Macrothink Institute™

Journal of Public Administration and Governance
ISSN 2161-7104
2022, Vol. 12, No. 4S

Technological Factors Towards Student's Achievement in Mathematics

Farah Damia Mohd Nasir

Facullty of Educational Studies,

University Putra Malaysia

Norliza Ghazali

Facullty of Educational Studies,

University Putra Malaysia

Al Mahdi Hussain

Faculty of Education & Humanities,

Unitar International University, Malaysia

Harnani Mohammed

Faculty of Education & Humanities,

Unitar International University, Malaysia

Adli Arshad

Faculty of Education & Humanities,

Unitar International University, Malaysia

Received: Nov. 3, 2022 Accepted: Dec. 10, 2022 Online published: Dec. 19, 2022

doi:10.5296/jpag.v12i4S.20577 URL: https://doi.org/10.5296/jpag.v12i4S.20577

Abstract

The purpose of this study is to investigate the relationship between the technological factors on student learning that affect the result in Mathematics subject. The findings in this study are based on the questionnaire and test distributed among students in SMK Lembah Subang. The research used random sampling of 60 Form 4 students in SMK Lembah Subang. Data were collected through close-ended and open-ended questions using a Likert scale. The pre-test and post-test were conducted to measure students' performance. Respondents were represented from various classes (four classes). The data were then analysed using SPSS software. The result has shown that educator's skills and environment have a significant impact toward students' performance in SMK Lembah Subang. The finding showed that technology application has no significant relationship with students' performance.

Keywords: Technological Factors, Technology Application, Educator's Skill, Environment, Students' Performance

1. Introduction

1.1 Background of the Study

The verdicts of Malaysian students regarding their mathematical abilities were usually high and optimistic. However, their achievement in mathematics has deteriorated (Bray & Tangney, 2017). Starting with a higher than the international average score for Mathematics and Science in the International Mathematics and Science Research Trends (TIMSS) in 1999, the achievement of Malaysian students continued to decline. Malaysian eighth graders' mathematics scores in TIMSS dropped from 508 points in 2003 to 494 points in 2007 to 451 points in 2011, while TIMSS 2015 saw a 25-point rise to 465 (Fan, 2021). Besides, technology in education has been introduced as an alternative way to replace the traditional teaching and learning process. Educators have recognized the potential of digital technologies to bring unprecedented teaching and learning opportunities inside and outside the classroom (Bray & Tangney, 2017).In the 21st century, technology and the Internet have become omnipresent in students' lives. In fact, many factors affect students' performance, especially in mathematics. This study is specified into the scope of technology in mathematics education. Technological factors are believed to enhance and improve the quality of students' learning. From the NST, Nik Ariff Nik Omar, The Microsoft Malaysia General Manager, said "At Microsoft, we believe in the power of the educator and school leader, and the impact they have when they are brought together and recognised for their achievements. However, technology alone cannot build up 21st century skills for students". Therefore, the technological factors such technology application, educator's skill and environment needed to fill in this gap (Bray & Tangney, 2017).

1.2 Problem Statement

The mathematics course emphasizes the use of symbols, images, and the explanation of mathematical issues' procedural phases. Mathematics is well-known to be a subject with its own distinct language. Students are required to use mathematical language appropriately and to illustrate their answers using numbers, mathematics formulae or special symbols while solving problems (Fan, 2021). Boards are often utilized in face-to-face classes such as mathematics by both students and teachers (Pang & Seah, 2021). However, mathematics education is predicated on the notion of students acquiring mathematical thinking, logical reasoning, and alternative answers via student-teacher interaction. While school teachers teach students mathematical concepts step by step by physically writing the symbols and drawings on the board, they may meet limits in an online learning setting. The greatest distinguishing characteristic of tablet PCs, graphics tablets, and digital pens is their ability to easily allow users to write symbols and graphical information electronically (Bloom, 2020). It is emphasized that educational innovations have increased the speed with which mathematical teaching and learning may be distributed and communicated. When students concentrate on only one material, the learning process is less effective. Due to a lack of resources, students are limited in their ability to tackle specific issues and are unable to communicate effectively with the outside world. It will intensify the learning inequality (Scherer et al., 2021). According to a study conducted by the Curriculum Development Centre in 2016, a flaw in the teaching and learning process is the inability to assist students in connecting new material to previous experiences and bridging the gap between education and daily life. Technology helps students easily find new information and interact with the outside world (Saltan, 2017). The use of instructional technology in the classroom improves learning and allows students to learn more efficiently. Students were exposed to a variety of applications in technology that may help them better comprehend the topic.

