**Android application innovation as the Indonesian basic spices learning media**

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**Abstract.** Education is a significant aspect in the development of a nation. Currently, Indonesia is entering the industrial revolution 4.0 which brings a great impact in various fields, including the field of education as the learning process must continuously evolve by embracing the applications of digital media. However, the learning process in formal education at the moment in Indonesia, especially in vocational high school, tends to use conventional-type media and methods. As a result, students are less enthusiastic and experience difficulties in understanding the lessons and absorbing the materials in the class. For this reason, this study develops a learning media innovation that addresses current student needs by developing an Android application innovation. The method used was the research and development (R&D) method, while the objective of the study was to examine the development process and feasibility of the Android application learning media for Indonesian Basic Spices. The research findings suggest that (1) the development process of the application uses the 4D research method (define, design, develop, and disseminate) and results in a 26.25 MB application using the Adobe Animate software; (2)

1. **Introduction**

Education is highly instrumental to improve quality human resources. Therefore, quality education is needed. Education is a process that begins since a child is born and related to both the personal experience and interaction with the environment in formal and non-formal manners. The formal education is divided into several levels; one of them is vocational high school. According to an expert, vocational education is an education program that implements learning to prepare individuals into professional workforce [1].

Learning process refers to the teaching-learning process that plays a role in determining the success of students. Learning in the education system requires a new approach to address the industrial 4.0 era. A study reports that many academics have directed their research focus to Industry 4.0 and emphasizes on how the field of education needs to immediately address the change of the era and prepare all resources to face the current trend [2]. Problems arise when the educators as the ones who implement learning are not skilled enough in developing the learning method and fail to help students participate actively in the learning process. Based on this notion, it is learned that the industrial revolution 4.0 has a significant influence on the Indonesian culture, including in the field of education, as the learning process must adjust to the use of digital media and how to optimize it.

Vocational high school with the culinary department is a form of education that teaches students on the art of cooking and all aspects of cooking, ranging from the preparation stage to the presentation of both traditional and international cuisine. The preparation stage consists of giving the introductory materials in the form of introduction of ingredients, where students must identify the names and kinds of ingredients, as well as the equipment that they will use in the next stage. The introduction process requires a visual form to save budget, as it would cost more to identify the ingredients using fresh produce.

Vocational high school SMKN 1 Kalasan is one of the referenced vocational schools where one of the culinary department’s objectives is to implement IT-based learning. One of the approaches aimed to achieve the objective is by using technology-based learning media. Previous studies have reported that the culinary department in the school is divided into two classes in each level and that each classroom has been equipped with LCD projector. However, this facility has not been used optimally.

The Indonesian Basic Spices material is selected as it is one of the fundamental lessons involving various theories on the introduction to the culinary world and serves as the foundation for the practicum implementation. Nevertheless, students still experience difficulties in identifying the names, physical forms, and types of basic spices. One of the culinary instructors points out that Grade 10 students experience a difficulty in understanding the lesson due to the foreign or new terms introduced. In addition, one of the students state that the paper-based materials that they use often get lost or mixed up in other documents, so that they cannot use them when they go on to the next Grade.

Variations in delivering the teaching materials are necessary to motivate students in the learning process. The learning media can serve as a graphic, photographic, or electronic tools that can be used to capture, process, and rearrange verbal/visual information [3]. The learning media as all well-planned and well-designed devices aimed to deliver information and build interaction [4]. Based on those notions, it can be summed up that learning media may refer to a device that can be used to deliver a message to the students which facilitate the learning process.

Entering the rapidly moving digital era, technology has an important role in this development. Indonesia must utilize existing resources to save the young generation from being left behind. The advancement and development of technology results in students who mostly use their time with their gadgets; therefore, it is imperative that educators utilize these devices as learning media. One of the ways is by using Android cellular phones as one of the main operating systems dominating the market. Google has provided a service for Android application developers in various sites which allow the developers to create an application easily [5]. Android, according to is an operating system for Linux-based mobile devices involving operating systems, middlewares, and applications [6]. The open source nature of Android allows many developers to make new applications or modifications to share. From the usability perspective, Android devices are easier to use as it has touch screen.

