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The Development of Interactive Learning Media with MIT APP INVENTOR on the Sub-material about the Distribution of Mining Goods in Indonesia

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ABSTRACT

The development of technology is currently growing rapidly followed by other developments. One of which is in the education field which is progressively integrated with technology. The implementation of education which is integrated with technology has been widely found, one of which is in geography subject. This is supported by the increased use of smartphone for learning. Android as smartphone operating system is chosen because it has the advantage of being open source, so it can produce interactive learning media focusing on the learning. The objective of this research is to produce an interactive learning medium with *MIT App Inventor* platform on the sub-material about the distribution of mining goods in Indonesia. This research used ADDIE method consisting of needs analysis and problem identification, designing android-based interactive learning media designs, producing android-based interactive learning media designs, conducting experts' validation and conducting trials. Validation was assessed by two experts, namely media and material experts. Meanwhile, trials were conducted individually (teacher) and collectively (students). The results of this study show that this media obtains 98% from a media expert, 82% from a material expert, 88% from individual trial by the teacher and 89% from small groups trial by the students. Overall, this study denotes that this media is classified as highly feasible to be implemented in learning.

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1. INTRODUCTION

The utilization of technology in education has begun to be widely implemented along with the progressive development of era [1], [2]. Technology seems to replace teachers in carrying out conventional learning, as well as be the major reason for distance learning and blended learning [3]. Consequently, technology plays a major role in improving the quality of effective and efficient learning in order to achieve the learning objectives. The existence of education transformation to technology era has made various technology-based learning, one of which is the development of media.

Technology-based learning can be implemented to all subjects, including

geography [4]. Geography in high school studies physical and social aspects [5]. Meanwhile, in the analysis of material needs as evidenced by the results of questionnaires at 11th grade social class at SMA Negeri 1 Lawang on geography subject for 11th grade, it showed that students have difficulties in understanding complex materials in the Basic Competence about Management of Natural Resources, specifically on the sub-material about the distribution of mining goods in Indonesia with an accumulation of answers as much as 60.5%. Moreover, they do not understand the explanation written in the textbooks as well as the explanation by the teacher.

In the learning process, teachers should provide creative, insightful and open-minded learning that is intended for students [6] which is through learning media. Learning media here is a form of tools or medium which is utilized to generate emotion, foster awareness, thinking and study competence, especially for students so they can carry out the learning process [7], [8]. Based on the analysis study of geography teacher's needs in SMA Negeri 1 Lawang in an unstructured interview, the utilization of learning media was not optimally done because it led to conventional learning, which was only making use of free articles from internet and was fixated on the learning resources. Therefore, learning media significantly plays a role in carrying out undeliverable messages of the material found in the analysis of needs. In order that learning messages can be delivered to achive the learning objectives, an interactive learning medium is required, namely a learning medium that covers text, visual, audio or a combination of both [9].

In the analysis of media needs as evidenced by the results of a questionnaire, students of 11th grade SMA Negeri 1 Lawang have employed smartphone technology as learning intermediary. On a large scale, in addition, the development of smartphone technology is currently growing rapidly, considering the need for communication which is also crucial for the society as well as practicality in space and time, especially among academics, both students and teachers [10]. The utilization of smartphone promotes students' independent learning in mastering the materials, flexibility of learning time and repeating the materials they do not understand [11].

Smartphone is equipped with operating system, one of which is Android that is known to be user friendly, apart from being easy to access, it is likewise affordable. The utilization of this Android operating system is beneficial for education because it provides applications as well as supporting features for learning process that can be downloaded in google play [12]. This Android operating system is open source, meaning that the software or the application products can be created as we want according to our needs [13]. Android-based interactive learning media can be easily created through one of online platform, which is MIT App Inventor [14]. MIT App Inventor is an online platform functioning in developing Android-based learning media without going through coding process so that it is easy to use for developers and educators who will develop learning media [15].

Research on the development of MIT App Inventor was presented by Yahya [16] entitled "The Development of 'Simba' Application (Social Studies Instructional Media Based Android) Using MIT App Inventor for Social Science Subject at 7th Grade" on the material about scarcity. This medium was developed with a designed model based on task and concept analysis as well as problems identification which was then integrated comprising Android-based learning materials. The design of this application used online platform, namely MIT App Inventor. The results of the research denoted the percentage of material expert's assessment was 89.5% and media expert's assessment was 96.25% so both assessments got highly feasible predicate. Meanwhile, the result of the trial by students denoted the responses on students' facility, motivation, curiosity and interest.

The objective of this research and development is to create interactive learning media focusing on Android-based application making. Consequently, through this article,

researcher develops interactive learning media using MIT App Inventor, specifically on the sub-material about the distribution of mining goods in Indonesia at 11th grade in hoping of the ability to overcome problems as well as promoting technology-based learning. In addition, it can also promote permanent practicality in utilizing interactive learning media so it can facilitate students in the learning process.