1.3 Research Objectives

The research objective is to determine the technological factors that have an impact towards students' performance in Mathematics. This study provides insight through factors that impact students' performance using technology in terms of technology application, educator's skill and environment. Such information might assist schools in strategically planning how to use technologies in an efficient manner among pupils.

RO1: To examine the correlation between technology application and students' performance in Mathematics subject.

RO2: To examine the correlation between educator's skills in technology and students' performance in Mathematics subject

1.4 Research Questions

The research questions are as follows:

RO1: Is there any correlation between technology application and students' performance in Mathematics subject?

RO2: Is there any correlation between educator's skills in technology and students' performance in Mathematics subject?

1.5 Hypotheses of the Study

H_0: There is no significant relationship between technology application and students' performance in Mathematics subject.

H_1: There is a significant relationship between technology application and students' performance in Mathematics subject.

H_0: There is no significant relationship between educator’s skills and students’ performance in Mathematics subject.

H_2: There is a significant relationship between educator’s skills and students' performance in Mathematics subject.

1.6 Significance of the Study

Technology has become more important in the twenty-first century, particularly in students' lives, since students nowadays use technology to develop or expand their academic knowledge (Wright, 2021). Parents and educators believe that technology may help children learn more by increasing their engagement, providing access to knowledge, and enabling them to interact with subject matter experts (Dong et al., 2020). This technology has evolved into a tool for facilitating students' learning. Numerous studies are required to determine the technical aspects that have an effect on students’ performance. This research aims to determine if there is a significant correlation between technological aspects and students' mathematical achievement.

2. Literature Review

2.1 Technology Application - Educational Technological Devices Use

The evolution of digital technology in mathematics teaching has occurred in stages. During this evolution, the classroom as we know it may completely transform from a physical space with clear limits to a virtual environment with a variety of components that will almost certainly be selected by the student rather than the instructor (Dziuban et al., 2018). ICT integration promotes improved mathematics teaching and learning. Technological advancements have enhanced the appeal of virtual learning environments in educational and business institutions, resulting in their growth and acceptability (Kumar et al., 2020). Additionally, E-learning may be considered as the process of integrating the materials and technology necessary to carry out the process of digitally supporting learning. In many educational institutions (Dede et al., 2021), e-learning establishes a new paradigm for delivering contemporary education with more efficacy. Additionally, when technology is employed, it is often incorporated into more conventional, pedagogic methods rather than being used in meaningful student-centered ways (Van et al., 2021). A survey of 35,525 K-12 teachers by Project Tomorrow (2018) showed that the most frequent use of technology is for homework and practice (58%), while others described teachers’ rare use of technology as “fancy chalkboards,” suggesting technology is integrated into more didactic ways and as a substitute for more traditional tools, instead of as an extension of the curriculum (Al-Samarraie et al., 2018). Along with boosting student learning in classes, integration of technology has shown positive benefits in terms of improving students' critical thinking (Ozkanal et al., 2021). Given that teachers only have a limited amount of time in the classroom to master learning objectives and cover in-depth material knowledge, creative use of technology may be a means of promoting critical thinking.

