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The Hooray! Hooray! ABC: The Evaluation of Mobile Application for Preschool Students

Noor Hidayah Che Lah[1*], Muhammad Syazwan Mad Nor[1], Muhammad Hamirul Hamizan Roslan[1], Muhammad Amin Aiman Zulkifli[1], Zaidatun Tasir[2], Suhaizal Hashim[3], Ahmed Alkhayyat[4] and Wan Azani Wan Mustafa[5]

[1]Faculty of Computing and Meta-Technology, Universiti Pendidikan Sultan Idris, Perak, Malaysia; hidayah.cl@meta.upsi.edu.my, d091406@siswa.upsi.edu.my, muhdhamirulhamizan@gmail.com, muhammadaminaiman01@gmail.com
[2]School of Education, Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia, Skudai, Johor, Malaysia; p-zaida@utm.my
[3]Faculty of Technical and Vocational Education, Universiti Tun Hussein Onn Malaysia, Johor, Malaysia; suhaizal@uthm.edu.my
[4]Faculty of Engineering, The Islamic University Najaf, Iraq; ahmedalkhayyat85@iunajaf.edu.iq
[5]Faculty of Engineering Technology, Universiti Malaysia Perlis, UniCITI Alam Campus, Perlis, Malaysia; wanazani@unimap.edu.my,

** correspondence author*

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Abstract

Mobile applications are now being used for 21st-century learning, including alphabet learning. There are numerous mobile application products for online learning, particularly those relating to the alphabet ABC. It was revealed that previous mobile applications did not provide interactive activities that suited preschool students. Therefore, this study aims to develop Hooray! Hooray! ABC for learning the alphabet. This study employed Design and Development Research (DDR) as the research design, which is divided into three phases: Phase I - the needs of the application; Phase II - the design and development; and Phase III - the evaluation. ADDIE model is used as the instructional design to design and develop the mobile application. Two experts were chosen to validate the application. It was tested for usability and student performance on 35 preschool students. The results reveal that Hooray! Hooray! ABC can be used for learning the alphabet based on experts' agreement in terms of usefulness (96%), ease of use (97%), ease of learning (94%), and satisfaction (100%). In addition, the result shows that Hooray! Hooray! ABC can increase students' performance ($t = 13.271$, $p = 0.000$) in learning the alphabet, making it beneficial for preschool students, teachers, and schools. This study also acknowledged the limitations and future suggestions of this study.

Keywords: mobile application, online learning, preschools, DDR, schools

INTRODUCTION

Nowadays, technology helps people in every sector, including education. Technological advancements open new opportunities for improving education and the teaching and learning processes (Hu et al., 2021). Technology plays a significant role in educational settings. Technologies tools enable teachers and students to improve their knowledge and learning skills. Besides that, technology tools play an important role in the development of the educational system and curriculum (Sudin et al., 2023). Various technology tools that can be used in teaching and learning include digital-based media such as educational games, instructional videos, electronic textbooks, augmented reality, virtual reality, and mobile applications.

Furthermore, previous studies revealed that using technology helps children with their learning capabilities and skills (Mashrah, 2017; Szymkowiak et al., 2021). The use of technology in the classroom is now widely accepted for its benefits in terms of students' learning as well as increasing their motivation and engagement in the material (Rizk & Davies, 2021; Tay et al., 2021). Previous studies also discovered that technology can increase students' motivation (Islam et al., 2018; Wang et al., 2022), performance (Dunn & Kennedy, 2019; Rajendra & Sudana, 2018) and foster students' engagement in their learning (Felszeghy et al., 2019; Kay & Pasarica, 2019). Generation Alpha refers to individuals born between 2013 and 2025. They are linked to preschool students, and this generation is born with technology (Apaydin & Kaya, 2020; Ziatdinov & Cilliers, 2022). Other than that, this generation is exposed to technology for learning. One of the technologies that Generation Alpha can use is mobile applications. Hence, it is significant to employ technology properly to assist students in mastering the ABC alphabet using digital media (Lasdya et al., 2022; Fadhli et al., 2022; Wati, 2020). Various technologies have been developed as teaching aids for teaching and learning, such as augmented reality (Aborokbah, 2021; Abrar et al., 2019), e-module (Azzahra & Arrasyid, 2023), courseware (Zolkipli et al., 2023; Abdul Ghafar et al.; 2021), mobile application (Opu et al., 2021), audio (Rostan et al., 2020), and video fusion (Wei et al., 2023).