Based on the explanation above, this study proposes that there needs to be a suitable technology-based learning quality improvement. In this case, Android is a suitable option to use as the current learning media innovation as nearly all students in Grade 10 at the culinary department of SMKN 1 Kalasan use Android devices. This type of application had never been used at the culinary department of SMKN 1 Kalasan. Android devices are typically mobile, which is important to make the users feel at ease when using the application. Finally, it is instrumental that this study be done to develop an Android application innovation as the learning media for Indonesian basic spices material as a variation in delivering and preserving the material. Learning implementation using the developed product is expected to improve students’ enthusiasm in the class and their understanding on the learning material, as well as to save the material in digital form. Ultimately, this will lead students to be graduates that are ready to face the working world in the industry, or to pursue a higher education level in the current industrial era 4.0.

1. **Methods**

This study employs the research and development (R&D) method [7], using the 4D model consisting of *define, design, develop,* and *disseminate* [8], [9]. The method used to collect the data is through a survey using a questionnaire with preliminary study in the form of observation and interviews. The data analysis technique used is the quantitative descriptive analysis technique, while measurement scale is the Likert scale of 1-4. The research subject consists of two lecturers from the Food and Fashion Engineering Education as the material and media experts, respectively, one instructor from the culinary department as the material expert, six Grade 10 culinary students for the participants in the small-scale trial, and 42 Grade 10 students from the culinary department in the large-scale trial.

1. Results and Discussion

The results of the R&D study based on the 4D model (*define, design, develop,* and *disseminate*) is as follows.

* 1. *Define*

The first stage in this research is to conduct an analysis on the learning condition at SMKN 1 Kalasan, involving formulating the objective, and analysis on the curriculum, materials, student character, and the facilitating device.

* 1. *Design*

The second stage is the design stage, which begins with selecting the suitable learning media, namely Android-based technology. Next, a simulation process on material and media presentation using flowchart, storyboard, images, and Android application, followed by a submission of the content or material using the 2017 Adobe Animate software. The final result of the application can be seen in Figure 1 and 2.

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| E:\Ss media jadi\Screenshot_2019-07-09-13-18-05-772_air.BogaDasar.png(a) | E:\Ss media jadi\Screenshot_2019-07-09-13-18-17-671_air.BogaDasar.png(b) |

Figure 1. The display of Android application: intro display (a), and the main menu display (b).

* 1. *Develop*

The third stage is the development stage, involving product testing and revision. Product testing includes expert validation and product trial on the students. Following the initial production, expert validation is done to learn the product’s feasibility before it is taken to the next stage. The validation is done by experts on the learning material and the media. The result is then used as a reference for product revision.

The results of the expert validation based on the above calculation can be seen in Table 1, Table 2, Table 3, and Table 4.

**Table 1.** Result of material expert validation



The validation result from the expert on learning material suggests that the media is feasible for use with revision. The overall score obtained from the material expert is 94.1%. The validation stage continues with media expert validation, with the following result.

**Table 2.** Result of media expert validation



The validation result from the expert on learning media suggests that the media is feasible for use with revision. The overall score obtained from the material expert is 96.6%. The following stage is the small-scale trial, with the following result.

**Table 3.** Result of small-scale trial (6 students)



The data processing on the result of the small-scale trial shows results between 76-100% across all five indicators, suggesting the product is highly feasible. The overall feasibility score in the small-scale trial is 84.3%. The research moves on to the next stage, namely the large-scale trial.

**Table 4.** Result of large-scale trial (42 students)



The data processing on the result of the large-scale trial shows results between 84-85% across all five indicators, suggesting the product is highly feasible. The overall feasibility score in the small-scale trial is 84.71%.

* 1. *Disseminate*

The last stage of the 4D model is the disseminate stage, in which the product is distributed and made available to the users by uploading the Android application into the Google Drive and providing a link to the drive, so that the users can download the application to their respective device.

