The development of interactive android-based learning multimedia on the beef and its processing results course

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Abstract. This study aimed to develop interactive multimedia based on android on the course of beef and its processing results and to know its feasibility based on the material experts, the media experts, the teachers, and the students. This research can be categorized as Research and Development (R&D) with ADDIE model, namely Analysis, Design, Development, Implementation, and Evaluation. This study only covers the implementation stage. The results of the study showed that the development of multimedia includes analyzing students' needs, designing multimedia products, making multimedia products with Adobe Flash CS6 software and validating with experts, testing the multimedia products to 24 students. The validation results revealed that the development of multimedia in the small-scale test in the case of the linguistic aspect was 83.38%, the presentation aspect was 82.25%, the interactive learning aspect was 86%, and the overall viewing aspect was 80%, respectively. These results indicate that these android-based interactive learning multimedia is very suitable to be used as a learning media for Food Material Knowledge with the Basic Competence of Analyzing Food Materials from beef and its procession results.

1. Introduction
The industrial revolution Era 4.0 or usually called the disruption era has stimulated various innovations within human activities including the education field. The Indonesian government currently implement the strategic steps based on the road map of Making Indonesia 4.0 to align education curricula and the industrial needs towards the industrial revolution 4.0 [1]. This era leads to the transformation of conventional learning into 21st century learning that is designed through the 2013 curriculum. It requires students to learn independently by accustoming students to apply 4C skills in daily activities. The 4C skills that must be mastered by students include critical thinking, communication, collaboration, and creativity to create new innovations [2].

The development of information and communication technology as it is today makes it easier for humans to do their daily work. One such technology device is a smartphone/android [3]. This smartphone can work like a mini computer that has a Personal Digital Assistant (PDA) function so that it is not only used as a communication tool but can also to search for information through cyberspace and other variety of advanced features.

Smartphones have the opportunity as an alternative learning media with a mobile learning system (M-Learning). Through mobile or mobile technology, learning services can be developed by referring to the principle of learning with no limitation of space and conditions [4]. This mobile learning media can be combined into interactive multimedia by adding images, music, games, and so on. Interactive learning multimedia based on an android application is expected to clarify the message or information
to be conveyed since it will create interactive learning among students, teachers, and learning resources in order to achieve the learning goals. As reported by Purbasari, where 83.49% of students stated that android-based learning media of three-dimensional material were suitable to support their learning process in high school [5].

In fact, the problems related to learning media in various schools including at State Vocational High School 4 Yogyakarta are the limited use of smartphones or android as mobile learning. It makes the whole students use their smartphone in school just to open social media, games, and browsing. The classroom learning is still done by using modules, textbooks, and power points as learning media as also happen in the course of Food Knowledge.

Food Material Knowledge is a science that studies the physical and chemical properties of the components contained in animal and vegetable foods including its nutrition. This subject is one of the basic subjects taught in the tenthgrade students of the Culinary major. This subject underlies students to practice both in school and industry so that the students are required to properly understand food ingredients before going to the procession activities. One of the main subjects learned in Food Knowledge is beef material and its procession product.

Based on the results of the interview with the teachers and students of Food Knowledge Course State Vocational High School 4 Yogyakarta, it is known that the learning process is not really interactive. The teacher only conveys the material using the lecturing method which seems to be ineffective to help students understanding the whole materials. The results of the daily test scores on beef and the processing results of in X class Culinary 1 showed that 53.12% of students were still below the Minimum Completeness Criteria. It shows that students need alternative learning media so that they can have a better understanding of beef material and its processing results because there are so many terms of beef carcass starting from the name, shape, and results that should be memorized.

By having this condition, it is necessary to make research on the development of interactive learning multimedia with the android application on the Food Knowledge subject, especially beef material and its processing results which serve as one of the sources of students’ learning. The results of this study can contribute to enhancing the learning resources for students with no limited time and space in order to match with the era of the industrial revolution 4.0. The existence of this multimedia can stimulate memorization and help to realize the learning process which is creative, innovative, and interactive.

