use of learning models that incorporate computer technology development to suit individual learning styles [6].Computer technology now has an impact on the ability to process, select, and disseminate information quickly. As a result, the speed of computer technology has brought about changes in the way we learn, teach, and apply knowledge [7].

2.0 BACKGROUND

The rapid advancement of computer technology, coupled with the availability of broadband and technological developments, has resulted in faster and more affordable internet access today. This situation has provided exploration opportunities for various fields, including the teaching and learning processes in schools. In the context of the

Ministry of Education Malaysia (MOE), schools and teachers need to take advantage of the availability of the internet to support the learning process. Although MOE encourages the use of computer technology in education, research on measurable and testable models is still lacking. Despite the existence of aspects such as schools, teachers, content, and technology that can provide and utilize computer technology through learning in Malaysia.

Several studies indicate that blended learning using computer technology can enhance students' critical thinking skills. Critical thinking skills are prioritized in the 21st-century learning process [8]. According to Sadri [9] and Smith [10], the ability to think critically enables students to analyze, identify, evaluate, consider, and redevelop all ideas and assumptions they acquire. This is because, in the end, it will lead to decisions or conclusions that are considered the best and feasible. According to the Standards-Based Curriculum for Form 4 Principles of Accounting, critical thinking skills need to be developed among students. This is because these skills can develop the ability to assess an idea logically and rationally to make reasonable considerations using reasonable reasoning and evidence.

According to Antin [11], teachers have to perform various tasks at school besides teaching. They only use conventional methods in teaching activities. According to Menat [12], teachers who fail to control themselves due to the pressure of many tasks will affect students and compromise the quality of their own teaching and learning processes. As a result, students may use less technology and receive less exposure to the use of technology in their teaching and learning processes.

In schools, the use of technology is still inclined to be used as a teaching aid, but it is less utilized due to limited conditions and numbers in schools. The use of technology in teaching is not a systematic and sustainable program, so the results and effects cannot be accurately measured. On the one hand, school management and teachers are still confused about how they use technology to support the teaching and learning process in schools. On the contrary, in the 21st-century digital era, the learning of Principles of Accounting has undergone many changes and requires the ability to use technology in the teaching and learning process in the classroom.

In Malaysia, the emphasis and exposure to learning and teaching by applying computer technology in blended learning are still in the early stages [13]. Based on previous studies, there is still a lack of research on blended learning, especially in the Principles of Accounting subject. Kingi [14] only discussed curriculum changes for the Principles of Accounting subject. Meanwhile, Che Azmi [15] only looked at students' views on the Principles of Accounting subject. Thus, research on blended learning in the Principles of Accounting subject is still under-studied in Malaysia.

The development of computer technology has led to the rapid evolution of various teaching strategies, such as Google Classroom, virtual classrooms, smart classrooms, e-learning, and others. Blended learning is an effective and extensive continuous learning with the use of computer technology. This learning requires the seriousness and interest

of students as it is student-centered learning. The teaching and learning process in the classroom cannot provide students with the opportunity to master all skills. The use of textbooks as the main teaching aid in delivering each skill remains a priority for teachers when they do not use computer technology sources.

3.0 PROBLEM STATEMENT

Many studies have been conducted to test various teaching methods to replace traditional teaching methods. According to research, the use of technology can attract students' interest, but many educators still practice traditional teaching, using textbooks as the main material in classroom teaching [16]. Face-to-face teaching in the classroom is still necessary to control the learning process, but this needs to be updated by combining technology-based learning to make the learning atmosphere more interesting and effective.

Therefore, teachers also need to conduct technology-oriented teaching and learning processes so that students have skills in information technology and are independent in exploring knowledge from various sources. Learning using a combination of computer technology and face-to-face is a new learning mechanism that can attract interest and help achieve learning objectives and increase interest and motivation to learn.

Given the various successful online learning experiences during the COVID-19 pandemic and ongoing technological advancements [17], it is clear that online learning in various methods is necessary to be maintained to increase students' interest and knowledge in learning. As blended learning is considered an effective alternative or complement to traditional methods, it is important to comprehensively analyze its effectiveness with a combination of computer technology [18]. The analysis should cover various aspects, including the teacher's teaching method, school facilities, lesson content, and the effectiveness and interaction of teachers and students in blended learning [19].

