

## Development of Learning Application for Topic Circular Measure for Additional Mathematics Form 5

Norhasyimah Hamzah<sup>1\*</sup>, Marwa Mahmood<sup>1</sup>, Normah Zakaria<sup>1</sup>, Arihasnida Ariffin<sup>1</sup>, Siti Nur Kamariah Rubani<sup>1</sup>

<sup>1</sup> Faculty of Technical and Vocational Education,  
Universiti Tun Hussein Onn Malaysia, Parit Raja, 86400, MALAYSIA

\*Corresponding Author: [hasyimah@uthm.edu.my](mailto:hasyimah@uthm.edu.my)  
DOI: <https://doi.org/10.30880/ritvet.2024.04.01.001>

### Article Info

Received: 15th May 2024  
Accepted: 12th June 2024  
Available online: 30 June 2024

### Keywords

Mobile Learning, Learning Android Application, Mathematics

### Abstract

Additional Mathematics is an elective subject in high school. However, students' scores in this subject are among the lowest in the most recent SPM exam results. This is one of the factors that makes Additional Mathematics an unsatisfactory subject. This study aims to develop a Learning Application for the Topic of Circular Measure for Additional Mathematics Form 5, considering that Additional Mathematics is an SPM subject where students' results have been unsatisfactory in recent years. The developers have used Hannafin and Peck's model throughout the development process of this learning Android app. In addition, two types of instruments have been used in this project which are checklist form and verification expert. The checklist form is used for expert assessment for the development of learning android applications. Three (3) experts evaluate the functionality of the developed learning Android application. The findings show that expert evaluation is based on aspects of content design, interface design, and interaction design by the standards for developing learning Android applications. Overall, the development of learning android applications for the topic of circular measure for Additional Mathematics subjects Form 5 can be one of the teaching aids in teaching and learning at school.

## 1. Introduction

Additional Mathematics is an elective subject in secondary schools in Malaysia. The purpose of supplementary mathematics is to develop students with in-depth knowledge and ability towards complex mathematics. Khali and Rosli (2022) state that when compared to other disciplines, Additional Mathematics is recorded among the lowest passing results in recent years.

Teaching and learning methods are an important factor in the achievement of Additional Mathematics. Most schools do not allow students to think about causing their reasoning skills to be weak during exams (John, 2020 & Brookhart, 2010). Therefore, teachers need to wisely use various methods to attract students into the classroom so that the teacher's presentation affects student achievement.

### 1.1 Mobile Learning

Mobile learning is a mobile technology that is implemented for easy online learning. Mobile learning is defined as the integration of mobile devices with wireless network technology to make it easier for users to access information anytime. The use of mobile learning is more effective than traditional learning in helping students

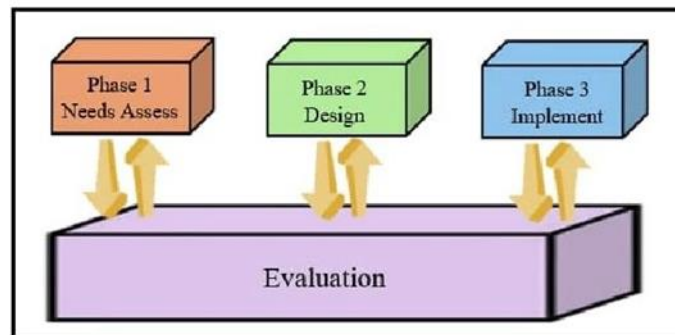
achieve and improve their skills (Crompton & Gregory, 2017). According to Safitri et. al., (2019), mobile learning uses Android-based Learning that provides support to students in understanding a subject.

Mobile learning has gained popularity due to its numerous benefits. Among the benefits of mobile learning is providing a more convenient and flexible way to learn. Additionally, mobile learning can improve engagement and motivation, as it provides a more interactive and personalized learning experience (Sung, Chang, & Liu, 2016). Furthermore, it can increase accessibility to education for individuals who may not have access to traditional classroom settings.

Another benefit of mobile learning is its cost-effectiveness (Looi et. al., (2010). A framework for mobile seamless learning. Proceedings of the 9th World Conference on Mobile and Contextual Learning, 183-190.). By reducing the need for physical classrooms, instructors, and materials, mobile learning can save schools and businesses a significant amount of money. Additionally, the cost of mobile devices is continuing to decrease, making mobile learning an increasingly affordable option.

## 2. Methodology

The research methodology selected in the development of learning application using the Hannafin and Peck (1988) design model as a guide. The research found that the Hannafin and Peck models is the most suitable methods because they can ensure that the product developed meets the goals and objectives of the developer.