2. Research Method

This research can be categorized as research and development (R&D) with ADDIE development model referring to Dick and Carey in 1996. This study was conducted on January 1, 2019, until June 18, 2019. The research was carried out in the Culinary Study Program, Faculty of Engineering, Universitas Negeri Yogyakarta, and State Vocational High School 4 Yogyakarta with the research subjects of 1 lecturer of Food Engineering Education, 1 lecturer of Informatics Engineering Education, and 1 teacher of Food Knowledge. The small-scale test was done on X Class of Culinary 1 with 24 people. The development procedure consisted of five stages, namely: 1) Analysis, 2) Design, 3) Development, 4) Implementation, 5) Evaluation. However, this study only implemented four stages until the implementation stage because it was still in the trial stage to test the product feasibility.

The data collection techniques used interviews and questionnaires. The interviews were used to analyze the needs of learning media, students’ conditions, and competencies in Food Knowledge. Meanwhile, the questionnaire was used to measure the feasibility of interactive learning multimedia products by the material experts with 8 indicators, the media experts with 20 indicators, the subject teachers with 21 indicators, and the students with 6 indicators, respectively. The questionnaire employed a Likert scale with 4 alternative answers, namely strongly agree, agree, disagree, and strongly disagree. The data analysis technique in this research was quantitative descriptive data. The data were obtained from suggestions, opinions, and input from the material experts, the media experts, the knowledge teachers, and the students. The quantitative data were obtained from the scores in the questionnaire from the material experts, the media experts, the teachers, and the students.
3. Results
The analysis phase included analysis of student characteristics, analysis of media needs, and competency analysis. The analysis of student characteristics and media needs in X class of Culinary 1 found that the students were easily bored and less interested towards the existing learning, the use of cows pictures. The lecturing, discussion, and demonstration methods also decreased students’ learning motivation. 53.12% of students obtained the score below the Minimum Completeness Criteria. The beef material and its processing results were considered difficult because there were many beef carcass terms that must be understood before having practice. The competency analysis was done by studying the syllabus of Food Knowledge, especially the Basic Competence of analyzing food ingredients from meat and its processing results. The Basic Competencies were translated into Competency Achievement Indicators, i.e. to describe the definition, the quality, as well as to identify the beef structure, and carcass or beef cuts and their use in processing results. The main material in the media includes the understanding of meat, meat quality, beef structure, and carcasses and their use in product procession.

3.1. The Design Stage
The design stage includes making flowcharts and storyboards, compiling material, composing quiz questions, and making the background, fonts, images, and navigation buttons.

3.2. The Development Stage
The development stage includes producing interactive multimedia based on android applications. At this stage, all the components in the design stage were arranged together according to the flowchart and storyboard using Adobe Flash CS6 software with the Action Script 3 programming language. The multimedia learning products that were then validated by experts to assess the feasibility of multimedia products.

The feasibility test results on the developed learning multimedia were obtained from the validation results of the media experts, the material experts, and small-scale tests. The validation results by the material experts obtained a total of 30 with the average value of 3.75 and the percentage value of 93.75%, respectively, which can be categorized as “very feasible” to be used as a learning media. The validation results by the media experts as a whole were obtained the total value of 65, the average value of 3.25 and the percentage value of 81.25%, respectively, which included in the category of “very feasible” to be used as a learning media. Feasibility in the language/communication aspect was 83.25%, the presentation aspect was 91.75%, the interactive learning aspect was 75%, and the overall display aspect was 80%. The results of the validation by the teachers as a whole were obtained the total value of 83, the average value of 3.95 and the percentage value of 98.75% which included in the category of “very feasible” to be used as a learning medium. The content feasibility aspect was 97%, the linguistic or communication aspects were 100%, the presentation was 100%, the interactive learning was 100%, and the overall was 100%. The expert validation is presented in Table 1 below.

| Validator       | Total score | Average | Percentage | Category    |
|-----------------|-------------|---------|------------|-------------|
| Material expert | 30          | 3.75    | 93.75%     | very feasible |
| Media expert    | 65          | 3.25    | 81.25%     | very feasible |
| Teachers        | 83          | 3.95    | 98.75%     | very feasible |

3.3. The implementation stage
The implementation stage includes testing of the developed learning multimedia in small-scale tests to 24 students of X class of Culinary 1 because all students in the class were considered smart enough to install this application. The students installed the beef android application which was sent via the share it application. The students operated the application and filled out the questionnaire that had been given to find out the responses and opinions while using the media.
The evaluation of small-scale trials covered the feasibility of the language/communication aspect with 83.33%, the presentation aspect with 82.29%, the interactive learning aspect with 85.94%, and the overall display aspect with 80.21%, respectively. The results showed that the developed learning multimedia was “very suitable” to be used as a learning media. The distribution of small-scale trial assessment is presented in Table 2.

