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The Development of Android-Based Economic Teaching Materials for Student Independence

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Technological developments affect smartphone addiction, therefore smartphones must be utilised with positive goals, for example, increasing student knowledge in economic learning. The purpose of this study is 1) to determine the effectiveness of Android-based economical teaching materials, 2) to recognise students' independence in learning. The development model used is Research and Development (R&D) and Gall. Learning innovation is carried out in class X MA NW Assyafiyah Tarekat, in East Lombok's Indonesian Congregation. The data obtained from the observation sheet of economic teaching materials based on Android after being tested in the implementation class is very good. The findings also revealed that after studying android-based economical teaching materials, students' independence was highly significant in independent learning. The research revealed that android-based economic teaching materials were highly feasible to use.

Keywords: Android, Economic Teaching Materials, Student Independence.

Introduction

The development of the times accompanied by technological advances has penetrated various aspects of human life. Humans now use technology to simplify their work and education to facilitate learning activities to achieve better results (Muis Tasmil, Khusumadewi Ari, 2019; Riyana, 2010). To obtain the goals of education, more efforts are needed to improve the quality of education in Indonesia, which is still lagging behind other countries. As an illustration, in terms of education, the Indonesian people are currently still underdeveloped in Asia, even in a smaller scope in Southeast Asia. In the 1970s, Malaysia again imported many teachers from Indonesia. This discrepancy is caused by several factors that affect quality (Ardika et al., 2017; Nursejo, 2009) of education in Indonesia is still said to be down, including a lack of infrastructure supporting education, a lack of competent and qualified

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Technological developments affect smartphone addiction, therefore smartphones must be utilised with positive goals, for example, increasing student knowledge in economic learning. The purpose of this study is 1) to determine the effectiveness of Android-based economical teaching materials, 2) to recognise students' independence in learning. The development model used is Research and Development (R&D) and Gall. Learning innovation is carried out in class X MA NW Assyafiyah Tarekat, in East Lombok's Indonesian Congregation. The data obtained from the observation sheet of economic teaching materials based on Android after being tested in the implementation class is very good. The findings also revealed that after studying android-based economical teaching materials, students' independence was highly significant in independent learning. The research revealed that android-based economic teaching materials were highly feasible to use.

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Introduction

The development of the times accompanied by technological advances has penetrated various aspects of human life. Humans now use technology to simplify their work and education to facilitate learning activities to achieve better results (Muis Tasmil, Khusumadewi Ari, 2019; Riyana, 2010). To obtain the goals of education, more efforts are needed to improve the quality of education in Indonesia, which is still lagging behind other countries. As an illustration, in terms of education, the Indonesian people are currently still underdeveloped in Asia, even in a smaller scope in Southeast Asia. In the 1970s, Malaysia again imported many teachers from Indonesia. This discrepancy is caused by several factors that affect quality (Ardika et al., 2017; Nurseto, 2009) of education in Indonesia is still said to be down, including a lack of infrastructure supporting education, a lack of competent and qualified



teaching staff, and many other obstacles. The most important factor is the awareness of the importance of education itself in the eyes of the Indonesian people (Ali, 2009; Azhar, 2011).

The responsibility of educational institutions in entering the new era of globalisation must prepare students to face all the challenges that change very rapidly in our society (Sulfemi, 2019; Suwardana, 2018). Therefore, educational institution must be capable of producing superior Human Resources (HR) that are able to compete in this global competition. Improving the quality and ability of students can be achieved quickly by utilising the Internet and websites to access knowledge to the fullest possible extent. This effort can be made through a site for each educational institution (Hastanti & Purnama, 2015).

Economics is a Social Science subject which examines human behaviour and actions to meet the diverse needs of life (Bettencourt et al., 2007; Diener & Suh, 1997; Handayani, 2013; Harris & Gibson, 2008; Ryan & Deci, 2006; Saraswati & Widaningsih, 2008). In the process of delivering economic subject matter, there is an emphasis on verbalism or the teacher in applying the learning method and activities of the teacher, rather than on student activities. Therefore, there is a build-up of information for students. Even if the teacher can develop teaching materials that attract students' attention, it will motivate and increase student interest in learning outcomes. Teaching material is an essential component of learning. Teaching material delivered by a teacher should refer to the objectives outlined in the curriculum (Cian et al., 2018). Additionally, teaching materials should also be relevant to local environmental conditions so that learning is more meaningful. Therefore, the teacher has the discretion to develop teaching materials that will be delivered if they do not deviate from the goal.