2. LITERATURE REVIEW

2.1 Consideration of Media Selection

Learning media needs to consider ongoing curriculum factors. The use of learning media should facilitate students to achieve the competencies specified in the curriculum. The information and knowledge content contained in the selected media should be new or updated. Media that contains information and knowledge about mobile technology, for example, needs to be updated regularly considering that mobile technology is a technology that is developing rapidly and every year there are always updates to more advanced features [17].

The use of learning media must be able to facilitate students in achieving learning goals. The learning media that will be developed, whether in visual, audio or audiovisual form, must be able to motivate students to study the information and knowledge content presented therein. Apart from containing accurate information and knowledge, learning media must also be designed in such a way that it goes through several stages of development so that it is structured and interesting so that it can motivate students to study intensively.

Student participation looks at how involved students are in all activities carried out in the learning process, students' willingness to participate in the learning process, and students' responses to the learning process. Student involvement is very important to create active and enjoyable learning. In this case, the use of media must be able to involve students mentally in the learning process [18].

2.2 The Urgency of Interactive Media

The urgency of interactive learning media in learning can improve the quality of learning outcomes to make them more meaningful. For example, in facilitating it with interesting learning media. Interactive learning media can foster students' learning motivation if the media developed is appropriate to class conditions, students' backgrounds, and students' readiness [19].

2.3 MIT App Inventor as Builder Interactive Media

MIT App Inventor has the main goal of developing mobile applications in an educational context. Before being released, most Android applications were created using complex programming languages. MIT App Inventor targets users inexperienced with computer science by using block components to reduce the complexity of the underlying programming language. Programming using MIT App Inventor into components and blocks allows application inventors to focus more on creating applications and solving problems related to coding errors [20].

3. METHODS

This research used ADDIE research and development methodology aiming of producing a product and testing the feasibility of the product. ADDIE is a development model consisting of 5 stages, namely Analysis, Design, Development, Implementation, and Evaluation that is utilized in designing learning system. Research and development aim to produce new medium through development methodology. This research and development aimed to produce new medium and test its feasibility [21].

Subjects of the research comprised validation and trial subjects. Validation subjects involved were media and material experts. Media expert validation subject was carried out by a lecturer in the Educational Technology Department, State University of

Malang, namely Mr. Eka Pramono Adi, S.I.P, M.Si. Meanwhile, material expert validation subject was carried out by a lecturer in the Geography Department, State University of Malang, namely Ms. Alfi Sahrina, M.Pd. Trial subject was carried out by a geography teacher at SMA Negeri 1 Lawang, namely Ms. Dra. Yuni Nurhayati as an individual trial subject. In addition, 20 students of 11th Grade Social Class 4 SMA Negeri 1 Lawang were selected as a small group trial subjects.

This development used quantitative and qualitative data. Quantitative data were attained from expert assessment questionnaire results and the results of questionnaires on the response of the trial, in which the final score in the questionnaire was percentaged to know the feasibility level of the developed media. Conversely, qualitative data were attained from interview, postscript, as well as critics and suggestions during media and material experts' trial.

The instruments of data collection comprised interview, observation and questionnaires. The interview was conducted before conducting the research on the 11th grade geography teacher at SMA Negeri 1 Lawang in an unstructured manner in order to determine the condition of geography learning at SMA Negeri 1 Lawang. Meanwhile, the observation was conducted to collect supporting data in implementing learning media as well as to determine students' behavior towards the use of smartphone. The questionnaires comprised the suitability of Android-based Mobile Learning as learning media as reviewed from media and material aspects. There were three types of questionnaires, they were questionnaires for media expert, material expert and trial subjects (teacher and students).

There were two types of data analysis, namely qualitative and quantitave data analysis. Qualitative data analysis was based on the feedbacks from media expert, material expert and students as respondents so that it could be used as a reference for researchers in the development and improvement of the product. Quantitative data analysis was carried out by collecting the data through material expert, media expert and students as respondents. This analysis is used for a benchmark of the feasibility of the product. The formula used in quantitative analysis on material expert, media expert, and individual as well as small groups trial is as follows.

$$V = \frac{\sum S.result}{\sum S.max} \times 100\%$$

Note:

V = Validation
$\sum S.Result$ = Numbers of scores attained
$\sum S.Max$ = Numbers of maximum scores of assessments

Next is the conclusion of validation results from material and media experts with the following references.

