Android-Based Application for Subtopic Based on Form 4 Home Science Clothing Selection

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The purpose of this study is to develop android-based learning applications for the basic subtopics of Clothing Selection and based on ADDIE theory, and to receive confirmation from experts based on previously identified problems related to the need for technology use in learning versus conventional learning. Data collection is conducted through in-depth interviews with respondents. While the research design focuses on product development, the development process refers to the ADDIE model—Analysis, Design, Development, Implementation, and Evaluation—taking into account aspects such as content as well as mobile application interface elements. The findings show that all respondents agree that the content and also the interface elements of this mobile application have achieved the objectives and goals of the study. The development of this application can add value to the topic of Clothing Selection for Home Science (SRT) Form 4 subjects because it can be accessed through Google Playstore. Therefore, this application provides benefits not only to the users but to a range of subjects including Form 4 Home Science.

Keywords: mobile application, home economics, ADDIE, M-Learning

INTRODUCTION

The advancement of information and communication technology (ICT) has influenced the education system of Malaysia (Rosman et al., 2019). The impacts of globalization and developments in ICT have demanded that some changes be made in the national education system (Holla & Katti, 2012). This is aimed at achieving the goal of making Malaysia a center of educational excellence (Center for Academic

Excellence) in the Asian region and also at the international level. Therefore, the country needs to improve the excellence of its image and quality of education in order to achieve world standards and obtain the status of "World Class Education," especially in the field of ICT. The use of learning methods based on the use of introduced technology is a change that has taken place in the national education system. According to the Malaysian Ministry of Education (Diana et al., 2018), the use of ICT in the delivery of knowledge to students is clearly able to accelerate and facilitate the transmission of knowledge.

The Ministry of Education Malaysia (MOE) has adapted to these changes by expanding the use of ICT in schools and higher education institutions. In line with the development of technology, dynamic changes are taking place in the world of educational technology by introducing the concept of mobile learning or M-Learning (Mobile Learning) to improve the level of learning and teaching (Parada & De Brisolara, 2017). M-Learning is a new learning paradigm that leverages the use of mobile devices in education both in primary and secondary schools. An easy and fast-to-access mobile platform is preferred for teaching and facilitation (PdPc). Over the last years, an increasing number of teenagers have begun using mobile devices to socialize through Facebook, Instagram, Twitter, WhatsApp, and various other applications (Ahmar & Rahman, 2017). These mobile devices make the educational process flexible and easily adaptable for students, and accommodate school schedules and teachers' needs (Klopfer et al., 2012) because they can be used anywhere and anytime.

Dynamic changes in the world of educational technology have introduced M-Learning-based techniques in line with advances in the field of ICT in order to improve the field of national education.