Interest in learning is essential in the learning process because without interest, students cannot accept education. If there is no interest from a student in a lesson, learning difficulties will arise. The presence or absence of interest in a lesson can be seen from the way the child follows the lesson, whether they complete notes, pay attention to the lesson or not. Interest in learning is basically the acceptance of a relationship between oneself and something outside oneself. The closer the relationship between yourself and something outside yourself, the more significant the interest. Based on observations at the MA NW Tarekat, in the learning process, there are problems faced by teachers in the class, that students do not ask for clarification on. Out of 30 students, only ten students dared to ask questions and express their opinions. Students are too lazy to write what has been delivered by the teacher in front of the class. Students are also preoccupied with talking to their peers when the teacher explains the subject matter. It is known that the teaching and learning facilities and infrastructure that are used are still lacking, for example, the lack of CDs due to the limited funds of schools. Teaching materials are also lacking in school libraries, mainly textbooks that are used for reference, but the amount is not sufficient for all students.



Factors that influence problems in the learning process are students themselves, which is very influential on the lack of interest in learning. The cause of the lack of interest in learning to study economics is because economics is considered a difficult, frightening, and a less attractive subject, therefore some students do not like economics. Studying economics relies on textbooks and economical material that still uses monotonous student worksheets. There are no Android-based economic teaching materials used in the learning process. Therefore, Android-based economic teaching materials to increase student interest in learning are highly needed by participants in class X MA NW of the Tariqa on economic subjects. Researchers are motivated to do this research because there is still a lack of teaching materials that can make the process of economic learning more enjoyable. Based on the results of interviews conducted by researchers in class X MA NW of the Congregation, it is known that students are interested in an attractive appearance and tend to have a lot of colours and images.

In this case, the school allows students to carry cell phones in certain subjects. The regulation is applied after deliberations or internal meetings with the teacher and the head of the foundation. The reason for this regulation was made because it was seen from teaching materials or handbooks for students who were still lacking, so the problem was the strongest reason that allowed students to carry cell phones in certain subjects, one of them was in Economics. The average student has a sophisticated android mobile phone that can be used to access the internet to find material in accordance with the subject. Of the 100% of students in the NW MA Tarekat, 85% of students have an android mobile phone.

The pace of development in Information and Communication Technology, specifically the presence of smartphone technology is in high demand by students at the level of high school (Fahrurrozi & Majid, 2017). It certainly can be used to develop learning technology, especially for Economics subjects. According to Yuniati, Android smartphones can be used as an alternative medium or teaching material to improve students' understanding of specific materials (Yuniati, 2012). Multimedia-based teaching systems (technologies that involve sound, images, and video) can present subject matter that is more interesting, not monotonous and facilitates delivery. Students can learn the specific material independently by using a computer equipped with multimedia-based software. Now a lot of software has been classified as an edutainment, which is a combination of education and entertainment (Adam, 2015).

When compared with conventional teaching, the android software application enables faster learning as it can be done anytime and anywhere. Without having to wait for instructions from educators, students will be challenged to try to learn the application (Barker et al., 2015; Hirsh-Pasek et al., 2015; McKnight et al., 2016; Reeve, 2016; Triluqman & Mulyoto, 2017).

With the existence of this Android-based teaching material, it is expected that learning becomes more fun, easier, and motivates students to understand each material (Yaqin, 2016).



With fun learning, students do not feel burdened in learning, and they will find out things they do not understand about Economic material just by opening an application and learning it all the time. Android is a Linux-based operating system that is designed for touch screens mobile devices such as smartphones and tablet computers. Android was originally developed by Android, Inc., with financial support from Google. The development of applications for Android-Based economic teaching materials in high schools includes hardware, software, and telecommunications. This aims to advance the open standards of cellular devices (America & Le Grange, 2019; Idris, 2017; Rokhmah, 2015). Based on these problems, it would be advantageous if the learning resources of students are packaged in an attractive android software design. Learners can access the Android software related to the material, and then the material will be immediately obtained. Many positive benefits obtained from the procurement of Android-based learning software include students indirectly learning technology, especially the Internet so that it can reduce students' learning skills.