This study aims to analyze the influence of blended learning, which combines both face-to-face and online components with computer technology, from the perspective of high school Principles of Accounting students, especially in regular daily schools in the southern zone of Malaysia. Therefore, it is hoped that this study can have a positive impact in identifying a suitable learning method and understanding the influence of blended learning elements that use computer technology in improving students' achievements in the Principles of Accounting subject through blended learning

4.0 RESEARCH PURPOSE AND OBJECTIVES

This study is conducted with the aim of identifying the influence of blended learning using computer technology on the achievement of the Principles of Accounting subject with self-directed learning as a mediator among students taking Principles of Accounting as an elective.

The objectives of this study are to:

4.1 Determine the level of elements in Blended Learning, Self-Directed Learning, and Student Achievement in the Principles of Accounting subject.

4.2 Determine whether there is a relationship between Blended Learning, Self-Directed Learning, and Student Achievement in the Principles of Accounting subject.

5.0 RESEARCH QUESTIONS

Based on the listed objectives of the study, this research will be conducted to answer each question as follows:

5.1 What is the level of elements in Blended Learning (School, Teacher, Content, and Technology), Self-Directed Learning (Self-Management, Desire to Learn, Self-Control), and Student Achievement based on the perceptions of Principles of Accounting students?

5.2 Is there a relationship between the elements of Blended Learning (School, Teacher, Content, and Technology), Self-Directed Learning (Self-Management, Desire to Learn, Self-Control), and Student Achievement in the Principles of Accounting subject?

6.0 RESEARCH METHODOLOGY

This study is survey research [20] using a questionnaire as the instrument and employing a quantitative method. The instrument from previous studies [21] and [22] has been designed and modified regarding blended learning and students' perceptions of blended learning. Items taken from these instruments are adapted for the researcher's study as the field of study is the same. It is also suitable for the objectives of this study, and the items are appropriate due to the study's factors and a similar sample. This study utilizes a questionnaire adapted from past research and modified to fit the current study. The questionnaire consists of 100 items, comprising three main components: blended learning, self-directed learning, and student achievement through monthly tests, mid-term exams, and final exams. The adapted questionnaire was sent to experts for instrument validity and face validity. The questionnaire was corrected based on expert suggestions and content validity to ensure that the questionnaire aligns with the research objectives.

7.0 SAMPLE OF THE STUDY

A total of 11,253 Form Four students from secondary schools in the states of Johor, Negeri Sembilan, and Melaka in Malaysia taking the Principles of Accounting subject, were selected as the study population. A random sample of 400 students was chosen for the study, as suggested in the Sample Size Determination Table by Krejcie & Morgan. Minimum, standard deviation, and percentage analyses were used to analyze respondent profile data. Descriptive analysis was conducted to measure and interpret minimum scores to determine the levels of blended learning, self-directed learning, and student achievement in Principles of Accounting.

In summary, the questionnaire used in this study is divided into three parts: Part A - Demographics, Part B - Influence of Blended Learning, and Part C - Self-Directed Learning. Data collected from the questionnaire in this study will be quantitatively analyzed using SPSS version 21 (Statistical Package for Social Science). Frequency and percentage analyses will be used to analyze respondent profile data, and descriptive analysis will be conducted to measure and interpret minimum scores [23]. The determination of levels in the analysis is based on minimum score values, as shown in Table 1, to determine the levels of blended learning, self-directed learning by Principles of Accounting students. To determine the relationship between Blended Learning elements (School, Teacher, Content, and Technology) and Student Achievement mediated by Self-Directed Learning, Smart PLS SEM 4.0 analysis will be used to assess measurement relationships and structural model.

Table 1: Determination of Levels based on Minimum Score

Minimum Score	Interpretation
1.00 – 1.99	Weak
2.00 – 2.99	Low
3.00 – 3.99	Moderate
4.00 – 5.00	High

Source: Syed Najmuddin et al. (2009)

8.0 FINDINGS

Based on the study findings, the analysis of respondent demographics is related to information regarding the background of the respondents. Table 2 shows that out of the 400 respondents selected for the study, 129 (32.3%) are male students, and the remaining 271 (67.8%) are female students in Form Four taking the Principles of Accounting subject in the states of Johor, Negeri Sembilan and Melaka in Malaysia. As for ethnicity, 37% of the respondents are Malay, 35.8% are Chinese, 21.8% are Indian, and 5.5% are from other ethnicities.