Kukulska-Hulme and Traxler (in Rossyahida & Mohamad Hisyam, 2011) state that "M-Learning is a new concept in the learning process. It emphasizes the ability to move the learning process without being tied to the physical location where the learning process takes place" (p. 39). Therefore, educators need to improve the teaching process in order to provide a suitable teaching environment for each student (Rossyahida & Mohamad Hisyam, 2011). Teaching aids (ABBM) produced based on ICT technology, such as applications for smartphones, can be used in practice (Vesudevan, 2021). With this, it is undeniable that existing technology has an equally important role for the education sector in the country and is indirectly able to bring a positive impact in the process of imparting knowledge from teachers to students. Therefore, teachers are able to obtain a positive impact with the development of educational technology in imparting skills and knowledge to their students (Kang & Cho, 2015).
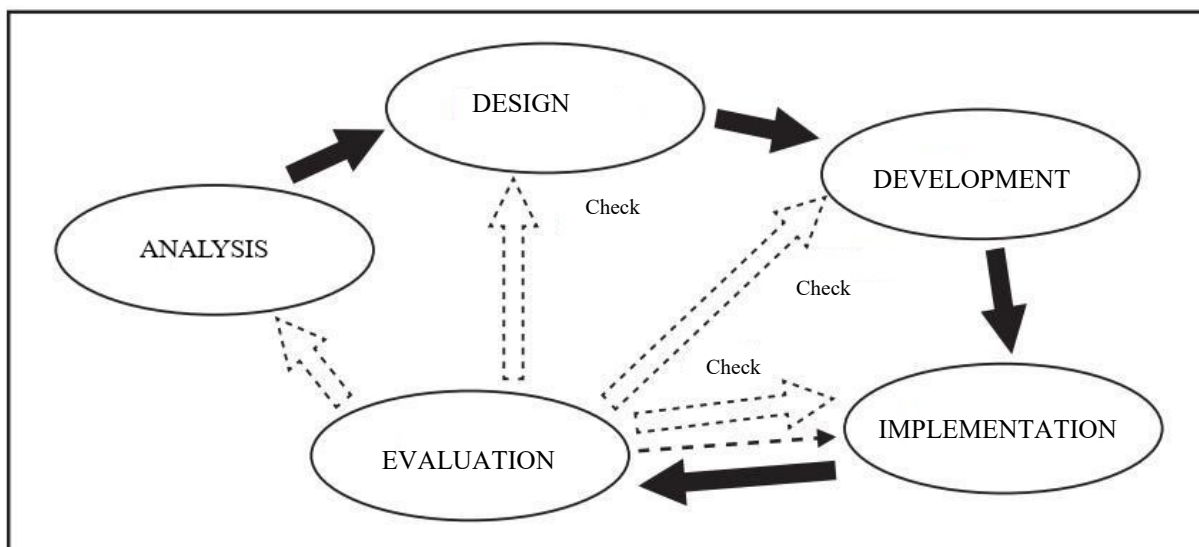
RESEARCH METHODOLOGY

To develop this basic Clothing Selection application, the ADDIE model is applied. According to Reiser and Dempsey (in Ahmad & Ammar, 2018), "[The] design model is a systematic process in technology resource development that includes learning and achievement analysis, application design, development, implementation, and evaluation." According to Ahmad and Ammar (2018), "[The] ADDIE model is an abbreviation of Analysis, Design, Development, Implementation and Evaluation" (p. 6). There are five key phases derived from the ADDIE model involved in the development process of this android mobile application. "This ADDIE model was chosen to develop a learning application because the model design that emphasizes repetition is done for each phase" (Ahmad & Ammar, 2019, p. 5). Each phase is interconnected with every other. If one of these levels cannot be performed correctly, then the process can be repeated until it can be fully completed. According to Gustafson and Branch (in Aliff & Gamal, 2016) the ADDIE instructional design model is the earliest model and forms the basis of other instructional system design models. The ADDIE model is the technique of choice for developing this android technology-based learning application. Figure 1 shows the workflow of the ADDIE instructional model.

Analysis Phase

The analysis phase is the first phase of the ADDIE model. Therefore, the production of android-based applications is developed to overcome the problems faced by students who are less interested in learning using conventional teaching methods in addition to being able to integrate the use of ICT in teaching and facilitation processes (Roslan, et. al., 2021; Ma, et. al., 2014). The applicationtarget user is suitable for all

students taking Form 4 Home Science subjects as well as other groups of students in national- type secondary schools. This mobile device application is entitled ""Selection of Clothing"". and is It is suitable for all student levels; however, of students, but this application is designed forproduced focused on students who take the subject of Home Science in fForm 4. This learning standard is also suitable based on the Assessment Curriculum Standard Document (DSKP) for Home Science subjects form 4. Android- based applications were produced through this software usingare using AppsGeyser.