Currently, various mobile applications have been developed for learning ABC, such as ABC Tutor (Ayeni et al., 2020), ABC Kids (Giuffre, 2021), and Duolingo ABC (Raffas, 2022). The existing mobile applications have several weaknesses, such as not including audio, video, and animation elements. This is considered a weakness because a mobile application will appear ordinary and not display the realistic shape of an object without the use of animation elements. In order to attract children's attention to learning, a good combination of multimedia elements is needed. Therefore, the multimedia element must be included in an application to be appealing, effective, and appropriate for users (Abdulrahaman et al., 2020).

Previous studies discovered several positive impacts of integrating multimedia elements in teaching and learning for children and preschool students. Coskun and Cagiltay (2022) reviewed several studies

and established that multimedia can affect children's cognitive processes, such as selecting, organizing, and integrating into their learning. Furthermore, Zaini et al. (2022) stated that using multimedia in learning helps preschool children understand complicated topics while also providing positive engagement and enjoyment. Another study by Li et al. (2023) revealed that children's scores of learning and interest in groups with the animated electronic storybook were higher than those in groups without the animated electronic storybook. In addition, Cheah (2022) stressed that multimedia elements are indispensable nowadays since education is no longer constrained in terms of location, size, space, and time. It can be conducted anytime and available 24/7 using multimedia technology.

Multimedia technology also can be implemented in mobile applications. There are several existing mobile applications for children learning alphabets, such as AuthiAid (Aburukba et al., 2017), Pisanka (Culig & Carapina, 2022) and D-Lexis (Jamal Abd Nasir, 2013). However, the previous mobile apps for learning ABC did not meet the standard educational requirements for the current preschool students' needs. In addition, these mobile applications focused on children with special needs such as dyslexia. Besides that, those mobile apps also did not consist of integrated elements such as images, texts, and audio that are believed to be commonly found in other teaching applications that lacked the design that allows children to enjoy and have fun when using the teaching application. Therefore, this study proposed a mobile application for learning ABC for preschool students, namely Hooray! Hooray! ABC and its evaluation.

LITERATURE REVIEW

Alphabetic Learning

According to Gerde (2019), alphabetic knowledge encompasses identifying letter shapes, knowing letter names and sounds, the skill of printing letters, and quickly naming letters. On the other hand, Tomas et al. (2021) deny the ability to recognize letters through sounds as one of alphabetic knowledge. However, both researchers agreed that the knowledge of the alphabet is a fundamental literacy skill. Learning the alphabet by recognizing letters by their sounds, prints, and names in uppercase and lowercase forms is important in predicting a child's reading and language skills (Vinter et al., 2023). It is widely acknowledged that understanding the alphabet is necessary for literacy and knowledge. Vinter et al. (2023) believed that early letter name knowledge before a formal introduction or learning process is a predictor of children's reading ability. On the other hand, Piasta et al. (2022) asserted that proficiency in the alphabet is one of the most reliable indicators of success in early reading. They advocated for initiating pre-literacy education during early developmental stages, suggesting that children should be exposed to this foundational knowledge even before preschool. Researchers advocate that a child should have exposure to alphabet learning, at least at the level of recognizing letter names, by age three.

Learning techniques for alphabet knowledge differ depending on the creativity of parents or teachers. Ehri (2022) highlighted the use of pictorial mnemonics to associate letters with sounds and the role of

mnemonic-pictorial in reading by comparing three controlled conditions: integrated pictures, disassociated pictures, and no-picture conditions. Integrated images worked well because they connected two otherwise unrelated items in the memory. The shapes of letters included in the pictures reminded learners of previously seen pictures with those shapes whose names began with the relevant letter sounds. It is possible to conclude that a multisensory approach improves the efficiency of alphabet learning. One of the alternatives to learning the alphabet is using the mobile application.