Table 2: Demographic Analysis of Respondents

Item	Demographic	Frequency (%)	Percentage (%)
Gender	Male	129	32.3
	Female	271	67.8
Total		200	100
Ethnicity	Malay	148	37
	Chinese	143	35.8
	Indian	87	21.8
	other	22	5.5

8.1 Findings of Research Question 1

The level of Blended Learning elements (School, Teacher, Content, and Technology), Self-Directed Learning (Self-Management, Desire to Learn, Self-Control), and Student Achievement based on the perceptions of Principles of Accounting students.

Table 3: Level of Blended Learning Elements, Self-Directed Learning, and Achievement

Element	Variable Level	Minimum Score	Level	Standard Deviation
Blended	School	3.997	High	0.457
Learning	Teacher	4.246	High	0.457
	Content	4.255	High	0.433
	Technology	4.150	High	0.452
Self-Directed Learning	Self-Management	4.306	High	0.434
	Desire to Learn	4.125	High	0.478
	Self-Control	4.326	High	0.409
Student Achievement		4.203	High	0.565

Overall, the descriptive analysis results show that the average scores for Blended Learning elements (school, teacher, content, and technology), Self-Directed Learning (self-management, desire to learn, self-control), and Student Achievement in the Principles of Accounting subject are high. The Desire to Learn dimension obtained the highest level (Min = 4.326) among all dimensions.

The standard deviation values of the study findings also indicate a low range. This suggests that there is only a small difference in the distribution of minimum values for the study variables. The very low standard deviation values for all items indicate a very high consensus among the study respondents. Meanwhile, standard deviation values from high to very high indicate a lack of consensus among respondents.

The range of standard deviation values for Blended Learning elements (school, teacher, content, and technology), Self-Directed Learning (self-management, desire to learn, self-control), and Student Achievement in the Principles of Accounting subject is between 0.409 to 0.565. This indicates that the consensus among the respondents of this study is low, and all items conclude that very high consensus can be obtained from the study respondents.

Table 4: Overall Level of Blended Learning Elements, Self-Directed Learning, and Achievement based on rankings.

Element	Overall Min	Element Level	Ranking
Blended Learning	4.162	High	3
Self-Directed Learning	4.252	High	1
Achievement	4.203	High	2

Overall, the analysis results show that the level influencing Blended Learning elements, Self-Directed Learning, and student Achievement in learning the Principles of Accounting subject is at a high level. Self-Directed Learning, with the highest minimum score (4.252), is followed by Achievement (4.203), and thirdly is Blended Learning (4.162). This illustrates that all elements play a crucial role in learning the Principles of Accounting subject.

8.2 Findings of Research Question 2

To determine the relationship between Blended Learning (School, Teacher, Content, and Technology), Self-Directed Learning (Self-Management, Desire to Learn, Self-Control), and Student Achievement in the Principles of Accounting subject to understand the relationship, a coefficient path structural model analysis was conducted to determine the relationship between exogenous and endogenous variables through the bootstrapping technique in the SmartPLS software. The results of the analysis are explained in the Coefficient Path Structural Model Analysis.

The analysis of the coefficient path structural model was conducted to identify significant relationships between the study constructs. After meeting the validity tests such as content validity, convergent validity, and discriminant validity for the measurement model and the structural model, hypothesis testing was conducted based on the path coefficients. The accuracy of predictions and the results of significant relationships between exogenous and endogenous variables were determined using the bootstrapping technique in the SmartPLS software.

8.2.1 Testing Relationship Hypotheses and Path Coefficients for Direct Hypotheses

Coefficient path analysis was conducted to measure and identify which relationships are most important and which may not be important in a study. Path coefficient values indicate the strength of a relationship between variables. Although the t-value is calculated through bootstrapping, it is used to test whether the tested relationship is significant or not [24]. In this study, the researcher used the bootstrap technique in hypothesis testing to determine path coefficient values to identify significant relationships between variables. The analysis was conducted on 5000 bootstrap samples and 400 cases to obtain p-values and t-values.