FIGURE 1
WORKFLOW BASED ON THE ADDIE INSTRUCTIONAL MODEL

Baharudin et al., 2014. Android-based application development procedures for the selection of form 4 home science subjects
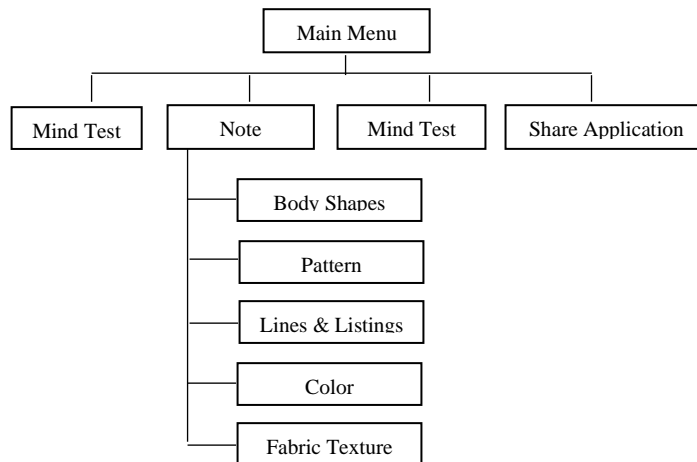
Design Phase
This stage is implemented after the needs analysis is completed. Through this design phase, Kingsoft Presentation software is used to build a "storyboard" to show a graphic arrangement in the form of illustrations or images that are presented for the purpose of pre-presentation for the development of this application (Hazwani & Dalbir, 2018). This visual arrangement allows the development by software programmers for this application to run smoothly. The earliest step in the process of developing this application is to start with a search for pictures related to fashion and clothing through a Google search on websites such as Pixabay, Pexels, and Unsplash to retrieve interesting open-source pictures, and then use PicsArt (available in smartphones) for the purpose of making the pictures more interesting (Abu Bedor et al., 2021). Next, the developer produces a storyboard using Kingsoft Presentation, which includes a hyperlink to show the interface relationship for each storyboard in the development of the final application. There are three design aspects involved in the development of this mobile application as described below.

Module Design
The main design involved in the development of an android-based application is the module design. Figure 2 shows the design of the modules involved in the development process of the Application of the Basic Principles of Form 4 Clothing Selection for the topic of Clothing Selection Principles. The arrows indicate module transition navigation along with menus for each item found in the developed mobile application.