2.2 Educator's Skill - Method of Content Delivery

The TPACK framework proposes that effective education involves in-depth knowledge of the complex interaction between three critical pillars of information: technology, pedagogy, and content. As well as details on how these linkages emerge in different situations (Aliyu et al., 2021). Thus, educators must understand more than the technical aspects of technology for effective technology integration design. They must also understand its restrictions and advantages for explaining subject matter and differentiating appropriate teaching approaches. Recently, the TPACK framework was recommended as a framework for incorporating teacher expertise in order to ensure effective technological integration. Additionally, 'technology' (T) to Shulman's pedagogical content knowledge (PCK) in 2005, so developing TPACK (technological, pedagogical, and content knowledge) (Mishra, 2019). Thus, TPACK is critical for the effective implementation of technology and teaching. Effective education requires instructors to understand how to operate knowledge and use technology effectively. TPACK is composed of three fundamental components: content knowledge (CK), pedagogical knowledge (PK), and technology knowledge (TK). Furthermore, teachers should scaffold the learning with the use of technology as they are able to use interactive tools such as smart boards, computers and any other related device in order to engage with the students. In order to meet students' needs, teachers and students should be trained on the use of technology-related devices to utilize in any situation (Nantschev et al., 2020). Thus, the teaching and learning process will be more meaningful.

2.3 Students' Performance

Student performance is a critical component of school performance evaluation since it shows the school's efficacy in accomplishing its main objective. According to the Framework for Quality Assurance of School Success in Kosovo (Kosovo Pedagogical Institute, 2016), one of the fundamental measures of student performance is the effective use of technology, the surrounding environment, and other resources to enhance teaching and learning. According to research, technology enhances student performance and academic attainment. The fundamental reason for implementing laptop classroom technology and supporting professional development for teachers is the notion that the new learning environment would foster student engagement and academic accomplishment. All classrooms should include technology to improve student performance on genuine applications and integrate technology into the daily curriculum's essential components. Technology, which includes various learning aids, such as computers and the internet, has altered conventional teaching and learning methods. Students demonstrate increased interest when they enhance the outcomes by minimizing their reliance on procedural memory. The researchers investigated the impact of a technology-enhanced classroom on primary children's development of higher-order thinking abilities and learning effectiveness. As a result, technology puts the students at the centre, where they may maximize their learning potential by expressing their inner potential.

3. Research Methodology

3.1 Research Design

The study is designed to investigate and determine the technological factors on students learning that affect students' performance in learning Mathematics. Quantitative research, such as descriptive and inferential research design will be used. Descriptive research design is defined as "the collection and analysis of quantitative data in order to develop a precise description of a sample's behaviour or personal characteristics" (Gall, Gall and Borg, 1999, p.173). The descriptive research design is used to collect data from the sample and the survey instrument. Then, the data is described more precisely based on its characteristics from the study. Besides descriptive research, the survey research design is chosen as it suits the questionnaires and study purposes. The data is collected from the survey designed for one group of people and used as the sample of the study that represents the entire population. In addition, a test as a pre-test is given to the students and marks are collected as data. The experiment of the study was about 2 weeks. Then, the post-test is given to the students in order to measure their understanding after the experiment. The marks were then compared between pre-test and post-test results.

3.2 Sample of Study

A sample is defined as a subset representing the entire group (population) as a whole. The targeted population of this study is the students from SMK Lembah Subang. In this study, the sample population was the Form 4 students from SMK Lembah Subang in Malaysia. According to Sekaran and Bougie (2016), a sample size above 30 and below 500 is appropriate for quantitative research design. In this study, four classes of Form 4 students are selected as a sample, with a total of 60 students in total. The sampling technique used in this study is random sampling. All students from four classes (4 Science, 4 Niaga, 4 Geo, and 4 Seni) were involved in this study.