According to Hair et al., [25], path coefficients should exceed 0.100 to consider a certain effect in the model and be significant at least at the 0.05 level. Based on Figure 8.1 and Figure 8.2, which are screenshots of the exogenous variables Blended Learning (School, Teacher, Content, and Technology), Self-Directed Learning (Self-Management, Desire to Learn, Self-Control), they have a significant relationship with the endogenous variable, which is Achievement, with P-values, loading values, and T-values.
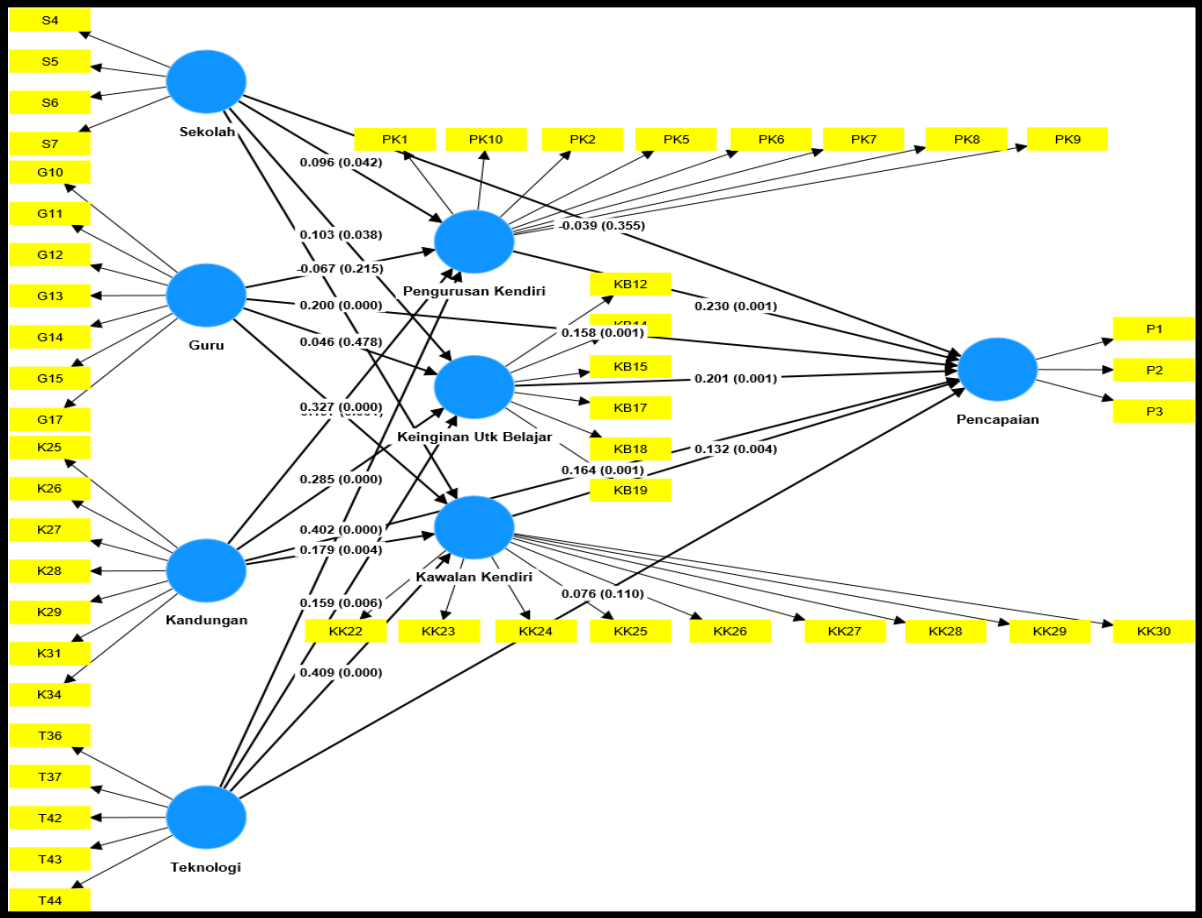
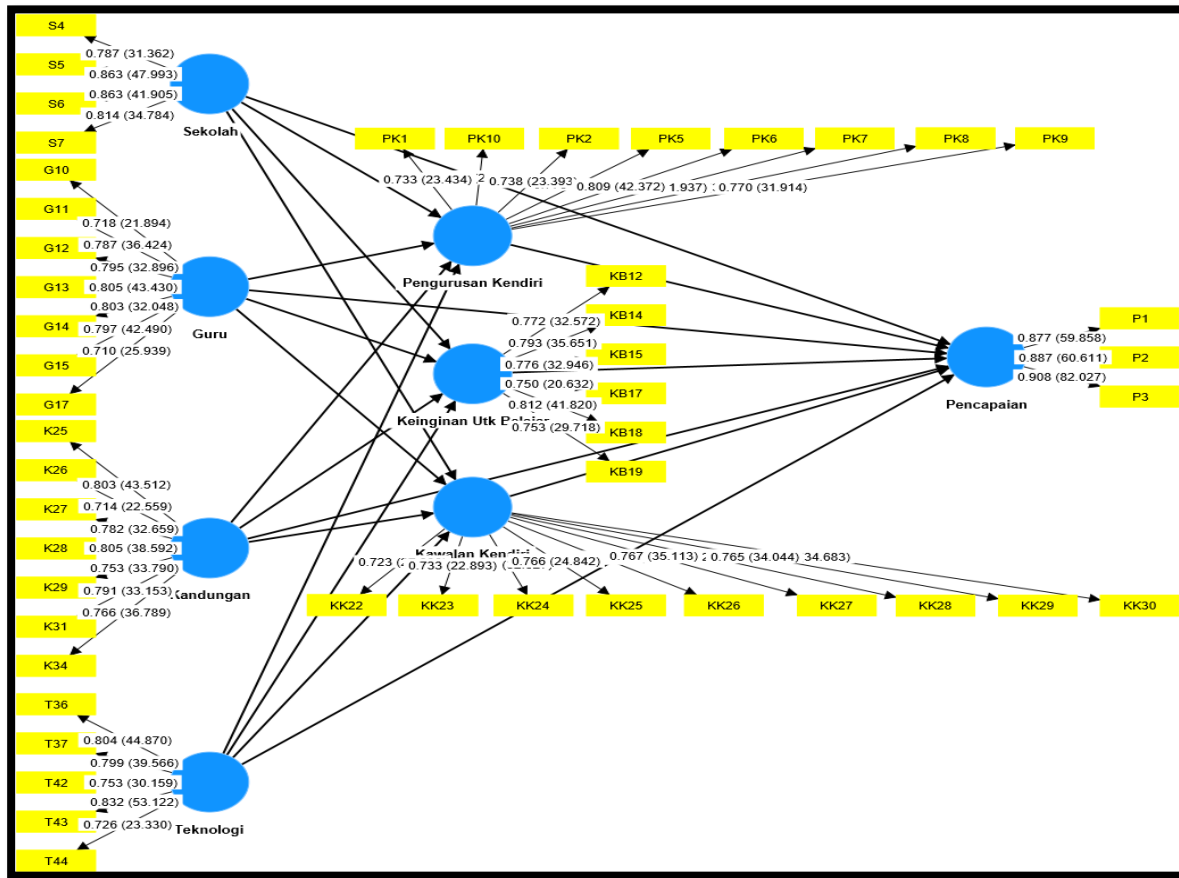**Figure 1: Path Coefficient Pathway with P-Values for Variables**

