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The Effect of Using the Frog Virtual Learning Platform for Mathematics Education in Primary Schools

Parameshvaran Varaman*
parameshvaranvaraman@gmail.com
Centre for Instructional Technology and Multimedia
Universiti Sains Malaysia,
Pulau Pinang, Malaysia

Jeya Amantha Kumar
amantha@usm.my
Centre for Instructional Technology and Multimedia
Universiti Sains Malaysia,
Pulau Pinang, Malaysia

Siti Nazleen Abdul Rabu
snazleen@usm.my
Centre for Instructional Technology and Multimedia
Universiti Sains Malaysia,
Pulau Pinang, Malaysia

Corresponding author*

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ABSTRACT

Frog VLE was introduced by the Malaysian Ministry of Education, an online-based virtual learning platform that delivers learning content through multimodal methods to assist learning activities. This platform has significantly impacted Malaysian education and has been found to be beneficial as a teaching aid for mathematics, yet not much is known of the effect on primary school education. Therefore, using a quasi-experimental design, this study examines the effect of using the Frog VLE platform for mathematics primary education of year four students in Malaysia. Students were assessed based on mathematical achievement and perception of interest in using the platform, and the findings reflect that most students found the platform and its contents appealing and improved their interest in learning mathematics and enjoyed its benefits. Furthermore, it was

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observed that students performed better when exposed to the VLE compared to the traditional classroom but lacked confidence in using the platform. These findings can help policymakers consider future methods for using virtual learning platforms to enhance mathematics learning outcomes in Malaysian primary schools.

Keywords: virtual learning, Frog VLE, e-learning, primary education, Mathematics,

INTRODUCTION

It's a huge plus that e-learning systems have recently become more popular in schools (Oducado & Soriano, 2021). As a result, learning will probably change in line with technological advancements incorporating state-of-the-art information technology like computers, software, and applications (Vemmi et al., 2021). Additionally, whether in secondary or primary school, educators must incorporate technology that are appropriate for the curriculum, particularly in mathematics subjects (Alabdulaziz, 2019), and it is essential to make studying both interesting and challenging (Hiong & Umbit, 2015). The effectiveness of teaching and learning has been found to be enhanced by the internet, especially e-learning techniques (Dietrich et al., 2020). An information technology tool called virtual learning enables the integration and manipulation of web-based multimedia, which aids students in understanding concepts quickly and simply (Hernandez et al., 2020)

These instructional techniques are based on the constructivist theory, which holds that knowledge is gained by experience. Students can access these techniques through interactive online simulations and other forms of virtual learning (Persada et al., 2022). The introduction of interactive learning through virtual learning stimulates cognitive functions, critical and creative thinking, and problem-solving abilities (Papanastasiou et al., 2019). The use of virtual learning is influential because it may affect the future use of e-learning for teaching and learning (Hiong & Umbit, 2015). Moreover, using computer-based instructions via the internet allows children to repeat activities numerous times to grasp numbers (Fischer et al., 2022) and can assist pupils in building new knowledge (Tien et al., 2018). Additionally, it is anticipated that the availability of virtual learning would make teaching easier by removing the need for teachers to repeat explanations if students find the educational materials unclear(Penn et al., 2019). Additionally, virtual learning platforms facilitate revising, training, and measuring learning outcomes due to the availability of learning packages as often as required (Mosquera, 2017).

Henceforth, the Malaysian Ministry of Education (MOE), in collaboration with YTL Communication (YES 4G), introduced the Frog VLE virtual learning platform through 1Bestarinet involving 10000 schools in 2013 (Raman & Radhakrishnan, 2018). Frog VLE is an online-based virtual learning platform built and supplied by MOE and was delivered in various media formats, including text, voice, pictures, visuals, and motion (Zoolkafli, 2019). It was projected to be more appealing to students than rigid books (Vemmi et al., 2021) as multimodal methods can assist pupils in conceptualizing and facilitating learning activities (Vaataja & Ruokamo, 2021). This platform has already significantly impacted Malaysian education (Phoong et al., 2020) and is beneficial as a teaching aid for mathematics (Koon et al., 2018). Empirical findings using Frog VLE indicated that the platform allowed teachers to implement mathematical teaching and learning more confidently (Cheok & Wong, 2014). Moreover, drills in Frog VLE can help keep

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pupils from giving up too quickly or thinking too little because they want correct answers immediately (Mohd Baharan et al., 2021).