3.3 Instrument of Study

Students were given a set of questionnaires adopted and adapted from the previous instrument related to the study. The instrument was developed to evaluate the technological factors on students learning that affect students' performance in Mathematics in SMK Lembah Subang. Students, as respondents need to answer all the questions from the items given. The survey consisted of many items, and it could measure the desired outcomes of the study. A demographic part of the survey form is used to collect information to provide a complete description of the study participants. The question included the social demographic of respondents, such as class, name and gender of the respondent. Besides, the questionnaire also consisted of two main constructs that measure the following independent variables: technology application and educator's skill. All the constructs are used to examine the relationship between independent and dependent variables. The survey uses the Likert scale from 1 (strongly disagree) to 5 (strongly agree). The technology application construct consisted of 5 items and addressed students' choice of using the applications and devices and more convenient to use in learning the subject. Technology application is defined as a type of application that is an available and convenient way for students to learn. The educator's skills construct also consisted of 5 items, defined as the teacher's ability to effectively give instruction and disseminate information between teacher and students. This quantitative research aimed to determine the degree to which the relationship exists between technological factors and students' performance in Mathematics subject at SMK Lembah Subang.

The pre-test and post-test have been conducted. The test used the same question that covered the topic of Mathematical Reasoning. The question has been created based on the past year's questions, and it was developed using the latest educational syllabus in KSSM. The pre-test was conducted in a classroom where students needed to answer the question for 30 minutes. Students then experiment with themselves to learn the topic again with the use of technology. The applications involved in this experiment such as PowerPoint software, YouTube, Kahoot and BlogSpot. A teacher has been trained to use the application of technology regarding the topic. The experiment has been carried out within 2 weeks. After the experiment, the post-test marks were collected to determine the difference in the improvement of student's understanding. The student's achievement is determined by the difference between pre-test and post-test marks showing the dependent variable

4. Data Analysis

4.1 Statistical Package for Social Science (SPSS)

The data is analysed after being collected from the respondent. SPSS is used to analyse the data. The data is needed to have a coding process in which we arrange the respondent's answers with numbers so that it is easy to key in the data into the SPSS system. After the coding process, all the data need to be keyed into SPSS, and the data was analysed. Besides, the study also applied the nominal scale. A nominal scale has been used in the questionnaire to obtain demographic data such as gender, age, and race. Then, the demographic data were analysed using frequency analysis in the SPSS system. SPSS has been used to conduct the reliability test, accessing normality test and correlation test to measure the relationship between technological factors and students' performance in Mathematics subject.

4.2 Descriptive Analysis

The data is collected, analysed and summarized by using descriptive analysis. The descriptive analysis is functioned to measure the parameters such as mean, median, mode, standard deviation, and include variances. The descriptive analysis was used in the Section B items to examine the relationship between independent variables and dependent variables. It is important to obtain and measure the central tendency and variability of the item variables.

5. Results and Findings

5.1 Demographic Profiles of the Respondents

A total of 60 questionnaires were distributed, and all respondents completed the questionnaires. This gave a response rate of 100%. The raw data from the questionnaire were analysed using the descriptive statistical analysis of mean score and correlation analysis provided by SPSS. The findings on the demographic profile of the sample have been summarized in terms of respondents' names, and gender. The respondents' age and educational level are the same and fixed as the respondents were Form 4 students from SMK Lembah Subang. The respondents have been chosen randomly by each class. The table below summarizes and highlights the demographic profiles of the respondents. The gender distribution of the respondent is presented in Table 1 below. In the table, the frequencies for male and female respondents are 28 and 32, respectively, which resulted in a percentage of 46.2 for male and 53.8 for female.

Table 1. Gender

Gender	Frequency	Percent (%)
Male	28	46.2
Female	32	53.8
Total	60	100

Table 1 shows the gender of the study. Female students were the majority in this finding, with n = 32 (53.8%) while male with n= 28 (46.2%).