Mobile Application in Learning

To help children or preschool students learn the alphabet, there is a need to propose a 21st-century learning approach by using technology such as a mobile application. There are several advantages of using a mobile application for learning, such as increased student engagement (Cho & Castañeda, 2019; Pechenkina et al., 2017), retained interest (Klimova, 2019; Wan Ahmad & Ahmad Harnaini, 2022) and improved motivation (Elaish et al., 2019).

According to Hoi (2020), the widespread use of mobile devices such as phones and tablets, as well as the fact that mobile technologies are assisting in the development and assessment of educational environments for applicable learning activities, has prompted scholars to consider whether they can be resourcefully used as a means for students to learn. Previous studies have revealed that smart mobile devices, particularly tablets, may positively improve preschoolers' teaching and learning (Gözüm & Kandır, 2021). In another study by Kokkalia and Drigas (2016), mobile applications could assist children in learning, such as early literacy, early mathematics, cognitive and social emotions. In addition, a study revealed by Tuli and Mantri (2021) that thirty children enjoyed using mobile learning for their childhood learning. Then, Masli and Husain (2022) developed a mobile app for children's dietary. According to them, the kids enjoyed using the mobile learning application. Mobile application is a very powerful and useful teaching aid that can be integrated with traditional teaching and learning. Using mobile applications can improve children's memory as they provide audio and visual aids that are easy for the children to learn.

Learning Alphabet can also be integrated into mobile applications. Previous studies have investigated the impact of using mobile applications for learning ABC. Brawerman et al. (2013) discovered that using mobile applications for children's learning is an interesting way to support learning. Interestingly, they also found that mobile applications intended to help develop cognitive abilities, such as touching the screen (coordination), listening to the sounds of words, and visualization of images and words. In addition, Ayeni et al. (2020) also revealed the positive impacts of using mobile applications for learning ABC among children. Their study was carried out on 20 nursery school students from ages 3 to 5 from different schools using mobile applications for learning the English alphabet. It revealed that children had fun learning, and their interest in learning also developed. Sherine and Olbernt (2022) also revealed that children could learn the English alphabet using mobile applications in an interactive learning environment. Most importantly, children can play and learn using mobile applications. Furthermore, Pareek et al. (2023) developed and tested their mobile application for children learning

Interactive 3D Marathi Language Alphabets. Their study also revealed that mobile applications create interest and motivation among preschool students in India. Thus, it was proved that the mobile application could help children learn the alphabet in creative ways.

However, previous studies focus on their region and country. Fewer studies were conducted on mobile applications for learning alphabets amongst Malaysian preschool students. Other than that, the mobile applications that were previously developed only focused on several multimedia elements as they did not manage to integrate all of the elements into one. Besides, the previous mobile application was not developed based on users' needs. Therefore, this study aims to develop and evaluate a mobile application among Malaysian preschool students.

Research Questions

This study contains four research questions:

i. What are the needs of mobile applications for learning the ABC alphabet?
ii. What will Hooray! Hooray! ABC mobile application look like?
iii. What is the usability of Hooray! Hooray! ABC in terms of content, elements, design, and ease of understanding based on user's perspectives?
iv. What is the effect of Hooray! Hooray! ABC towards student's performance in learning the ABC alphabet?

Hypotheses

H^0: There is no significant effect on students' performance before and after using Hooray! Hooray! ABC
H^1: There is a significant effect on students' performance before and after using Hooray! Hooray! ABC

METHODOLOGY

Research Design

Design and Development Research (DDR) was employed as the research design in Figure 1. Several studies employed DDR research to design and develop educational products (Jaya et al., 2021; Padzil et al., 2021). This study has three Phases, Phase I - the needs of Hooray! Hooray! ABC; Phase II - the design and development of Hooray! Hooray! ABC; and Phase III - the evaluation of Hooray! Hooray! ABC.