Nevertheless, empirical studies have reflected that students are usually less interested in mathematics (Ufer et al., 2017) as mathematics is considered a complex subject to master in Malaysia (Novriani & Surya, 2017). Empirical findings also speculate that students could be disinterested in mathematics lessons due to tedious teaching patterns (d'Entremont & Voillot, 2021). Additionally, most teachers practice traditional teaching methods such as "chalk and talk" with no other instructional resources to motivate learning mathematics (Mohd Baharan et al., 2021). In addition, the COVID-19 pandemic and the lockdown have impacted teaching and learning mathematics (Havenga, 2020), where face-to-face teaching was switched to virtual learning without compromising the advantages of active and responsible learning (Shamir & Blau, 2021). According to Aliyu et al. (2021), there are limited studies on mathematics education in Simmsschool students are challenged by fundamental mathematical skills such as rounding numbers (Veloo et al., 2021).

Nevertheless, Fitri and Zahari (2019) suggested that a possible solution is to diversify teaching methods in mathematics by using computer-based instructions and platforms. Such need is further supported by Ying et al. (2020) by describing mathematics as a creative process that requires exploration to solve problems. Thus, virtual learning environments emerged as the ideal option for on-site education to support students' educational needs (Kurniawan et al., 2020). Diversity in such an intervention can contribute to the teaching and learning process if used systematically and specifically designed to achieve the curriculum objectives (Lubis & Dasopang, 2021)

Therefore, the objective of the study is to

I. To investigate the difference in students' mathematical achievement between traditional and virtual learning.

II. To explore students' perception toward the effectiveness of Frog VLE and interest in learning Mathematics.

LITERATURE REVIEW

Virtual Learning Platforms (VLP)

VLP in education today is in line with the progress of the cyber world (Dung, 2020). VLP is a practical education platform compared with other media because it can include a variety of media such as text, sound, images, graphics, and animation in a digital environment, which also allows interactivity with the user (Ng, 2017). In virtual learning, media is used to help students learn concepts and meet the lesson's objectives (Zawacki-Richter & Jung, 2022). Media can also stimulate pupils mentally while they go through the process of assimilation and accommodation (Widodo & Wahyudin, 2018). Suratno et al. (2018) discovered that learning by applying exploratory methods in primary schools is more successful than exposure to traditional methods.

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As a result, primary school students who utilize VLP have a more positive attitude toward themselves and the capacity to handle more complex problems (Fabian et al., 2018). In addition, according to Akbarov et al. (2018), primary school students' attitudes toward learning will increase when technology is integrated into the classroom.

VLP in Malaysian Primary Schools

Malaysia's education system has changed as a result of the opening of the Multimedia Super Corridor (MSC), where the usage of the internet as a medium of teaching and learning in the smart teaching and learning process has resulted in the necessity to create a software package for use in the classroom (Muali et al., 2018). The utilization of virtual learning in education is the first step toward a technological society (Papanastasiou et al., 2019), as envisioned by Malaysia Education Blueprint (2013-2025) (Chong et al., 2020). However, to attain Malaysia's educational goals, a paradigm shift in thinking and technology usage is required (Barakabitze et al., 2019). Hence, educational institutions must adopt technology faster than others to attain these aims.

FROG VLE

Frog VLE was implemented in Malaysian schools to spark students' interest. This is because most students have recently become skeptical about using technologies such as smartphones, computers, laptops, and other technological devices (Aljenobi, 2022). Frog VLE is added with the benefit of creating animation, which is said to increase and strengthen students' knowledge (Ismail et al., 2017). This makes it possible to transform a static textbook into a more dynamic experience with animation that can "switch on" concepts that were previously only artistically explored in the imagination and through the educator's explanation. Figure 1 shows the interface of Frog VLE.