FIGURE 2
DESIGN OF CLOTHING SELECTION APPLICATION MODULE

```
                            ┌──────────────┐
                            │  Main Menu   │
                            └──────┬───────┘
        ┌──────────────┬──────────┴──────────┬─────────────────┐
   ┌─────────┐   ┌──────────┐         ┌────────────┐    ┌──────────────────┐
   │Mind Test│   │   Note   │         │ Mind Test  │    │Share Application │
   └─────────┘   └────┬─────┘         └────────────┘    └──────────────────┘
                      │    ┌──────────────────┐
                      ├────│   Body Shapes    │
                      │    └──────────────────┘
                      │    ┌──────────────────┐
                      ├────│     Pattern      │
                      │    └──────────────────┘
                      │    ┌──────────────────┐
                      ├────│  Lines & Listings│
                      │    └──────────────────┘
                      │    ┌──────────────────┐
                      ├────│      Color       │
                      │    └──────────────────┘
                      │    ┌──────────────────┐
                      └────│  Fabric Texture  │
                           └──────────────────┘
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The Application of Form 4 Clothing Selection Principles consists of four main items, namely, Application Info, Notes, Mind Test, and Application Share, and each item provides a different presentation. Application Info provides information on the content and purpose of the development of the application as well as information on the introduction of the sub-topic Basic Principles of Clothing Selection before learning more about the sub-topic in this application. In addition, in the Notes section is information on the five basic principles in the selection of clothing. The five principles consist of body shape, pattern, lines and grafting, color, and texture of the fabric. These principles convey information about the introduction, types, and even pictures as examples to improve the understanding of students and users of the application. Next is the Mind Test item. Students are required to answer the question as a reinforcement activity after learning to use this application. Lastly, Application Share makes it easier for students to share these apps quickly and easily.
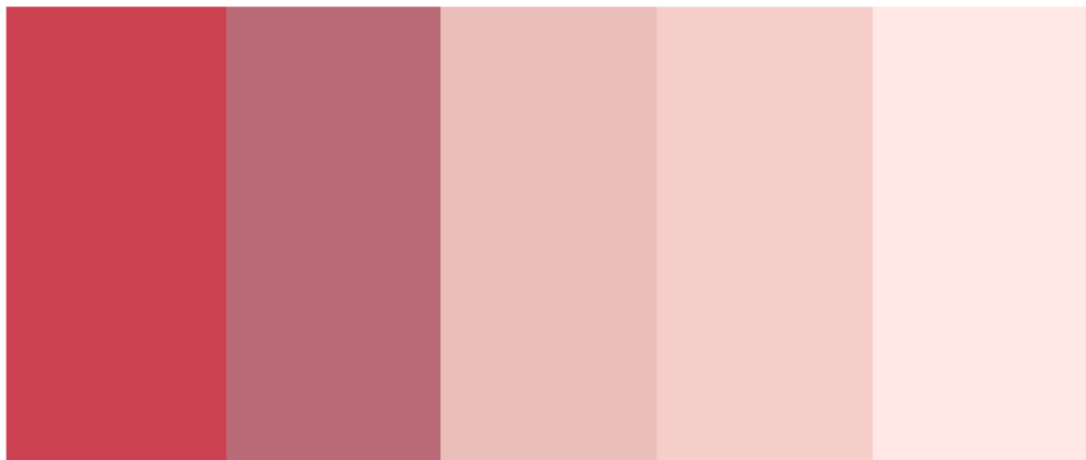
Multimedia Element Design

Multimedia design is a technique that integrates various media such as text, graphics, audio, video, and others. The addition of multimedia elements in this application is intended to produce effective information delivery through the use of interesting and interactive computer technology (Oviawe et al., 2021). There are three multimedia elements included in the Basic Clothing Selection mobile application: typography, audio, and graphics.

The design of the typographic multimedia elements used by the developers in this mobile application involves the selection of the typeface and color (Hui & Wei, 2013). Because this application is developed for learning purposes, the font should be clear and bright for the presentation of information that is clear and easy to understand by the target users. The font type selected is "Tahoma," which is a Sans-Serif Humanis typeface designed by Matthew Carter for Microsoft Corporation. Sans-Serif letters were chosen because they are suitable for children's learning because they are easy to read.

The graphic multimedia elements found in the Basic Clothing Selection mobile application include images, icons, buttons, interfaces, and so on. Graphic design is included in this application to make it more interesting and meaningful. The graphics software programs used for editing before being loaded into this application include Adobe Photoshop, PicsArt, and Light Room. The background color of the selected application is Faded Pink. The color pink often symbolizes feminism and the color of women. The developer chooses the best-suited color for use of the application for clothing selection. The selected font color is the opposite (contrast) color to the background color used. This makes it easier for users of the Clothing Selection mobile application to see and read the writing on the application clearly and well. Figure 3 shows the color themes used in the mobile application of the Basic Principles of Clothing Selection.