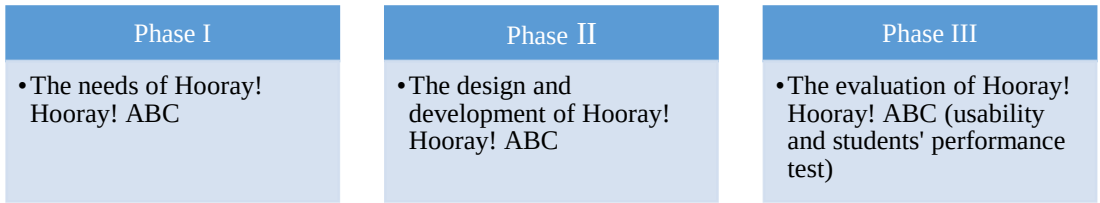

Figure 1: Design and Development Research

Phase I: The Needs Analysis of Hooray! Hooray! ABC

During this phase, the researcher analyzed the appropriateness of the application for assisting children in recognizing the ABC alphabet. Several processes were used in this phase to determine and identify the problems. After identifying a problem, the analysis is performed to determine the cause or factor related to the problem. This analysis process includes several parts:

i. Analysis of users
ii. Analysis of the learning environment
iii. Identify the need for mobile applications for learning ABC

In the analysis phase, the researcher studied every aspect of what should be included in the mobile application development. The software developed for educational purposes is usually built through research and continuous collaboration between various parties and involves the evaluation of various aspects. Among the aspects that need more attention is the validity of the content to produce a teaching analysis of whether the software meets the expected goals and skills. In addition, the need for mobile applications for learning ABC was investigated via interview sessions.

Phase II: The Design and Development of Hooray! Hooray! ABC

The Hooray! Hooray! ABC was designed in phase II The app was created using a storyboard systematically beforehand to design the flow of Hooray! Hooray! ABC. The design for the interface of Hooray! Hooray! ABC was created in this phase. Several software programs were used to develop this app, such as Adobe Illustrator CS6, Adobe Photoshop CS6, and Articulate Storyline 3. This study used the ADDIE Model as the instructional design to develop the app. Other studies also used the ADDIE model as the instructional design to develop their educational products (Budoya et al., 2019; Ghani & Daud, 2018; Widyastuti, 2019). Five experts were chosen to validate the Hooray! Hooray! ABC.

Phase III: The Evaluation of Hooray! Hooray! ABC

The final phase is the evaluation phase of Hooray! Hooray! ABC. The researcher evaluated the app in terms of usability and student performance.

Population and Samples

Note that 35 children aged four to six years old in a kindergarden X participated in the experiment. The study sample is made up of the study respondents, who were selected to represent a population. The researchers examined the extent to which learning and teaching using mobile applications can help teachers and children. Research ethics were employed on the 35 children involved in this study. The consent forms were given to their parents, who gave permission and agreed that their children would participate in this study.

Instruments

This study used three instruments: interview questions, an observation checklist, and a performance test. The interview has five questions regarding the need for mobile applications for learning ABC among preschool students. Next, the observation checklist was developed based on the usability of Hooray! Hooray! ABC. Then, the performance test was used to evaluate the students' performance in learning ABC. There were 15 questions in the pre-test and 15 questions in the post-test regarding ABC for preschool students. All the instruments had been validated by three experts, making the instruments valid and reliable for this study.

Data Analyses

The researcher performed several data analyses to answer the research questions using thematic analysis and descriptive analyses such as percentages, percent agreement, pre-test and post-test, normality test, and paired sample t-test.

RESULTS AND DISCUSSIONS

The Needs of Mobile Applications for Learning ABC Alphabet

The study results revealed that preschool students needed interactive mobile applications, interactive tools, a variety of activities in mobile applications, and mobile applications that suited 21st-century learning. Figure 2 illustrates the results from thematic analyses on the need for mobile applications for learning ABC based on the interview sessions with three preschool students. The study results revealed that preschool students needed interactive mobile applications, interactive tools, a variety of activities in mobile applications, and mobile applications that suited 21st-century learning.