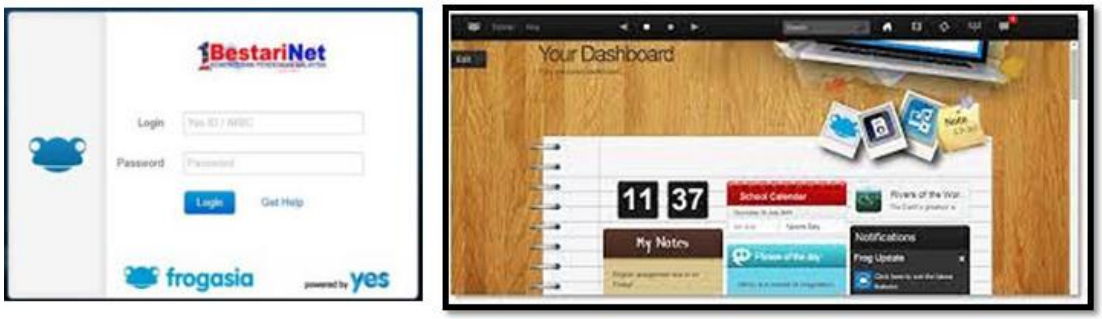

Figure 1: Interface and dashboard of Frog VLE

When teachers use the Frog VLE in the classroom, pupils' focus and attention are increased. The Frog VLE learning system incorporates website-based learning materials. To learn something, students might concentrate and pay close attention to educational content on the internet, including videos or pictures. This is because internet content can relay its contents by attaching eye-catching images, which often feature a variety of colours (Phoong, 2020). Frog VLE not only benefits students and teachers, but it also allows parents to exchange ideas and assist their children in learning through Frog VLE (Zakaria *et al.*, 2022). Furthermore, Frog VLE provides a simple and

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adaptable learning strategy (Khalipah et al., 2019) that allows learning to occur at any time and location. Figure 2 shows some of the contents of Frog VLE.

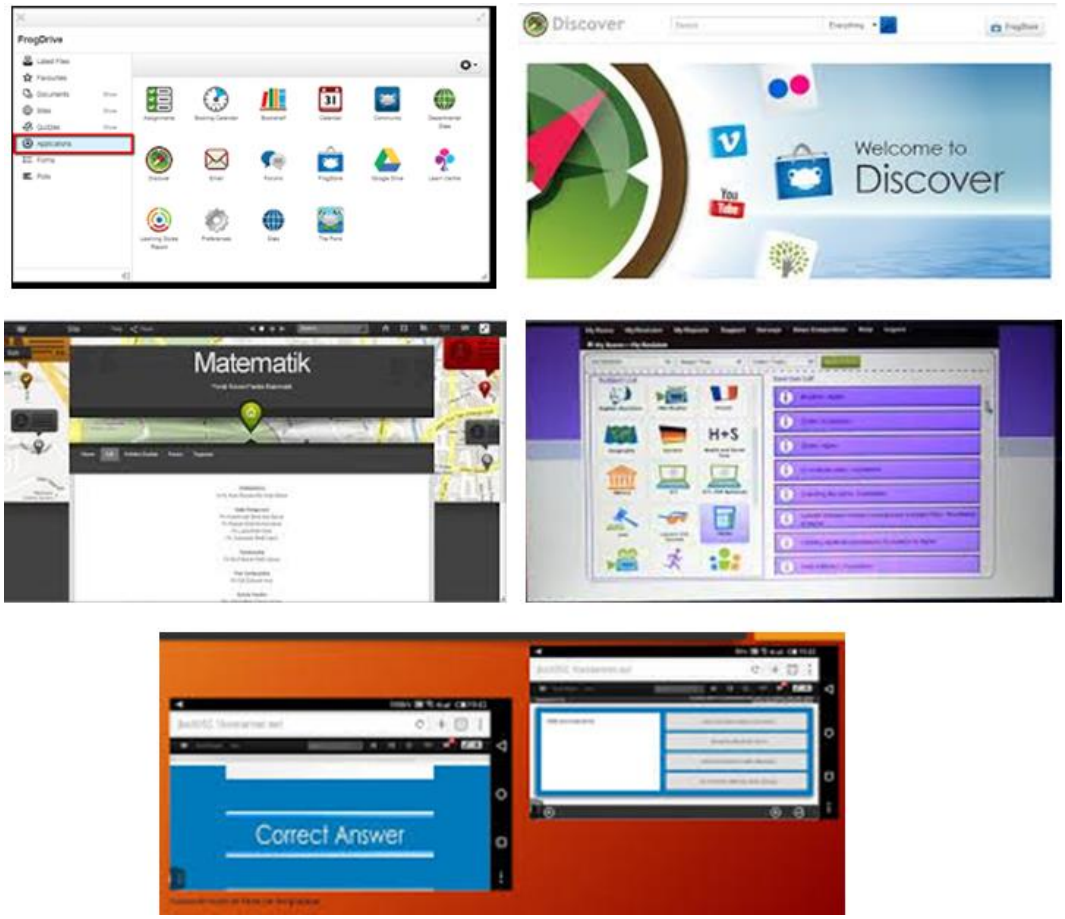

Figure 2: Example Mathematics content of Frog VLE

In regards to teaching and learning mathematics, Phoong et al. (2020) claim that the platform facilitated mathematical understanding. Frog VLE contains various features that might help students better understand the topic as the system student-centred, where students follow explicit instructions on mathematical topics based on the Frog VLE content while teachers serve as facilitators (Shen et al., 2017). Furthermore, by applying technology to carry out their teaching and learning activities, teachers can diversify Mathematics instruction that is more appropriate for different levels of students (Hiong & Umbit, 2015).