Table 2. The distribution of small-scale trial assessment

| Aspect                          | Score | Total | 1 | 2 | 3 | 4 |
|---------------------------------|-------|-------|---|---|---|---|
| Communication                   |       |       | f | % | f | % | f | % | f | % |
| a. Product clarity              | 0     | 0     | 0 | 0 | 14| 58.33| 10| 41.67| 24| 100|
| b. Ease to understand materials | 0     | 0     | 1 | 4.16| 16| 66.67| 7 | 29.17| 24| 100|
| c. Presentation                 | 0     | 0     | 0 | 0 | 17| 70.83| 7 | 29.17| 24| 100|
| Interactive learning            |       |       | f | % | f | % | f | % | f | % |
| a. Ease of media use based on the linguistic aspect | 0 | 0 | 0 | 0 | 15 | 62.5 | 9 | 37.5 | 24 | 100 |
| b. Ability to improve the understanding | 0 | 0 | 0 | 0 | 12 | 50 | 12 | 50 | 24 | 100 |
| c. Whole appearance             | 0     | 0     | 0 | 0 | 19 | 79.17| 5 | 20.83| 24| 100 |

Explanation: 1 = very unsuitable, 2 = unsuitable, 3 = suitable, 4 = very suitable

4. Discussions

Based on the validation results of the communication aspect, the developed media is considered “very feasible” to be used in schools. This is consistent with the theory put forward by Ega Wati Rima [6] that the media has a semantic function to enrich to the vocabulary mastery so that the meaning of the presented material in learning media can be well understood by students since the follow the standard language forms and foreign terms for beef carcass. It makes the use of language in learning media very important to consider.

The validation result on the presentation aspect shows that the learning media are very suitable to be used in a learning process. It is similar to the theory from Azhar Arsyad that the presentation of material packaged with the media makes learning more attractive to students and motivates students to pay attention to the learning process [7]. In the media, there is a game menu for a special challenge that is loved by vocational students as teenagers.

Related to the interactive aspect, the developed media is very feasible to be used in the classroom. The learning media can function to develop motivation. It encourages students to carry out learning activities by making it easier for students to accept and understand the content/subject matter [8]. In this learning multimedia, there are links as stated by Ariesto H. Sutopo [9] that shows an object/button to access the program as in the beef carcass material menu so students can interact with the learning media just by pressing the buttons in the cow picture to have an exercise of matching the inside of a cow image (puzzle).

From the aspect of overall appearance, the developed media is very feasible to be used in classroom. This is in accordance with Tan and Angela [10] regarding the quality of instructional media, namely the choice of type and size of letters help students easily to read the material in the interactive learning multimedia [11]. The font and size used are Time New Roman fonts with a font size of 12.

5. Conclusion

Development of interactive android-based learning multimedia on beef application and its processing results with ADDIE development model until the implementation stage include: (a) the analysis phase by analyzing the students’ needs, such as students’ characteristics, learning media needs, and Basic Competence, (b) the design stage by designing the developed products from making flowcharts and...
storyboards, compiling material and evaluation, as well as making multimedia components
background, fonts, images, navigation buttons), (c) development stage by developing media products
using adobe flash CS6 software, and experts validation who stated that interactive learning multimedia
products were “very feasible” to be used for research, (d) the implementation stage of this media
product was tested on with 24 students of X class Culinary 1 in State Vocational High School 4
Yogyakarta.

The feasibility of the beef android application and its processing results according to the material
experts was 93.75% that can be categorized as “very feasible” as a learning media. The feasibility
of the developed media according to the media expert was 81.25% that is included in the very feasible
category. Meanwhile, the validation from the teacher was 98.80% which was also included in the
category of “very feasible” to be used as a learning media. The small-scale tests on of X class students
of Culinary 1 obtained the results of the language/communication aspect was 83.33%; the presentation
aspect was 82.29%; the interactive aspect was 85.94%; and the overall display aspect was 80.21%,
respectively. This trial indicates that the interactive android-based multimedia learning on beef
material and its processing results is very feasible to be used as learning media in the classroom.

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