Table 2. Distribution of Respondent by Classes

Class	Male	Female	Total	Percent (%)
4 Sains	2	12	14	23.3
4 Niaga	12	10	22	36.7
4 Geo	8	0	8	13.3
4 Seni	6	10	16	26.7
Total	28	32	60	100

Table 2 shows the class distribution of the respondent. The mode of this variable is 4 Niaga class with (n =22) and 36.7%. The frequencies of 4 Sains, 4 Niaga, 4 Geo and 4 Seni class are 14, 22, 8, and 16, respectively.

5.2 Independent Variables

Table 3. Distribution of Respondents by Types of Application

Types of Application	Frequency	Percentage (%)
Edmodo	0	0.0
Kahoot	0	0.0
VLE Frog	60	100.0
Others	0	0.0
Total	60	100

Table 3 shows that 100% of respondents choose VLE Frog as their learning application subject in school with (n = 30) and 100%.

5.3 Dependent Variables

Table 4 Distribution of Respondent by Technological Application construct

Construct	SD	%	D	%	N	%	A	%	SA	%
I think I am easy to use and apply the application in learning Mathematics	1	3.3	0	0.0	3	10.0	17	56.7	9	30.0
I think I am easy to interact with other students and teachers using the application.	1	3.3	0	0.0	0	0.0	19	63.3	10	33.3
I think technology helps me to have a social network with others.	0	0.0	1	3.3	0	0.0	15	50.0	14	46.7

Table 4 shows the data distribution of respondents by technological application construct. The respondents answered the items based on the first construct, representing the independent variable (technology application) based on the questionnaires. The raw data for the first construct has been measured using the likert-scale from (1 = strongly disagree to 5 = strongly agree). The respondent has answered the questions based on their views.

Table 5: Distribution of Respondent by Educator's Skill construct

Construct	SD	%	D	%	N	%	A	%	SA	%
i think my teacher often uses technology when teaching mathematics in the classroom.	16	53.3	9	30.0	3	10.0	2	6.7	0	0.0
i think the technology that use social networking could improve	11	36.7	4	13.3	0	0.0	13	43.3	2	6.7

Construct	SD	%	D	%	N	%	A	%	SA	%
my teacher's teaching performance and effectiveness.										
i think teacher customize learning activities to address students' abilities using digital tools and digital.	9	30.0	5	16.7	8	26.7	8	26.7	0	0.0
i think my teacher asks students to use digital tools and resources to explore and solve real-world issues.	11	36.7	8	26.7	9	30.0	2	6.7	0	0.0
i think my teacher fully understands about on how to use technology effectively, and it is good as a tool for teaching and learning in the classroom.	7	23.3	3	10.0	6	20.0	14	46.7	0	0.0

Based on the questionnaires given, the respondents has answered the items based on the second construct, which represented the independent variable; educator's skill. The raw data for the first construct has been measured using the Likert-scale from (1 = strongly disagree to 5 = strongly agree). The respondent has answered the questions based on their views. Table 6 shows the data distribution of the educator's skill construct.

5.4 Dependent Variables

The pre-test and post-test were conducted, and the marks were collected to measure the student's achievement in learning the Mathematics subject. The topic of Mathematical Reasoning (FORM 4 Mathematics topic) is chosen for the test. The marks allocated for each test are 10 marks. Table 8 shows the distribution marks of respondents for pre-test and post-test results. The student's achievement is measured by the differences between pre-test and post-test marks (D).

Table 6. Distribution of Respondent by Student Achievement (D)