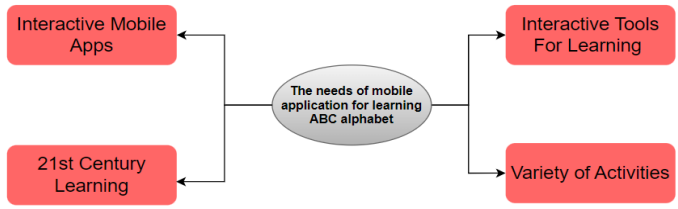

Figure 2: Result of the need for mobile application for learning ABC

The Development of Hooray! Hooray! ABC Mobile Application

This study used multimedia elements such as audio, graphics, text, and animation to develop Hooray! Hooray! ABC. Tools such as Articulate Storyline 3 and Adobe Illustrator CS6 software were used to develop it. Three technology experts and two preschool students validated the Hooray! Hooray! ABC. Table 1 shows the screenshot for Hooray! Hooray! ABC mobile application and its explanation.

Table 1: The screenshot of Hooray! Hooray! ABC mobile application

The screenshots of Hooray! Hooray! ABC mobile application	Explanation
 **Figure 3:** Main page of Hooray! Hooray! ABC	Figure 3 shows the front interface of the Hooray! Hooray! ABC mobile application. When the continue button is clicked, it will proceed to the next interface.

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Figure 4: Character option

Figure 4 shows the character selection interface. This interface is located in the second scene. Each text and graphics in this interface has its own layer. The user needs to press on the desired character to change it. Consequently, the user has to press the continue button to go to the next section.

Figure 5: Home page of Hooray! Hooray! ABC

Figure 5 depicts the subtopic interface or topic options for the topic. This interface is located in the third scene. Each text and graphics in this interface has its own layer. This page has 4 subtopics: Fun Colour, Fun ABC, Flashcard, and Word Scramble. There is a button for each subtopic. When clicked, it will go to the topic scene.

Figure 6: Uppercase section

Figure 6 illustrates the interface for learning the alphabet. The display includes text, image, and audio elements. The user has to press on each alphabet to hear its pronunciation. Subsequently, the user must click on the button at the bottom right to see other alphabets. After viewing all the alphabets, the user must click the left button to go to the main page.

Figure 7: Color section

Figure 7 portrays the interface of a color game. The display includes text and color elements. The user is required to choose the correct color based on the picture provided. After choosing the correct answer, the user needs to press the submit button. The user can try again if the answer is wrong and will go to the next section if the answer is correct.

Figure 8: Flashcard section

Figure 8 shows the interface of the flashcards. The display includes text, image, and audio elements. The user must click on each flashcard to see the objects and listen to their audio. Consequently, the user must click the button at the bottom right to see other flashcards. After viewing all the flashcards, the user must click the left button to go to the main page.

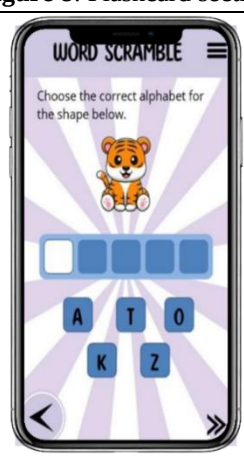

Figure 9: Word game section

The interface of the word game in the Hooray! Hooray! ABC is illustrated in Figure 9. The elements of text, images, and colors are used in the display. The user is required to draw the correct alphabet based on the picture provided. After choosing the correct answer, the user must press the submit button. The user can try again if the answer is wrong and go to the next section if the answer is correct.

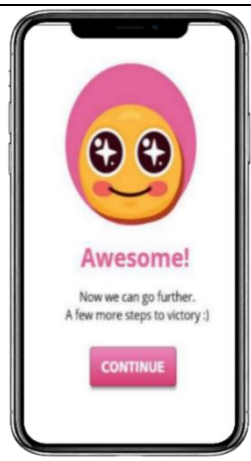

Figure 10: Result interface

The interface for selecting the correct answer is depicted in Figure 10. The elements of text, image, color, and audio are used in the display. The display will appear if the user gives the correct answer. Then, the user must press the continue button to continue the game.