**Fig. 1** Hannafin and Peck (1988) design model

Figure 1, shows a design model of Hannafin and Peck. This design Model has three main phases, namely the needs assessment phase, the design phase, and the development and implementation phase. Each phase in this model will go through a phase of evaluation and repetition. Each phase will be repeated if there is an error before proceeding to the next phase. This situation can detect problems that arise in the early phase and improvement will continue to ensure the quality of the product. This design Model is a systematic approach to developing a multimedia product that contains three phases that the researcher must pass. The researchers chose this model to ensure that each design phase can produce an Android application that adapts to the user's problems.

Developers use Adobe Animate software to develop Android applications. It fits to use because it is easy to use. Moreover, this software is more interactive than other software. Adobe Animate is used to develop learning android applications about Additional Mathematics. Developers also use Canva software to create interactive learning videos. The learning videos are developed with as many as three videos based on the selected subtopics.

The developer tests the developed application so that it can accurately display information in the content, interaction design, and interface design used and correspond to the topic created. This assessment will be made by several experts such as Additional Mathematics teachers and Creative Multimedia lecturers in FPTV UTHM selected by the developer to evaluate the product.

## 3. Results and Discussion

Figure 2 shows the menu page android learning application of Circular Measure of Additional Mathematics form 5. This application has five menus which are objective of learning, formula, topics learning, exercise, and user manual.



**Fig. 2** Main page Android learning application

Figure 3 shows a learning video uploaded on YouTube. The developer provides three learning videos based on subtopics of circular measure topics on Additional Mathematics.

**Fig. 3** Learning videos

Figure 4 shows the page of exercise. This exercise questions have two parts which are section A and section B. Each section has 10 questions. Section A represents optional answer questions, while Section B represents subjective questions where the user has to fill in the correct answer.

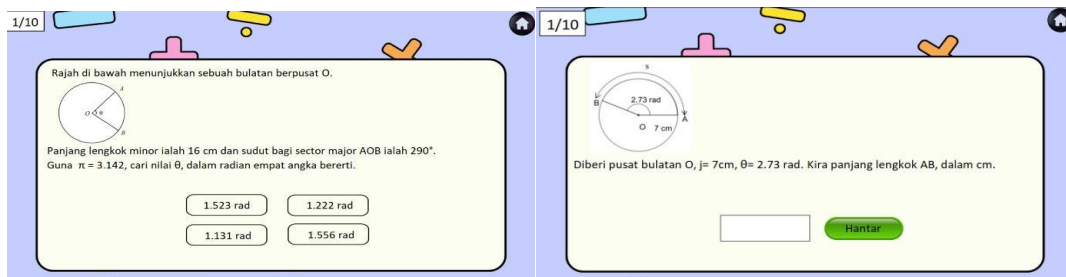
**Fig. 4** Page of exercise section A and section B

Table 1 shows the developer has analysed the views and expert reviews that have been proposed by three experts on the developed learning android applications. Improvements have been made to content design, interaction design, and interface design. The views and comments of experts on the development of this product are as in Table 1.

**Table 1** Example of presenting data using a table

Expert	Expert Position	Review and Comment
1	Teacher in High School Experienced for more than 18 years in the field of Additional Mathematics	Add several questions for each title
2	Lecturer at the Faculty of Education Technical and Vocational at UTHM Experienced for 18 years in the field of Creative Multimedia	<ul style="list-style-type: none"> <li>Standardize the use of language</li> <li>Add animation and interactivity elements, especially to learning videos</li> </ul>

3	Lecturer at the Faculty of Education Technical and Vocational at UTHM Experienced for 11 years in the field of Creative Multimedia	Change the setting icon and exit icon that sinks to the background
---	---	--

Table 1 shows that all three experts have given recommendations for improvements to the developed product. Among them is the first expert who suggested adding the number of questions for each title by increasing the number of questions from 10 questions to 20 questions per title. The second expert on the other hand suggested standardising the use of the language where the developers use Malay as the main language. Not only that, but she also suggested adding animation and interactivity elements to the learning videos. The third expert recommends changing the setting and exit icon so that it looks more embossed with the background used. Overall, comments and improvement actions have been taken by the developers.

Android learning apps have their advantages. Among them are students who can download the application through the Google Play Store and use the application for free. In addition, the contents of learning Android applications have various types of learning content such as text, images, audio, and video. According to Mustaji et al (2022), as a key aspect of teaching to students, interactive and systematic visuals attract their interest.

All experts also agree that the duration of the developed learning videos is ideal for learning. According to Susanti et al (2018), the appropriate duration of learning videos is between 5 minutes to 10 minutes. This is because studies have shown that the percentage of respondents who choose a duration of 5 minutes to 10 minutes is higher. The developers have developed three videos whose duration does not exceed 10 minutes.