students	class	gender	pre-test (10%)	post-test (10%)	d
student 1	4 sains	f	4.0	7.0	3.0
student 2	4 sains	f	2.0	5.0	3.0
student 3	4 sains	f	1.0	5.0	4.0
student 4	4 sains	f	8.0	8.0	0.0
student 5	4 sains	f	4.0	5.0	1.0
student 6	4 sains	m	7.0	8.0	1.0
student 7	4 sains	f	7.0	8.0	1.0
student 8	4 seni	f	2.0	4.0	2.0
student 9	4 seni	f	2.0	3.5	1.5
student 10	4 seni	f	4.5	4.5	0.0
student 11	4 seni	m	2.0	3.0	1.0
student 12	4 seni	m	1.5	2.0	0.5
student 13	4 seni	f	3.5	3.5	0.0
student 14	4 seni	m	2.5	3.0	0.5
student 15	4 seni	f	3.5	4.0	0.5
student 16	4 geo	m	2.0	3.5	1.5
student 17	4 geo	m	4.5	5.0	0.5
student 18	4 geo	m	3.5	5.0	1.5
student 19	4 geo	m	2.0	4.0	2.0
student 20	4 niaga	f	4.5	5.0	0.5
student 21	4 niaga	f	4.0	5.5	1.5
student 22	4 niaga	f	2.0	4.0	2.0
student 23	4 niaga	m	4.5	5.0	0.5
student 24	4 niaga	m	4.0	5.0	1.0
student 25	4 niaga	m	5.5	6.0	0.5
student 26	4 niaga	m	3.5	3.5	0.0
student 27	4 niaga	m	3.5	5.0	1.5
student 28	4 niaga	m	5.0	6.0	1.0
student 29	4 niaga	f	3.0	5.0	2.0
student 30	4 niaga	f	2.5	5.0	2.5

5.5 Reliability Analysis

The result indicated a high level of reliability, and each subscale item was strong. Notable examples are the frequently used Lloyd and Gressard Trust subscale, recorded in 1986 as having an internal accuracy reliability of.86, and a then respectable average of.75 in 1995-96 (Christensen & Knezek, 2000). The survey was conceived for the SMK Lembah Subang Form 4 students. The instrument was sent to 30 students for this study, and all replied. The survey consists of two parts; the demographic part and the three main constructs (independent variables and dependent variable) consisting of 15 descriptive questions using Likert-scale answers. A Likert scale has been selected since a large number of variables can be measured in a short time frame. Respondents stated their degree of agreement when responding to a Likert questionnaire object. For this analysis, a five-point scale was used: 1 = strong disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. A Cronbach alpha correlation coefficient study was used to evaluate the precision of the survey instrument, which measured a coefficient of 0.796, suggesting a reliability factor of 79.6 %. The pre-test and post-test questions were distributed to the respondents to measure the students' performance. The test consisted of 6 questions with a total mark of 10 marks for each test, the topic of Mathematical Reasoning. The question for the pre-test is the same as the post-test questions. The difference marks between pre-test and post-test are calculated to measure the students' understanding of the topic learned. From table 10, it shows that the reliability for the pre-test was 0.786, and the post-test was 0.803.

5.6 Correlation Analysis

The correlation is calculated to show the important relationship between the independent variables (application of technology, ability and environment of the educator) and the dependent variable (performance of the students in mathematics).

Research Question 1: What is the correlation between technology applications in technology and students' performance/result in Mathematics subject?

H_0: *There is no significant relationship between technology applications and students' performance in Mathematics subject.* ***(Accepted)***

H_1: *There is a significant relationship between technology applications and students' performance in Mathematics subject.* ***(Rejected)***

There was a negative result of relationship between technology application and students' performance in Mathematics. The correlation value is - 0.061. Moreover, the p-value of 0.374 (more than 0.05) which shows that Technology Application was not statistically significant to Students' Performance in Mathematics subject. The null hypothesis, H0 is accepted, which signifies no significant relationship between technology applications and students' performance. Therefore, H1 is rejected.

Research Question 2: What is the correlation between educator's skills in technology and students' performance/result in Mathematics subject?

H_0: There is no significant relationship between educator's skills and students' performance in Mathematics subject. ***(Rejected)***

H_1: There is a significant relationship between educator's skills and students' performance in Mathematics subject. ***(Accepted)***

There was a positive relationship between educator's skills and students' performance in Mathematics. The correlation value is 0.389. Moreover, the p-value of 0.01 (less than 0.05) which shows that the Educator's Skill was statistically significant to Students' Performance in Mathematics subject. In conclusion, it can be assumed that students' performance was influenced by the educator's skill. The alternate hypothesis, H0, cannot be accepted, which signifies no significant relationship. Therefore, H0 was rejected. Then, there is a correlation between educator's skills and students' performance in Mathematics. Thus, H1 was accepted.