The Evaluation of Hooray! Hooray! ABC

The Usability of Hooray! Hooray! ABC

The usability of The Hooray! Hooray! ABC was investigated using the observation of 35 preschool students. Three teachers observed the preschool students using the app. Preschool students were given a certain period to use the mobile application. Results in Table 2 show that The Hooray! Hooray! ABC can be used for learning ABC in terms of usefulness (96%), ease of use (97%), ease of learning (94%), and satisfaction (100%). By referring to Table 2, the findings show positive results regarding the usability of the app. It is proven that the app can be used for learning ABC in preschools.

Table 2: Results of the observation on the usability of The Hooray! Hooray! ABC

Descriptions	Teacher 1	Teacher 2	Teacher 3	Total level of agreement	Percent of teachers' agreements (%)
	Level of agreements				
USEFULNESS					**96.00**
1. Preschool students like the interface of The Hooray! Hooray! ABC.	3	3	2	8/9	88.88
2. Preschool students like the colors in The Hooray! Hooray! ABC.	3	3	3	9/9	100
3. The Hooray! Hooray! ABC display is appropriate for preschool students in learning the alphabet.	3	3	2	8/9	88.88
4. Preschool students can read the text in The Hooray! Hooray! ABC easily.	3	3	3	9/9	100

5. Preschool students like the graphic visuals displayed in The Hooray! Hooray! ABC.	3	3	3	9/9	100
6. Overall, preschool students are satisfied with The Hooray! Hooray! ABC.	3	3	3	9/9	100
EASE OF USE					**97**
7. Preschool students can use The Hooray! Hooray! ABC easily.	3	3	3	9/9	100
8. The link in The Hooray! Hooray! ABC menu works properly for preschool students.	3	3	3	9/9	100
9. The organization of learning materials in The Hooray! Hooray! ABC is well-structured for preschool students.	3	2	3	8/9	88.88
10. Preschool students can easily access all the content in The Hooray! Hooray! ABC.	3	3	3	9/9	100
11. The Hooray! Hooray! ABC application has prominent and interactive features with excellent multimedia elements for preschool students.	3	2	3	8/9	88.88
EASE OF LEARNING					**94**
12. Preschool students can easily understand the learning content in The Hooray! Hooray! ABC.	2	3	3	8/9	88.88
13. The topic of each lesson in The Hooray! Hooray! ABC is relevant to the instructional materials.	3	3	3	9/9	100
14. The content in The Hooray! Hooray! ABC is flexible for preschool students.	3	3	2	8/9	88.88
15. Preschool students can easily find the source of learning materials provided by teachers.	3	3	3	9/9	100
SATISFACTION					**100**
16. The application is useful for preschool students in learning the alphabet.	3	3	3	9/9	100
17. Preschool students have gained more knowledge about the way of learning the alphabet.	3	3	3	9/9	100
18. The application has improved preschool students' understanding of learning the alphabet.	3	2	3	8/9	100

Note: Level of agreement (3: Strongly agree, 2: Agree, 1: Disagree)

The Hooray! Hooray! ABC is a 21st-century learning tool. Khan et al. (2022) discovered that mobile applications are one of the learning tools that can be used for learning. In addition, Papadakis et al.

(2022) also highlighted the advantages of using mobile applications in learning for preschool students. The interactive design of The Hooray! Hooray! ABC motivated preschool students to learn ABC. Several studies conducted by Soni et al. (2019) and Wang et al. (2021) established interface design strongly influenced children's interaction experiences with touchscreen apps. Next, the ease of use of the mobile application is very important to help learners in using the app. The Hooray! Hooray! ABC application has prominent and interactive features with excellent multimedia elements for preschool students. In addition, the organization of learning materials in the Hooray! Hooray! ABC is well-structured for preschool students.

Ease of learning is also one of the important elements in the usability of mobile applications. A study by Al-Fraihat et al. (2020) also determined that ease of learning positively correlates with user satisfaction and adoption rates. Besides, the satisfaction of Hooray! Hooray! ABC is important. This is stressed by Al-Adwan et al. (2023), who state that satisfaction is a key determinant of user loyalty and the likelihood of recommending the application to others. The outcomes of this study are consistent with the findings of Nicholls et al. (2016) that combining the concept of learning with the usage of fine psychomotor skills improves learning and eye-hand coordination. Furthermore, the study findings are compatible with the findings of Sage et al. (2019) and Yasin et al. (2018) that the technology used in learning instruction has gained traction because instruction is gradually shifting away from traditional materials such as paper books and towards digital-based media such as educational games, instructional videos, and electronic textbooks. Therefore, it can be concluded that every aspect of The Hooray! Hooray! ABC is useful and can help preschool students in learning the alphabet.