METHODOLOGY

Research procedure

The method used in this study is a quantitative method for identifying the effective use of Frog VLe for topic rounding off numbers in Mathematics Year Four. The quasi-experimental method was used to evaluate the efficacy of an intervention (Gopalan et al.2020), where respondents were

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not randomly selected but selected based on purposive sampling. Therefore, this study was conducted in students' natural classroom settings where participants were assigned to either experimental or control groups, as shown in Figure 3.

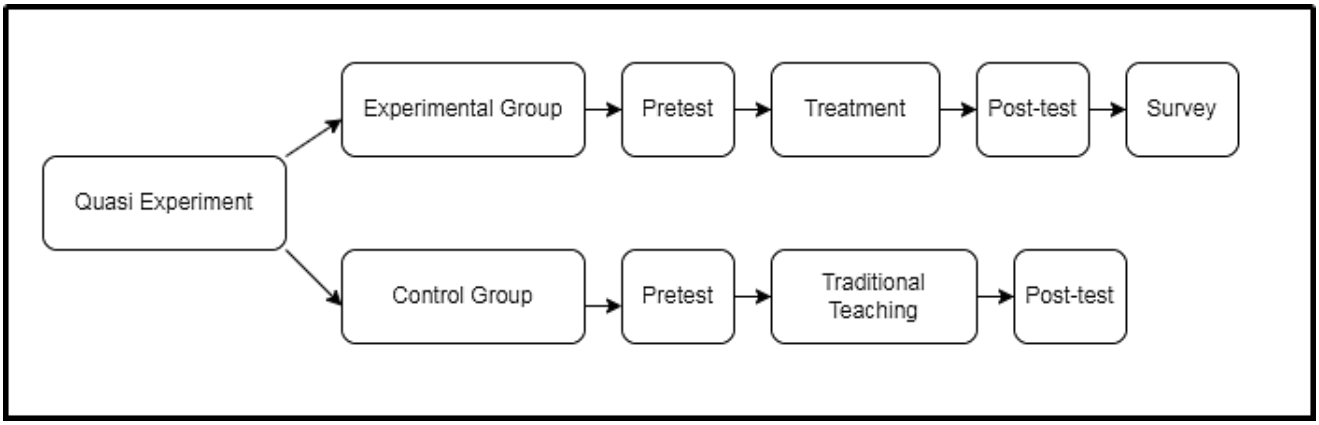

Figure 3: Research Procedure of this study

Respondents

The respondents were Year Four students chosen from a primary school in the northern region. Twenty students were assigned as the control group and another twenty students as the experimental group, where no pre-assessments were done to group students based on their abilities. The minimum number of samples was chosen based on the Sample Size Determination Table (Adam, 2020).

Learning Content

The effectiveness of this approach was assessed by assigning the virtual learning on round-off numbers using Frog VLE for the treatment group and traditional teaching for the control group on the same topic. The content for the topic "1.4 round off numbers" where developed based on Standard Curriculum Document Year 4 (Kementerian Pendidikan Malaysia, 2015). The objective of the contents is 1.4.1. Round off whole numbers to the nearest ten thousand.

Instrument

The data for achievement were gathered through pre-test & post-test conducted before and after the treatment (Trinidad, 2018). Next, The questions were examined by subject matter specialists and modified from question banks in order to guarantee the validity and dependability of the achievement. The pre-test and post-test questions, with item and response rotation, are comparable. Before teaching and learning for both groups, students took a pre-test with 20 objective questions. The answers to the questions were based on the students' prior understanding of rounding numbers to the nearest thousands, which they had learnt in year three. The post-test was then given to the experimental group after they had finished all of the modules on the Frog VLE platform, whereas the post-test was given to the control group following a typical teaching and learning session.