6. Discussion, Limitations & Conclusions

6.1 Discussion

Research Question 1: What is the correlation between technology application and students' performance in Mathematics subject? H0: There was no significant between technology application and students' performance in Mathematics subject. (Accepted). H0 was accepted since the p-value of 0.374 (more than 0.05), which shows that Technology Application was not statistically significant to Students' Performance in Mathematics subject. Cristia et al. (2017) support the H0 statement above, saying there was no significant effect in math or language courses. However, it contradicts other researchers. According to (Hossain & Quinn, 2013; Suleman, Aslam, Habib, & Hussain 2013; Thomson & Davis 2013), technology initiatives such as one-to-one laptops and IWBs, had quite a positive impact on student achievement in mathematics and English among other technology initiatives. Research Question 2: What is the correlation between educator's skills and students' performance in Mathematics subject? H1: There was a significant relationship between technology application and students' performance in Mathematics subject. (Accepted). H1 was accepted since the p-value of 0.01 (less than 0.05) which shows that the Educator's skill was statistically significant to Students' Performance in Mathematics subject. This is supported by (Qing & Xin, 2010; Oigara & Wallace, 2012), who said that the delivery method of the teacher using technology in the classroom could affect the teacher's preference and student's motivation to work diligently with technology in order to increase students' academic achievement. From 30 Form 4 students that have been selected randomly from the same school. Data for this study may be richer if the number of total students involved is bigger. Moreover, it should not be focused on Form 4 students only. The study should be involved more students from each level from Form 1 to Form 5. Also, the small sample size may limit the transferability of this study. The questionnaire shows that each main construct contained five-item questions. The item questions should be more as it will improve data accuracy. At the same time, the validity of the data increases the reliability value. The survey dealt with participants' perceptions and could not claim as fact based. The survey is measured the students' views based on the item questions inside. Students, as respondents react to the questions based on their perceptions/views of implementing technology in their school. It may differ from how students respond to the questions, and the consistency of data will not be more reliable and valid.

6.2 Conclusions

The result showed that two of three technological factors; educator's skill and environment were significant towards students' performance in Mathematics subject. The technology application showed a negative significant relationship, and there is no effect towards students' performance. The research model was able to predict the relationship between technological factors and students' performance. Through the correlation analysis, the quantitative study has demonstrated that a connection exists between teacher candidates' belief factors and the teacher candidates' focus on the learning environment and the role of technology infusion into the classroom (Davies & West, 2014). Educators know that the environment in which students learn must contain conditions that facilitate learning (Davies & West, 2014; Lee & Lee, 2014). The findings were consistent with previous findings, indicating that these three constructs are essential and that it is difficult to quantify their importance as determinants affecting students' performance. In conclusion, this research analysed the technological factors on student learning that affect the students' results/performance in Mathematics subject. This chapter consisted of a study summary, findings from the research and data, a discussion of the significance of the findings, recommendations for further research, and final thoughts and considerations.

References

Al-Samarraie, H., Teng, B. K., Alzahrani, A. I., & Alalwan, N. (2018). E-learning continuance satisfaction in higher education: a unified perspective from instructors and students. *Studies in Higher Education, 43*(11), 2003–2019. https://doi.org/10.1080/03075079.2017.1298088

Aliyu, J., Osman, S., Daud, M. F., & Kumar, J. A. (2021). Mathematics teachers' pedagogy through technology: A systematic literature review. *International Journal of Learning, Teaching and Educational Research*, *20*(1), 323–341. https://doi.org/10.26803/IJLTER.20.1.18

Bloom, M. A. (2020). Adapting Science and Mathematics Instruction During the Coronavirus Pandemic, *24*(3), 1–4.