The use of in-app audio is indispensable in application development. According to Syamsuddin (2022), audiovisual is a modern one that is used according to the Times and technological advances in the current era. Furthermore, the audio used is interesting and not boring for users, especially the learning objectives. All experts agree on the audio used by developers in the development of applications in terms of volume and type of audio used.

Graphics are a key element in conveying information in some applications. According to Che Ibrahim et al (2021), the use of more graphics is more effective on human memory compared to the use of text because humans have a relationship with natural experience. This is said to be because users are now more attracted to visual elements than text. Experts agree on the type of graphics used by the title of the developer.

Text is an important multimedia element. According to Wijoyo (2018), with the existence of a text, all information can be explained in written form and explained something by using readable written content. This is said to be so because the use of text becomes more interesting in multimedia development. In addition, the type of font also affects the text used in application development. Therefore, the type of font used should be appropriate and easy to understand by users so that users can easily understand what is conveyed.

Equations and formulae should be typed in MathType and numbered consecutively with Arabic numerals in parentheses on the right-hand side of the page (if referred to explicitly in the text). They should also be separated from the surrounding text by one space.

#### 4. Conclusion

In conclusion, based on the collected data, the researchers have concluded that learning Android applications can serve as an additional instrument for practical learning in addition to helping with Additionally mathematics success. Students can watch the generated instructional videos while performing the tasks provided in the program by using the designed Android application. In addition, the development of this product can help students and teachers in the teaching and learning process. Therefore, the developer hopes, this developed application can help students to hone further their ability to learn Additional Mathematics.

#### Acknowledgement

This research was supported by Universiti Tun Hussein Onn Malaysia (UTHM) through Tier 1 (Q506).

#### Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of the paper.

#### Author Contribution

The authors confirm contribution to the paper as follows: **study conception and design:** Norhasyimah Hamzah, Marwa Mahmood; **data collection:** Norhasyimah Hamzah, Nur Kamariah Rubani; **analysis and interpretation of results:** Norhasyimah Hamzah, Marwa Mahmood, Arihasnida Ariffin, Normah, Zakaria; **draft manuscript preparation:** Norhasyimah Hamzah, Marwa Mahmood, Normah Zakaria, Arihasnida Ariffin, Siti Nur Kamariah Rubani.

## References

- Brookhart, S. M. (2010). How to Assess Higher-Order Thinking Skills in Your Classroom. Alexandria, VA: ASCD.
- Crompton, H., Burke, D., & Gregory, K. H. (2017). The use of mobile learning in higher education: A systematic review. *Computers & Education*, 123, 53-64.
- Elisa Susanti, Harta, R., Ari Karyana, & Mas Halimah. (2018). Desain Video Pembelajaran yang Efektif pada Pendidikan Jarak Jauh: Studi di Universitas Terbuka. *Jurnal Pendidikan dan Kebudayaan*, 3(2).
- Ibrahim, N., Rusli, N., Shaari, M., & Nallaluthan, K. (2021). Persepsi Pelajar terhadap Aplikasi Multimedia Interaktif dalam Proses Pengajaran dan Pembelajaran Abad ke-21. *Online Journal for TVET Practitioners*, 6(1), 15-24.
- John, D. (2020). "The Impact of Teaching Methods on Students' Reasoning Skills." *Journal of Educational Psychology*.
- Khali, Z. K., & Rosli, R. (2022). Amalan Pengajaran Guru Matematik Tambahan Dari Perspektif Murid: Satu Kajian Kes. *Jurnal Kepimpinan Pendidikan*, 9(3).
- Looi, C. K., Seow, P., Zhang, B. H., So, H. J., Chen, W., & Wong, L. H. (2010). A framework for mobile seamless learning. *Proceedings of the 9th World Conference on Mobile and Contextual Learning*, 183-190.
- Mustaji, R. R. & Bachri, B. (2022). Media Pembelajaran Berbasis Aplikasi Android dalam Meningkatkan Keaksaraan. *Jurnal Pendidikan Anak Usia Dini*, 6(4).
- Safitri, I., Pasaribu, R., Simamora, S. S., & Lubis, K. (2019). The Effectiveness of Android Application As A Student Tool In Understanding Physics Project Assignment. *Jurnal Pendidikan IPA Indonesia*, 8(4).
- Sung, Y.-T., Chang, K.-E., & Liu, T.-C. (2016). The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis. *Computers & Education*, 94, 252-275.
- Syamsuddin, N. (2022). Pengembangan Teknologi Audio Visual dalam Pembelajaran Bahasa Arab. *Jurnal Konsepsi*, 10(4).
- Wijoyo, A. (2018). Pengaruh Hasil Siswa dengan Menggunakan Multimedia Pembelajaran Interaktif untuk Sekolah Pertama dan Sekolah Menengah Atas. *Jurnal Informatika Universitas Pamulang*, 3(1).