FIGURE 3
COLOR THEMES USED IN THE BASIC APPLICATION OF CLOTHING SELECTION

The use of icons in the Basic Clothing Selection mobile app is no less important. An icon is a symbol or image that signifies its function. The main purpose of icons loaded into the Basic Clothing Selection mobile application is to facilitate users' access to information more quickly and easily. Icons serve to assist the navigation process. Each icon will include hypermedia and hypertext to link one section to another in this mobile application. Among the sections that use the icon symbol are the Home button replaced with the home icon, the App Share button replaced with the Earth symbol, the Quiz replaced with the pencil symbol, and others.

The next multimedia design element is video. Video elements are also loaded in this application. The main purpose of including video multimedia elements is to make the presentation of information look more vivid and realistic. The video included in the application is a series of pictures presented in the form of video so that it looks interesting and also indirectly attracts users of the application to learn to use this mobile application.
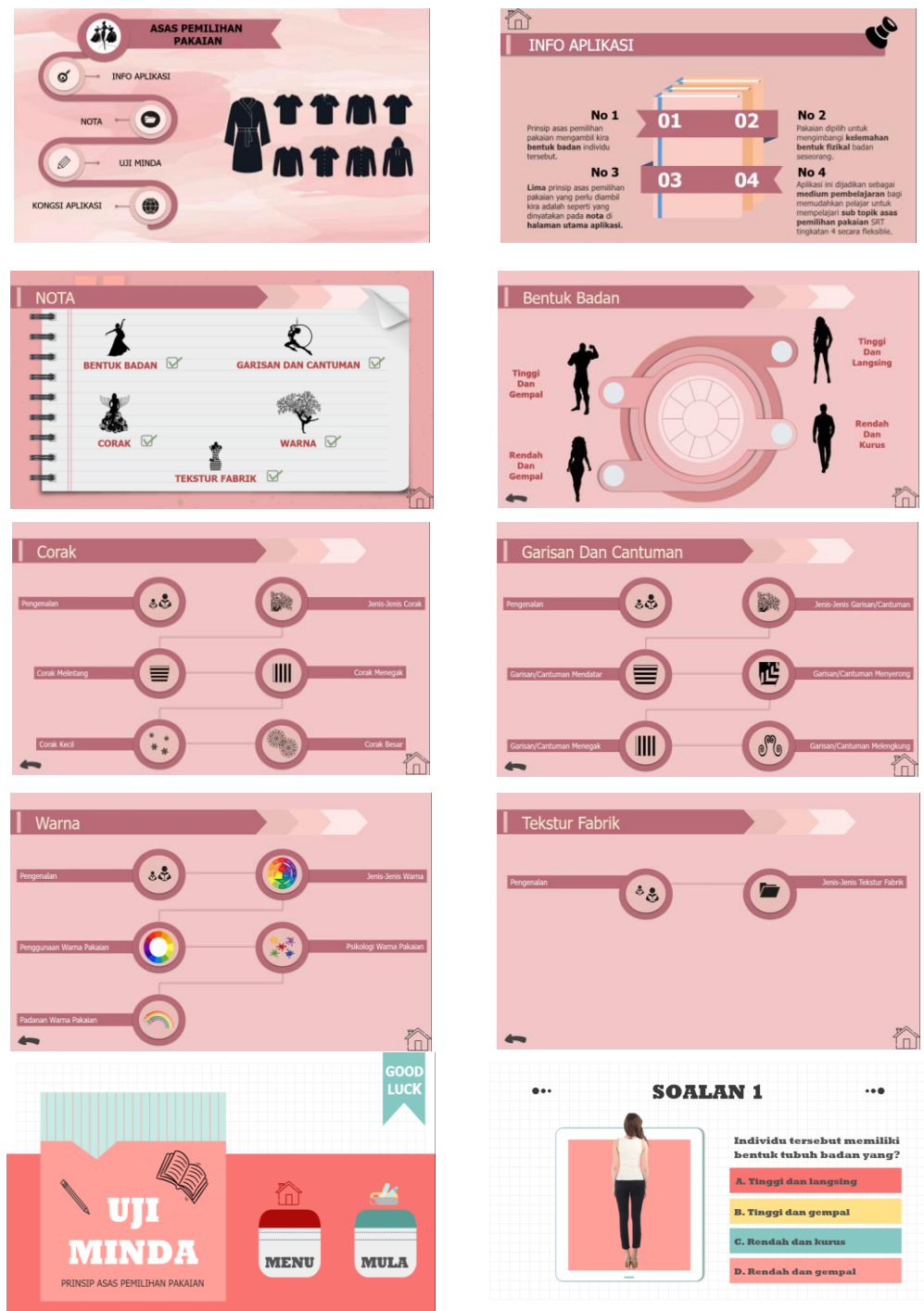
Interface Design

In interface also contains multimedia elements as shown in Figure 4. Among them are images, the use of color, and typography, which have been discussed in the multimedia design section. Meanwhile, the layout is neatly organized and the navigation is planned in more detail so that the elements can function smoothly to maximize the app's utility. The application interface is designed based on the storyboard prepared to launch the development process.

Development Phase

In this development phase, all initial planning, such as the storyboard,s, module division, and interface design made in the design phase, will be implemented. However, the planning donethat has been made in the previous phases will also be changed according to the needs of the software used. The android -based mobile device application for theis Form 4 Home Science Clothes Selection Basics sub-topic was developed using AppsGeyser.

FIGURE 4
BASIC APPLICATION INTERFACE DESIGN OF CLOTHING SELECTION

Implementation Phase

    This phase aims to provide students with an opportunity to meet the learning goals as determined in the previous phase, namely, the analysis phase, through implementation. The completed mobile application is implemented in AppsGeyser software, converted into an Android Application Package (APK) file on an android-based system, and then included in a mobile smartphone as presented in Figure 5. This phase aims

to combine all elements loaded in the Clothing Selection application so that its functionality can be tested smoothly and without any problems. The implementation phase is very important as it is a determinant toward ensuring that these mobile applications are developed to achieve the project's objectives by identifying suitability, feasibility, and reasonableness before it is trialed by the targeted group. Implementation also involves the views and opinions given by experts in terms of functionality and suitability of the application to the target users.

FIGURE 5
BASIC APPLICATION INTERFACE DESIGN OF CLOTHING SELECTION: (A) FRONT COVER; (B) CONTENTS INTERFACE; (C) INFRONT MIND TEST QUESTION INTERFACE;, (D) INFO INTERFACE;, (E) SMALL PATTERN INTERFACE; (F) EXAMPLE MIND TEST QUESTION INTERFACE

(A)

(B)

(C)

(D)

(E)

(F)