Figure 2: Loading Values with T-Values for Variables

Table 5: Results of the Direct Relationship Hypothesis Test

Hypothesis	Path Coefficient	Standard Deviation	T-Value	P-Value	Outcome
School -> Self-Management	0.096	0.047	2.035	0.042*	Supported
School -> Desire to Learn	0.103	0.049	2.077	0.038*	Supported
School -> Self-Control	0.200	0.056	3.584	0.000**	Supported
School -> Achievement	-0.039	0.043	0.925	0.355	Not Supported
Teacher -> Self-Management	-0.067	0.054	1.239	0.215	Not Supported
Teacher -> Desire to Learn	0.046	0.065	0.709	0.478	Not Supported
Teacher -> Self-Control	-0.197	0.060	3.290	0.001**	Supported
Teacher -> Achievement	0.158	0.048	3.297	0.001**	Supported
Content -> Self-Management	0.327	0.059	5.521	0.000**	Supported
Content -> Desire to Learn	0.285	0.067	4.277	0.000**	Supported
Content -> Self-Control	0.179	0.061	2.916	0.004**	Supported
Content -> Achievement	0.164	0.051	3.213	0.001**	Supported
Technology -> Self-Management	0.402	0.051	7.872	0.000**	Supported
Technology -> Desire to Learn	0.159	0.058	2.752	0.006**	Supported
Technology -> Self-Control	0.409	0.056	7.290	0.000**	Supported
Technology -> Achievement	0.076	0.047	1.597	0.110	Not Supported

Self-Management -> Achievement	0.230	0.071	3.266	0.001**	Supported
Desire to Learn -> Achievement	0.201	0.060	3.359	0.001**	Supported
Self-Control -> Achievement	0.132	0.046	2.866	0.004**	Supported

**p<0.01; *p<0.05

Table 5 presents the results of the Direct Relationship Hypothesis Test, addressing the second research question. The first element of Blended Learning, School, is significantly related to three study variables. One variable has a highly significant and strong relationship (P<0.01), while two have significant relationships (P<0.05). The results show that School to Willingness to Learn (β=0.103; t =2.077; p = 0.038; P<0.05), School to Self-Control (β=0.200; t = 3.584; p = 0.000; P<0.01), and School to Self-Management (β=0.096; t =2.035; p = 0.042; P<0.05) are supported. However, the relationship between School and Achievement (β=-0.039; t =0.925; p = 0.355) is not significant, indicating no connection.

The second element of Blended Learning, Teacher, has a strong and significant relationship with two study variables: Teacher to Self-Control (β= - 0.197; t =3.290; p = 0.001; P<0.01) and Teacher to Achievement (β=0.158; t = 3.297; p=0.001; P<0.01). However, Teacher does not have a significant relationship with the variables Willingness to Learn (β= 0.046; t = 0.709; p = 0.478) and Self-Management (β= - 0.067; t = 1.239; p = 0.215).

The third element of Blended Learning, Content, has a strong and significant relationship with all four study variables. All four variables have highly significant relationships (P<0.01). The results indicate that Content to Willingness to Learn (β=0.285 ; t =4.277 ; p = 0.000 ; P<0.01), Content to Self-Control (β=0.179 ; t = 2.916 ; p = 0.004 ; P<0.01), Content to Self-Management (β=0.327 ; t =5.521 ; p = 0.000 ; P<0.01), and Content to Achievement (β=0.164 ; t =3.213 ; p = 0.001 ; P<0.01) are all supported. This suggests that Content has a strong direct relationship with Blended Learning and student achievement in the Principles of Accounting subject.

The fourth element of Blended Learning, Technology, has a significant relationship with three study variables. All three variables have a highly significant relationship (P<0.01). The results show that Technology to Willingness to Learn (β=0.159; t =2.752; p = 0.006; P<0.01), Technology to Self-Control (β=0.409; t =7.290; p = 0.000; P<0.01), and Technology to Self-Management (β=0.402; t =7.872; p = 0.000; P<0.01) are supported. However, the relationship between Technology and Achievement (β=0.076; t = 1.597; p = 0.110) is not significant.

In conclusion, within the Blended Learning construct, 12 variables have significant relationships, while four variables do not. This implies that the Blended Learning construct has a significant relationship in enhancing student achievement in the Principles of Accounting subject.