4. RESULTS AND DISCUSSION

4.1 Result of Media Development

The developed interactive learning media covered a study of natural resources from coal mining which was integrated into geography lesson. Interactive learning media called SDA Geo is hoped to be able to be implemented in geography lesson so that the messages of the material can be maximally delivered. "SDA Geo" content comprises picture composition, text, video which are integrated into one learning media that can be utilized by students anytime and anywhere. "SDA Geo" interactive learning media was developed by utilizing MIT App Inventor online platform, which generated .apk type of product that is compatible with Android-based smartphone. The result of "SDA Geo" interactive learning media is not more than 22 MB in size which can be used with or without internet connection. "SDA Geo" interactive learning media contains substudies, such as: (1) Definition and benefits of coal mining resources; (2) Distribution of coal mining resources; (3) Issues and impacts of mining coal; (4) Reclamation and rehabilitation of coal wasteland; (5)

Utilization of coal resources with sustainable development principles. This media also provides worksheets as well as key words that can enhance students' understanding.

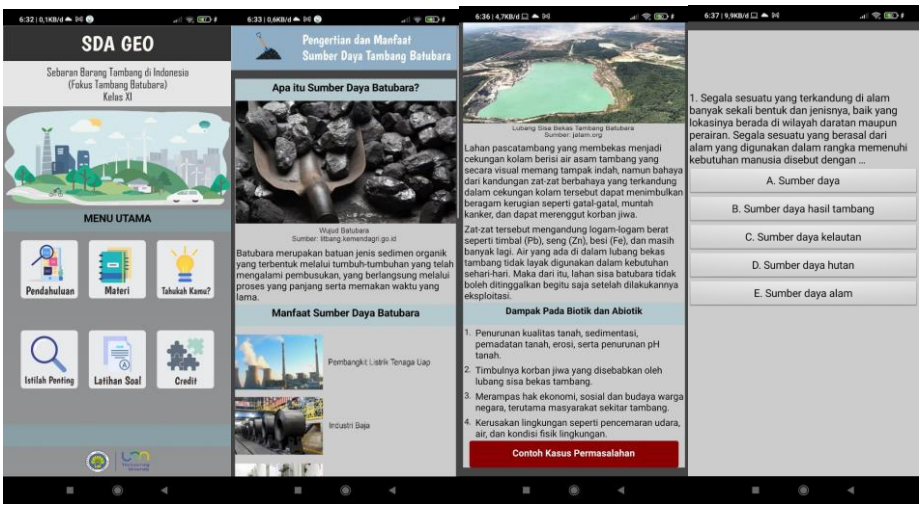

Figure 1. SDA Geo

Table 1. Results of Data Validation

	Quality of Content	Quality of Instructional	Quality of Technical	Average
Result validation of Media Expert	100%	100%	94%	98%
Result validation of Material Expert	80%	88%	80%	83%

4.2 *Validation of Media Expert*

In accordance with the assessment of media expert's validation on the table above, the learning media which was developed on the basis of quantitative assessment of media expert shows a percentage of 98%; hence, it is considered as highly feasible to be tested to teachers and students. Aspects of quality of content and objectives as well as instructional quality showed a perfect percentage as it met the trial requirement. Nevertheless, aspect of technical quality shows a lower percentage of 94%. This percentage refered to the score which the validator gave for color composition and display indicator which was as much as 4. To conclude, the color display should be improved in order to correspond to more vibrant interactive learning visuals. There was a discrepancy in the text layout besides color composition. It was found that the text layout disappeared and was unreadable when it was tested to some other devices of different types. Therefore, after media expert validation, the improvement was carried out according to the validator's suggestion, which was to fix the text layout so as to be compatible with all Android devices. In brief, aspects of quality of content and objectives as well as instructional quality have been presented in a coherent and proportional manner.

4.3 *Validation of Material Expert*

The material which was developed on the basis of assessment of material expert shows an average percentage of 83%, so it is considered as highly feasible to be tested to teacher and students. Aspects of content and objectives quality as well as worksheets are considered as feasible. On the other hand, aspects of technical and instructional quality shows a great qualification, which are highly feasible.

In reference to the results of quantitative assessment of media expert, the developed material was ready to be tested, yet there were several revisions

based on the feedbacks received. The feedbacks were intended to almost all components on the media, such as introduction, material, supporting component suchlike worksheets; as a result, it still needed revision before it was tested to teacher and students. In the introduction component, the learning objectives were not included yet, so it needed to be included later. Furthermore, in the material component, the revision was emphasized on both visuals and content of the material which seemed simple. Next, in the supporting material component, the worksheets needed to be linearized with coal material. At last, the worksheet number 4 and 9 needed revision since both were considered difficult and less redactional.