Students' Performance

The pre-test and post-test were administered to 35 preschool students. Figure 11 illustrates the pre-and post-test results on 35 preschool students in one kindergarten. The pre-and post-test results demonstrate positive improvements. Compared to the pre-test, all 35 students improved in the post-test. Before proceeding with the analysis of the research hypothesis using paired sample t-test analysis, the normality test must be performed to ensure that the data are normally distributed. In this study, the Shapiro-Wilk test was chosen for the normality test. Table 3 shows the Shapiro-Wilk test for the pre- and post-test data. Based on the result of the Shapiro-Wilk test, the significance of the pre-test is 0.590, and the post-test is 0.925. The Shapiro-Wilk test is a statistical test of the hypothesis that the distribution of the data as a whole deviates from a comparable normal distribution. If the test is non-significant ($p>0.005$), it tells that the distribution of the sample is not significantly different from a normal distribution. The value of the Shapiro-Wilk test is greater than 0.05, and the data is normal. Thus, the null hypothesis is rejected. As a result, the pre-test and post-test data in this study are normally distributed. Following the confirmation of the data's normal distribution, the research hypothesis is tested using the paired sample t-test. The paired sample t-test method was used to examine two hypotheses, H_0 and H_1. The study's hypothesis is to assess if this study will accept or reject the null hypothesis provided at the beginning of the study, which is H_0: there is no significant difference in students' performance before and after using the Hooray! Hooray! ABC mobile

application. The confidence level used in this study is 0.05. If the obtained confidence level surpasses 0.05, the hypothesis H_0 is rejected.

Based on the paired sample statistics, the means for both values are pre-test: 55.71 and post-test: 68.49, as shown in Table 4. The result for the paired sample t-test is t = 13.271, p = 0.000, which is a significant value of less than 0.05 (refer to Table 5). Therefore, the null hypothesis is rejected. This shows that students' performance improves significantly after using The Hooray! Hooray! ABC.

The Hooray! Hooray! ABC increases students' performance in learning the alphabet. This study was in accordance with Korenova et al. (2019), who discovered that mobile applications could help preschool students' learning. In addition, Klimova et al. (2019) revealed that mobile applications could help improve students' performance. The advantages of using mobile applications for learning are that they are time-efficient, cost-efficient, more engaging, and more accessible (Pedro et al., 2018).

Based on the result, it can be concluded that The Hooray! Hooray! ABC has a significant effect on students' performance. This finding is in line with the previous studies (Rovithis et al., 2019; Straková & Cimermanova, 2018) that show that the use of technology is effective in improving students' achievement as well as providing high motivation to learn something new. In addition, the students also showed a high level of interest in the ABC alphabet learning session using the mobile application. Preschool students prefer learning while playing, and the learning activities' content allows them to explore and learn independently. The research data obtained from the score difference between the post-test and pre-test were higher compared to the score obtained before using the mobile application. The research data is also consistent with Pan and Chen (2021) on the use of technology in the classroom, which is widely accepted because it is useful in student learning and enhances their motivation and engagement in the content.