Furthermore, the hypothesis test indicates strong and significant relationships (P<0.01) between the elements of Self-Directed Learning, consisting of Willingness to Learn, Self-

Control, and Self-Management, and student achievement. The first variable, Willingness to Learn, has a significant relationship with Achievement ($\beta=0.201$; t =3.359; p = 0.001; P<0.01). Additionally, the second variable, Self-Control to Achievement ($\beta=0.132$; t =2.866; p = 0.004; P<0.01), has a significant relationship. Finally, the third variable in the Self-Directed Learning construct, Self-Management to Achievement ($\beta=0.230$; t =3.266; p = 0.001; P<0.05), also shows a significant relationship with student achievement. In conclusion, the Self-Directed Learning construct has strong significant relationships with all variables, indicating its significant impact on student achievement in the Principles of Accounting subject.

Table 6, summarizes the results of the hypothesis testing. In Table 6, it is shown that the hypotheses H1-1, H1-2, H1-3, H1-6, H1-8, H1-9, H1-10, H1-11, H1-12, H1-13, H1-14, H1-15, H1-17, H1-18, and H1-19 are supported. Meanwhile, hypotheses H1-4, H1-5, H1-7, and H1-16 are not supported. In general, most of the hypothesized relationships are supported and have a significant impact. The conclusion is that blended learning has a significant relationship among the components of blended learning (School, Teacher, Content, and Technology) and Self-Directed Learning (Self-Management, Desire to Learn, Self-Control) in the academic achievement of students in the subject of Principles of Accounting.

Table 6: Summary of Hypotheses Relationships

Hypothesis	Hypothesized Effect	Result
H1-1	School has a relationship with Desire to Learn	Supported
H1-2	School has a relationship with Self-Control	Supported
H1-3	School has a relationship with Self-Management	Supported
H1-4	School has a relationship with Achievement	Not Supported
H1-5	Teacher has a relationship with Desire to Learn	Not Supported
H1-6	Teacher has a relationship with Self-Control	Supported
H1-7	Teacher has a relationship with Self-Management	Not Supported
H1-8	Teacher has a relationship with Achievement	Supported
H1-9	Content has a relationship with Desire to Learn	Supported
H1-10	Content has a relationship with Self-Control	Supported
H1-11	Content has a relationship with Self-Management	Supported
H1-12	Content has a relationship with Achievement	Supported
H1-13	Technology has a relationship with Desire to Learn	Supported
H1-14	Technology has a relationship with Self-Control	Supported
H1-15	Technology has a relationship with Self-Management	Supported
H1-16	Technology has a relationship with Achievement	Not Supported
H1-17	Desire to Learn has a relationship with Achievement	Supported
H1-18	Self-Control has a relationship with Achievement	Supported
H1-19	Self-Management has a relationship with Achievement	Supported

9.0 DISCUSSION AND CONCLUSION

Blended learning with evolving computer technology is recognized as a comprehensive learning strategy, reinforcing students' ability to manage their own learning while receiving necessary guidance in the classroom environment. Self-directed learning involves active

student involvement in managing their learning processes. Students play a role as managers of their personal learning, selecting suitable learning resources, setting learning goals, and assessing their understanding. This approach enables students to develop self-reliance, leadership, and initiative in an educational context [39].

On the other hand, contemporary blended learning with computer technology can involve classroom-centered teaching with guidance and interaction between students and teachers. Vygotsky's theory (1978) emphasizes the importance of social interaction in learning, and blended learning provides opportunities for students to interact with classmates and receive direct guidance from teachers. This creates a supportive environment for active and collaborative learning, leading to deeper understanding and quick error correction.

In the context of subject of Principles of Accounting, the combination of both approaches provides students with opportunities to master complex concepts and practice application skills more effectively. Students can leverage online learning resources, interact with classmates, and simultaneously receive teacher guidance in blended learning sessions. In terms of implications, this study provides valuable insights for teachers, school administrators, and the Ministry of Education in Malaysia. By emphasizing the importance and effectiveness of computer technology through blended learning, it can provide opportunities for alignment and improvement in teaching methods at the school level. This, in turn, can contribute to the overall improvement of the quality of education in our country.

In conclusion, this study affirms that computer technology with blended learning is a highly effective approach in enhancing student achievement and their self-development. Through significant implications and judicious suggestions for further research, computer technology in blended learning makes a significant contribution to the Malaysian education system. As a best practice method, it creates a dynamic and relevant learning environment for teachers and students, strengthening the foundation towards a more quality and relevant education.

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