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The data for perception toward the effectiveness of Frog VLE and interest in learning mathematics was gathered through questionnaires (Etikan, 2017). The questionnaire was adapted from Phoong et al. (2020). Ten items from the questionnaire were used to test students' perceptions based on four points Likert scale, ranging from Strongly Disagree (1) to Strongly Agree (4). The Likert scale is ideal for this study since it can elicit responses connected to objects, events, or individuals investigated (Mircioiu & Atkinson, 2017). The instrument's validity is measured to identify the consistency of the device. The Cronbach alpha value for interest (0.875) is considered "good," while the effectiveness of Frog VLE (0.782) is found to be "acceptable" (Gliem & Gliem, 2003)

Data Analysis Method

The pre-test and post-test for the experimental and control groups were analyzed by comparing the mean score and standard deviation using SPSS version 20. The researchers also compared the significance of the achievement using the Mann Whitney U-Test. Next, the data were analyzed descriptively based on the Likert rating (Simms et al., 2019) of the effectiveness of Frog VLE and interest in learning mathematics questionnaire to measure mean and standard deviation.

RESULT AND DISCUSSION

Demographic Profile of the Students

A total of 40 students were involved in the study. Among them, 42.5% were male, while 57.5% were female. Nine male and eleven female students were assigned as the control group and eight male and twelve female students as the experimental group.

Learning Achievement

The descriptive statistics of learning achievement are summarized in Table 1 and Figure 4, while the difference in achievement for both groups was compared using Mann Whitney U-Test. Pre-test and post-test analysis showed increased respondents' achievement toward mathematics after the intervention.

Figure 4 shows the comparison of mean scores in the pre-test and post-test for both groups. For the pre-test, students from the experimental group achieved (M=42.52, S.D.=9.23) while the control group achieved (M=44.62, S.D.=9.17) and a Mann-Whitney test indicated ($U = 17.2$, $p = 0.45$) where there is no significant difference for the pre-test. This result indicates that both groups did not vary much and are homogenous in mathematical knowledge. A post-test was performed after implementing virtual learning on rounding off numbers for the experimental group and traditional teaching for the control group. Consequently, based on the post-test results, the learning gain for both groups was increased, where the experimental group (M=79.64, S.D.=8.05) performed better than the control group (M=52.75, S.D.=12.45). A Mann-Whitney test performed on the difference in learning gain indicated ($U = 5.0$, $p = 0.03$) proves that both groups' difference was statistically significant. Besides, Cohen's d effect size also indicates 0.55, reflecting a

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significant effect based on the category of manipulative materials on the math above 0.3 (Hattie, 2018).

Table 1
The pre-test and post-test achievement scores

The pre-test score				The post-test score			
Experimental Group		Control Group		Experimental Group		Control Group	
Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
42.52	9.23	44.62	9.17	79.64	8.05	52.75	10.45

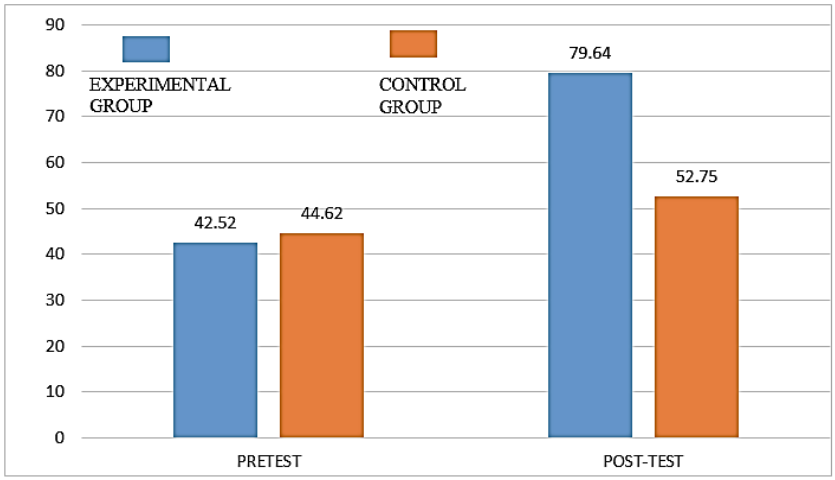

Figure 4: Comparison of the mean score for pre-test & post-test between the groups

Perception toward the effectiveness of Frog VLE

Table 2 shows the measurement of students' perception of the effectiveness of Frog VLE in teaching and learning. The average score for students' views on the suitability of content in the Frog VLE is M=3.42, S.D=0.81. The mean score is nearing "Strongly Agree." This means most students agree with using the VLE Frog for learning rounding off numbers. Question 8, *I enjoy doing Mathematics questions through Frog VLE to* obtain the highest student score. It indicates that students believe virtual learning helps them learn mathematics more easily than traditional learning. Meanwhile, in question 6, *I get sufficient training materials in the VLE to* obtain the least score. Hence, it shows that students are seeking more materials for self-learning.