The curriculum analysis in the *define* stage reveals that the curriculum used was the 2013 Curriculum and the learning system was a block system. The curriculum applies two weeks of theory classes and two weeks of practicum classes. This means that during the theory week, students are forced to receive lessons with no practicum involved, and vice versa. Meanwhile, from the material analysis, it was found that the teacher only used one type of learning resource that was delivered orally in the class with occasional additional materials. It was also found that students experience difficulties in understanding one of the materials on basic spices and their derivatives in Indonesian food due to the great amount of theoretical content which serve as an initial foundation for them to study more advanced materials. The next stage was to formulate the objectives, hence formulating the competencies first. The basic competencies selected to be developed in the Android learning media were 3.8 (analyzing the basic spices and their derivatives in Indonesian food), and 4.8 (using the basic spices and their derivatives in Indonesian food). These competencies were then defined in the competency achievement indicators. After that, the objectives were determined. The following stage was the student character analysis, which was observed during the learning process in the theory class. The observation shows that students were jaded due to the class duration, and as a result, did not pay attention to the class. Some played online games on their gadgets, while others chatted or simply did not respond when the teacher asked them a question. Students also struggled in keeping the materials in the paper format as they could not maintain it a long term. The last stage was the device analysis. Students evidently possessed Android devices with most of the device memory used for online game applications. This study took liberty to use this opportunity to educate the students by forcing them to delete the apps to make room for learning apps with the hope that the online games which took too much of their time would be slowly replaced by learning apps.

In the *design* stage, the study decided to select an Android-based application as the observation shows that nearly all Grade 10 Culinary students at SMKN 1 Kalasan used Android-based mobile phones. It is also important that a mobile phone is a flexible, portable device that most students have nearly at all times. The design process involved searching for images, designing the content, and designing the app using the Adobe Animate Software.

The *develop* stage process begins with testing the app through validations from the material experts who gave an input on how there needed to be more resources to give the app more values as one resource was not sufficient. Revision was made by adding materials from four books and one journal article. Further validation from the media expert shows various results from the three aspects assessed. From the development and display aspects, it was suggested that not all users responded well to the media and display developed, particularly as the buttons were placed in different positions. The next stage was testing the product on the students, which was done by presenting the app to the students, disseminating the app to the students’ mobile phones via the SHAREit application and Bluetooth, and asking them to try the app independently. Afterwards, students were asked to fill out the questionnaires with a 4-point scale. The result shows that the app received more than 75%, which means that it was very feasible to be used as learning media. Another advantage of the app is that it can be used in an offline mode after being installed on the device, which means that all the materials are conveniently stored in their device, and students can use the app without having to connect to the internet.

1. **Conclusions**

Based on the research and development of the Android application innovation as learning media for Indonesian basic spices, this study manages to draw several conclusions and suggestions. First, the innovation is done through the 4D development model. The *define* stage includes curriculum analysis, material analysis, formulating objectives, student character analysis and device analysis, while the *design* stage consists of selecting the appropriate learning media, namely the Android app and simulating material presentation using the Adobe Animate software with a size of 26.25 MB that can be operated in an Android device. The *develop* stage involves validation from the media and material experts, revision, limited testing and large-scale testing. The overall result shows that the developed Android app innovation is deemed very feasible for use as the media in learning Indonesian basic spices. Finally, the *disseminate* stage is conducted by distributing the app in the GoogleDrive.

Based on these conclusions, this study proposes some suggestions for the product use and development in order to make the user experience of the app more optimal. It is therefore recommended that future studies add more materials as the learning material in the app is limited to the basic spices and their derivatives in Indonesian food. Moreover, as the content of the learning media development is limited to the material, assessment, images, and animation, it is expected that more elements can be added, e.g. animations for the material or a learning video. Finally, future studies may conduct a follow-up of this study by investigating the effectiveness of using the developed product on the students’ learning achievements.

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