4.4 Restricted Individual Field Trial

Table 2. Results of Restricted Individual and Small Group Field Trial

	Quality of Content	Quality of Instructional	Quality of Technical	Worksheets Aspect	Average
Result of Restricted Individual Field Trial	100%	90%	82%	80%	88%
Result of Small Group Field Trial	91%	93%	87%	89%	90%

Individual trial by teacher was carried out in order to know the feasibility level of the learning media that was tested to the teacher. This trial could be teacher's reference in implementing the interactive learning media on the coal mining resources lesson. The result of individual trial assessment shows a percentage of 88%, meaning that the trial on the teacher is highly feasible. The content and objectives quality aspect shows a perfect result, which is 100%, meaning that it is highly feasible. Instructional quality aspect shows a percentage of 90%, implying that it is highly feasible. Aspect of technical quality shows a percentage of 82%, implying that it is highly feasible. Meanwhile, worksheets aspect shows a percentage of 80%, which means feasible. On the other hand, based on qualitative aspect regarding comment, suggestion, opinion and feedback from individual subject, it was suggested to provide more enriched application features. With comprehensive features, it is hoped that it can facilitate the comprehensiveness of the materials all in one application.

4.5 Small Group Field Trial

Small group trial was conducted by distributing the end product of the learning media to students of 11th Grade Social Class 4 at SMA Negeri 1 Lawang. This trial could be students' reference in implementing the learning media on the coal mining resources lesson.

On the basis of the table above, it shows that the average scale of 20 respondents gets a percentage as much as 90%. It denotes that the learning media is qualified as "highly feasible" to be implemented and it can be utilized in the actual lesson. Scale of assessment was used to know the feasibility in each indicator. The indicator of content and objectives quality gets an average scale as much 91%, implying that it is highly feasible. Instructional quality gets as much as 93%, meaning that it is highly feasible. Then, the technical quality shows a percentage pf 87%, implying that it is highly feasible. Meanwhile, the worksheets shows a percentage of 90%, implying that it is highly feasible as well. In reference to the scale of the quantitative data that shows highly feasible qualification, this learning media has surely been tested. The qualitative results of students' feedbacks were in terms of media and materials, in which students hoped that the media was compatible with all operating system. Meanwhile, in terms of materials, students hoped there was discussion of the worksheets.

4.6 Discussion

The aim of this research is to produce of whether interactive learning media using MIT App Inventor can be used in Class XI Geography learning. The interactive learning media produced uses material on the Distribution of Indonesian Natural Resources, especially on the material on the Distribution of Mining Products in Indonesia. To measure whether the interactive learning media produced was appropriate, the researchers measured it using material expert validation, media expert validation, as well as field trials on 1 geography teacher and class XI students at SMA Negeri 1 Lawang. To be able to produce interactive learning media using MIT App Inventor, researchers used the ADDIE research method.

Based on the results of validation and trials, the interactive learning media developed in this research can be said to be highly feasible. This can be seen from the scores obtained, namely 98% from media experts, 82% from material experts, 88% from teacher trials, and 90% from student trials. These scores indicate that the learning media developed has met the feasibility criteria in terms of design, materials and effectiveness in learning.

The results of validation and trials show that the interactive learning media developed has several advantages. First, from the perspective of media experts, the design and appearance of the media is considered very attractive and interactive, so it can increase students' learning motivation. Second, from a material expert's point of view, the material presented in the media is considered relevant and accurate. Third, the results of trials on teachers and students also show a positive response to this learning media, which indicates that the media is effective in conveying learning material.

Although overall this interactive learning media is considered highly feasible, there are several aspects that need attention for future improvement. The material expert score which is relatively lower compared to other scores indicates the potential for improvement in the presentation of the material. Apart from that, input from teachers and students can also be used as consideration for further development.

5. CONCLUSION

The research and development of this interactive learning media is designed for geography lesson, specifically on the distribution of mining goods in Indonesia which is taught at 11th grade of senior high school level. The resulted product is in the form of media called SDA Geo in .apk format that covers sub-material about the distribution of mining goods in Indonesia. The results of this research denote that the assessment of media expert obtains a score of 98% showing that, based on media perspective, it is "highly feasible" to be tested. Likewise with the assessment of material expert, the overall score is 82% meaning that, in terms of material, it is "highly feasible" to be tested. In individual and small group trials, 88% and 89% were attained respectively showing that the developed learning media is highly feasible to be implemented and utilized in the lesson.

The conclusions obtained from the development results of this media application are: (1) Researchers have developed interactive learning media using MIT App Inventor on the sub-material about the distribution of mining goods in Indonesia using ADDIE model; (2) The result of the media is in the form of Android application in .apk format that is easy to use for learning without space and time limits; (3) The results of the validation and trial of the developed media denotes that the learning media is feasible to be implemented in the lesson in a percentage scale, namely: (1) Media expert obtains highly feasible result and can be tested; (2) Material expert obtains highly feasible result and can be tested; (3) The individual and small group trials obtain highly feasible results. In conclusion, this interactive learning media is highly feasible to

be implemented in the class, especially on the sub-material about the distribution of mining goods in Indonesia.

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