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Table 2
Analysis of the Questionnaire on perception toward the effectiveness of Frog VLE

NO	ITEM	MEAN	S.D.
4	The lesson in Frog VLE is fun	3.35	0.77
5	I easily understand round-off numbers using Frog VLE	3.48	0.62
6	I get sufficient learning materials in Frog VLE platform	3.25	1.05
7	The learning materials are interactive	3.28	1.07
8	I enjoy doing Mathematics questions through Frog VLE	3.72	0.53
	AVERAGE SCORE	**3.42**	**0.81**

Perception of Interest in Learning Mathematics
The mean score and standard deviation for each item on students' interest are reflected in Table 3. The average score for students' interest in e-learning is M=3.62, S.D=0.75. This value is nearing the highest value of 4 and indicates students strongly agree that their interest in mathematics increases when they learn through the Frog VLE platform.

Table 3
Analysis of Questionnaire on Students' Interest in Learning Mathematics

NO	ITEM	MEAN	S.D.
9	Learning using Frog VLE increase my interest in learning Mathematics	3.53	0.93
10	Learning through Frog VLE excites me	3.54	0.87
11	Using Frog VLE in Mathematics can help me to improve my understanding on topic rounding off numbers	3.45	1.02
12	I always want to learn Mathematics in Frog VLE	3.75	0.57
13	Frog VLE is user friendly	3.85	0.35
AVERAGE SCORE		**3.62**	**0.75**

Question 13, "*Frog VLE is user-friendly"* obtained the students' highest score indicating students were fond of Frog VLE to learn mathematics. Meanwhile, question 11, "*Using Frog VLE in Mathematics can help me improve my understanding of topic rounding off numbers"* obtained the least score indicating that some students still lack confidence in using VLE for learning mathematics.

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DISCUSSION AND CONCLUSION

The first research question on how teaching with the Frog VLE could increase student learning achievement has already been addressed, according to the data analysis. The study of the pre- and post-test results showed that the use of the Frog VLE platform affects students' achievement. When compared to the control group, which was instructed using the conventional technique, the experimental group's achievement is significantly higher, as shown by the learning gain. Thus, it can be said that Virtual learning can attract students (Das et al., 2018) and directly increase students' performance in mathematics (Choi et al., 2017).

Regarding the second question, most participants highly support using the Frog VLE as a teaching aid. According to Lou (2017), learning mathematics using a virtual learning platform is better than traditional teaching in improving student achievement. In addition, students' interest in learning mathematics has been found to increase when technology is used (Syakur et al., 2019), as this study indicated. Besides, through Frog VLE, students can be proficient in their studies as well as share the skills learned (Saeheng, 2017) and be more creative (Yaniawati et al., 2020), which cumulatively improve their interest (Hoerunnisa et al., 2019) when multimedia used in their learning. This study concludes that teaching and learning in the classroom using the Frog VLE platform could improve students' interest in mathematics and their achievement. The study also revealed that the Frog VLE is an effective tool for learning Mathematics.

LIMITATION AND FUTURE DIRECTION

This study is only limited to students at a primary school and involves students from Year Four by focusing on rounding off numbers. Therefore, the findings of this study cannot be generalized to all contents in the Frog VLE platform. Therefore, this study should be conducted in different schools and levels throughout Malaysia to generalize the findings to acquire more reliable results. Future studies suggest conducting this research for other shapes and spaces, fractions, decimals, percentages, and measurement topics. Future studies could also be conducted to compare teaching methods using the Frog VLE platform the Ministry of Education provides and other virtual learning platforms in the market, such as Google Classroom.

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About the Authors

	Mr. Parameshvaran Varaman is a Ph.D. candidate in the Centre for Instructional Technology and Multimedia, Universiti Sains Malaysia. He has a Master in Education (M.Ed) and experience in the field of ICT and robotics.
	Dr. Jeya Amantha Kumar is a senior lecturer at Universiti Sains Malaysia. She has a Ph.D. in Instructional Systems Development and experience in the field of Electrical Engineering and Information Sciences, which involves teaching and coordinating courses.
	Dr. Siti Nazleen Abdul Rabu is a senior lecturer at Universiti Sains Malaysia. She has Ph.D. in Educational Technology and teaching experience as an Information Technology (IT) lecturer.

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