Table 3: Shapiro-Wilk Test

Shapiro-Wilk			
	Statistic	**df**	**Sig.**
Pre-Test Score	0.975	35	0.590
Post-Test Score	0.986	35	0.925

Table 4: Mean and standard deviation

	N	**Mean**	**Standard Deviation**
Pre-Test	35	55.71	13.911
Post-Test	35	68.49	11.307

Table 5: Paired Sample Test

	Paired Differences					t	df	Sig. 2-tailed
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Post-Test Score Pre-Test Score	12.771	5.694	0.962	10.816	14.727	13.271	34	0.000

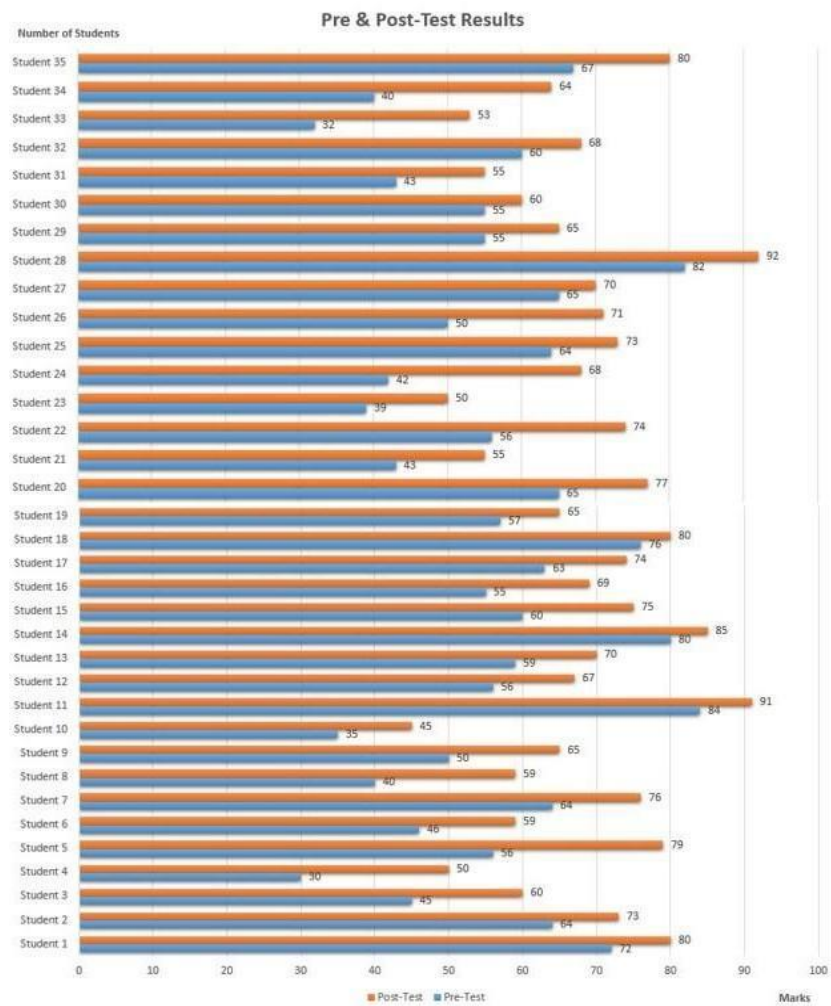

Figure 11: Pre-test and post-test results of Hooray! Hooray! ABC for each student

CONCLUSION

Overall, The Hooray! Hooray! ABC mobile application improves the understanding of the alphabet among preschool children aged 4 to 6 years old. This study also proves that mobile applications can be used as one of the most effective learning aids in improving preschool students' understanding of the alphabet and colors. Consequently, this study determined that the combination of teaching delivery and facilitation methods with the use of mobile applications is more effective than the usual teaching methods in teaching the alphabet. A total of 35 preschool students at Kindergarten X showed good performance improvement using the Hooray! Hooray! ABC mobile application. Therefore, this study can be used as a guide and research reference for other researchers in the future.

LIMITATION AND FUTURE ENHANCEMENT

There are some limitations in this study. First, it only focused on the subtopic of understanding letters and colors. Future studies can study the development of mobile applications for kids by adding other subtopics, such as number recognition, to enhance the valuable skills of young children. Second, this study has a limited number of samples. Future studies can choose respondents from multiple groups. The respondents can be drawn from other kindergartens or low-income homes. When the scope of the study is expanded or more groups are included, the conclusions will be broader and of higher quality. The mobile application for this study also has limitations in terms of functionality. As a result of this condition, the mobile application has restricted capabilities and is not comprehensive. Therefore, more advanced functions can be included in this mobile application in the future.

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