Bray, A., & Tangney, B. (2017). Technology usage in mathematics education research – A systematic review of recent trends. *Computers & Education, 114,* 255–273. https://doi.org/10.1016/J.COMPEDU.2017.07.004

Dede, Y., Akçakın, V., & Kaya, G. (2021). Mathematical, Mathematics Educational, and Educational Values in Mathematical Modeling Tasks. *ECNU Review of Education*, *4*(2), 241–260. https://doi.org/10.1177/2096531120928089

Dong, C., Cao, S., & Li, H. (2020). Young children's online learning during COVID-19 pandemic: Chinese parents' beliefs and attitudes. *Children and Youth Services Review*, *118*, 105440. https://doi.org/10.1016/j.childyouth.2020.105440

Dziuban, C., Graham, C. R., Moskal, P. D., Norberg, A., & Sicilia, N. (2018). Blended learning: the new normal and emerging technologies. *International Journal of Educational Technology in Higher Education, 15*(1), 1–16. https://doi.org/10.1186/s41239-017-0087-5

Fan, L. (2021). Exploring Issues About Values in Mathematics Education, *4*(2), 388–395. https://doi.org/10.1177/20965311211016002

Kumar, J. A., Bervell, B., & Osman, S. (2020). Google classroom: insights from Malaysian higher education students' and instructors' experiences. *Education and Information Technologies*. https://doi.org/10.1007/s10639-020-10163-x

Mishra, P. (2019). Considering Contextual Knowledge: The TPACK Diagram Gets an Upgrade. *Journal of Digital Learning in Teacher Education*, *35*(2), 76–78. https://doi.org/10.1080/21532974.2019.1588611

Nantschev, R., Feuerstein, E., González, R. T., Alonso, I. G., Hackl, W. O., Petridis, K., Triantafyllou, E., & Ammenwerth, E. (2020). Teaching Approaches and Educational Technologies in Teaching Mathematics in Higher Education. *Education Sciences*, *10*(12), 354. https://doi.org/10.3390/EDUCSCI10120354

Ozkanal, B., Gulen, S. K., & Pinar Uca Gunes, E. (2021). Online Information Searching Strategies of Open and Distance Learners: Anadolu University sample. *Turkish Online Journal of Distance Education*, *22*(3), 163–176. https://doi.org/10.17718/TOJDE.961831

Pang, J. S., & Seah, W. T. (2021). Excellent Mathematical Performance Despite "Negative" Affect of Students in Korea: The Values Perspective. *ECNU Review of Education*, *4*(2), 285–306. https://doi.org/10.1177/2096531120930726

Saltan, F. (2017). Blended Learning Experience of Students Participating Pedagogical Formation Program: Advantages and Limitation of Blended Education. *International Journal of Higher Education*, *6*(1). https://doi.org/10.5430/ijhe.v6n1p63

Scherer, R., Howard, S. K., Tondeur, J., & Siddiq, F. (2021). Profiling teachers' readiness for online teaching and learning in higher education: Who's ready? *Computers in Human Behavior*, 118, 106675. https://doi.org/10.1016/j.chb.2020.106675

Van, N. T., Abbas, A. F., Abuhassna, H., Awae, F., & Dike, D. (2021). Digital Readiness for Social Educators in Health Care and Online Learning During COVID-19 Pandemic: A Bibliometric Analysis. I*nternational Journal of Interactive Mobile Technologies*, *15*(18), 104–115. https://doi.org/10.3991/ijim.v15i18.25529

Wright, P. (2021). Transforming mathematics classroom practice through participatory action research. *Journal of Mathematics Teacher Education, 24*(2), 155–177. https://doi.org/10.1007/S10857-019-09452-1/FIGURES/1

Journal of Public Administration and Governance
ISSN 2161-7104
2022, Vol. 12, No. 4S