Evaluation Phase

According to Bacotang and Mohamed Isa: "The evaluation stage measures the effectiveness of a teaching and learning model conducted comprehensively, in a given stage, between one stage to another, and after the implementation of the teaching and learning model" (Bacotang & Mohamed Isa, 2016, p. X). This stage consists of two types of assessment: formative and summative. The evaluation phase is the final phase found in the ADDIE model to evaluate the functionality of the Clothing Selection mobile device application. The purpose of this implementation is to ensure that each step in the process meets the project objectives. Once the evaluation is completed, improvements can be made if there are problems that arise before the final user tests. After the improvement process is implemented, the researcher will request re-validation from the experts.

FINDINGS

The reliability of the collected data can be verified through interviews with three expert respondents selected based on specific characteristics. The respondents were carefully selected from among those who have relevant knowledge from 10 years or more of experience in Home Science Form 4 and are experts in fields related to application development (Meng & Idris, 2015). However, the data collected needed to be interpreted and coded legally, and a reliable method for analysis applied. The researcher prepared a set of interview questions prior to the in-depth interviews. The aim of the interview is to observe the suitability of the developed mobile application for Home Science Form 4 (Mohamad & Eng Tek Ong, 2013). Two respondents were interviewed by telephone and the WhatsApp application, respectively, and one respondent was interviewed by a face-to-face conversation lasting about 20–30 minutes. Table 3.1 reports on respondents' backgrounds.

The ten questions are divided into four categories: opening questions, application content, application interface elements, and closing questions related to the Clothing Selection application. Tables 1–4 report the questions asked by the researcher. Responses to Question 1 found all respondents to have knowledge, expertise, and experience related to multimedia, and also the content for the subject of Home Science.

Part A of the interview is a question related to the background of each respondent such as personal details, educational background, and experience in Home Science and technology in apps development. Table 1 presents these findings.

TABLE 1
BACKGROUND OF RESPONDENTS

Respondent	Gender	Background	Experience
R1	Female	Teacher for Home Science (SRT) subject	10 years
R2	Male	Teacher for Home Science (SRT) and Technology and Communication subjects	11 years
R3	Female	Teacher of the Faculty of Technical and Vocational at the Family and Consumer Science Department, UPSI. Has experience and expertise in the field of Home Science	18 years

Part B touches on the content of the Clothing Selection mobile application software. This section consists of four (4) questions that include the content of the application. Table 2 lists the Part B questions by the researchers and opinions given by the three experts.

Part C deals with the design of the developed application. This section consists of four (4) questions related to the design elements used such as typography, image/graphics, navigation design, interface design, and color. Table 3 lists the Part C questions given by the researchers and opinions given by the three experts.

TABLE 2
PART B QUESTIONS AND EXPERTS' OPINION

No.	Question	Expert Views
1	Does the content of this application relate to the Standard Curriculum and Assessment Document for the subject of Home Science?	Clothing Selection mobile application software has content that coincides with the Standard Curriculum and Assessment Document (DSKP) for Form 4 Home Science subjects for the sub-topic of Clothing Selection.
2	In your opinion, are the sentences used in this Clothing Selection application clear and easy to understand?	All respondents gave a positive response by agreeing that the information in the application is clear and easy to understand, and the sentences are concise and easy to understand.
3	Is the description for each topic given in this Clothing Selection app clear?	All respondents stated that the descriptions given in the application use sentences that are easy to understand, clear, concise, and very appropriate; in addition, there are not too many sentences.
4	Are the questions created as a mind test activity appropriate to the content of the application?	The respondents found the mind test questions to be very appropriate and did not deviate from the topic of Clothing Selection. However, one of the respondents suggested using real SPM questions to expose students to real SPM questions related to the sub-topic.

TABLE 3
PART C QUESTIONS AND EXPERTS' OPINION

No.	Question	Expert Views
1	Are the images/graphic elements, such as pictures, symbols, and icons, interesting?	All respondents agreed that the Clothing Selection mobile application has an interesting use of images and graphics, with a variety of videos and photos. Furthermore, they agreed that the use of these images and graphics could prevent students from being easily drowsy.
2	In your opinion, are the size and type of text used in this application appropriate?	The use of font type and font size in the application is very appropriate and beautiful as it is not too big and not too small. In addition, the respondents said they are very interesting, with the use of bold writing to give emphasis on important topics or concepts. This is very helpful for the app user to understand which topic is important while using this application.
3	Are the layout and navigation elements of the content in this mobile application well organized?	Navigation in this application is very consistent but needs improvement in terms of navigation uniformity. Respondents also agreed that the app layout in this very neat and organized app.
4	Is the use of background and text colors in this application appropriate?	Respondents agreed that the use of a soft background color is very appropriate to this topic as it fits the title of the app itself.

Part D comprises one question on the content of the Clothing Selection mobile application software. Table 4 shows the Part D question and opinions given by the three experts.

TABLE 4
PART D QUESTION AND EXPERTS' OPINION

No.	Question	Expert Views
1	In your opinion, what improvements can be implemented on this application to make it more effective in the future?	There are two (2) suggestions proposed by all respondents: a) Put background music in the app b) Use real SPM questions in the application as a mind test exercise

DISCUSSION AND CONCLUSION

The development of a learning application needs to be planned well and very carefully to ensure the application produced can be used optimally. This occurs through the repetition technique in each phase—Analysis, Design, Development, Implementation, and Evaluation—implemented in this ADDIE model while developing the application of Basic Clothing Selection. Learning is an important technique to ensure the development of the application can be maximized as well as producing quality and meaningful learning applications. With this, the selection and use of the ADDIE model in developing this application, is very helpful in developing a learning application that can work well and the rate of use can also be maximized.

Overall, the development of learning apps can add value to the topic of Basic Clothing Selection of SRT Form 4 subjects. Therefore, it is hoped that the results of this study can be beneficial to users of this application and also to the world of education, especially in the subject of Home Science Form 4.

ACKNOWLEDGMENTS

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