Methods

The development model used is Research and Development (R&D) (Permata Sari et al., 2019; Sari et al., 2019). Samples for field trials of 35 students in class X procedure in research development consisted of (1) preliminary studies, literature review, and conducting field surveys, (2) planning stages, namely designing content or content, mapping the material formulating objectives, (3) create the initial concept of the product, starting from the development of economic teaching materials based on the Android draft economic teaching materials, designing Student Worksheets, Learning Implementation Plans (RPP), and evaluation sheets, (4) validation of economic teaching materials, by expert lecturers, economics teacher and peer reviewers, (5) product revisions, (6) validated final products, (7) product trials. The validities of the Learning Implementation Plan (RPP), Student Worksheets (LKS), and economical materials based on Android Media were analysed using Content Validity Ratio (CVR) and Content Validity Index (CVI). Values are given in the validation questionnaire items with CVR (Koh & Chai, 2014). This is explained in the equation below.

$$CVR = \frac{\left(Ne - \frac{N}{2} \right)}{\frac{N}{2}} \quad (1)$$

Ne is the number of validators who agree, and N is the total number of validators. After identifying each questionnaire item with CVR, CVI is used to calculate the validity index with equation (2), which are:

$$CVI = \frac{\text{Total Number CVR}}{\text{Total Item}} \quad (2)$$



Criteria interval percentage is determined in each category consisting of 5 categories. The grouping of values in each category is presented in Table 1.

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Results and Discussion

The development of Android-based economic teaching materials to improve student learning outcomes were developed based on various stages of the needs analysis needed. This initial product development stage is the initial stage of development research activities. Researchers develop learning media following what has been designed. The learning media developed were tested for their effectiveness and validity before they were applied in the learning process according to Brog and Gall's development research. In testing, the validity of the development of this learning model used several experts who validate the product that has been made. There are also instruments of teacher and student response regarding learning models that have been developed.

a. Design validation

Components that will be assessed in the validation of teaching materials in the display of teaching materials are aspects of the quality of content, aspects of eligibility, language eligibility, and aspects of product attractiveness. The following is an analysis of the results of the material expert validation.

Based on Table 2, it is demonstrated that the assessment of the material experts for the aspect of content obtained criteria is quite valid, with a percentage of 83.5%. As for the presentation, aspects also got valid criteria of 90%. For linguistic eligibility also obtained criteria quite valid with a percentage of 78.5%, and assessment aspects obtained by valid criteria with a percentage of 87.5%. The results of the validation of material experts in the development of android-based economic teaching materials obtained an average of 84.0%. From some of this data, it can be concluded that the android-based economic teaching materials are quite feasible to be used by students in the MA Assyafi'iyah NW Tarekat.

Components that are assessed in the display's validation of economic teaching materials are the size of teaching materials, cover design aspects, content design aspects of instructional materials, and aspects of content illustrations. The following is an analysis of the results of the validation of media experts.

Table 3 shows the assessment of media experts for the aspect of icon size obtained criteria are quite valid with a 75% percentage. As for the cover, aspects also had a valid criterion of 87.5%. For the content aspect, it is found that the criteria are valid with a percentage of 85.7%, and for the illustration also the criteria are quite valid with a percentage of 75%. The results of the validation of media experts in the development of Android-based economic



teaching materials obtained an average score of 83.3%. From some of this data, it can be concluded that the android-based economic teaching materials are quite feasible to be used by students at MA Assyafi'iyah NW Tarekat. From the Validation questionnaire that was filled out by the media experts validate, in addition to obtaining quantitative data, qualitative data was also obtained in the form of descriptions, namely comments and suggestions. The following outlines the results of feedback and recommendations from the media expert validate of the Android-based economic teaching materials.

b. Product Trial

At this stage, researchers conducted a small-group trial of five students and teachers in the field of economic studies. Inputs and comments had been given in the small-group trials as a form of revision of the Android-based economic teaching material products developed. After the revision, then a field trial was conducted on 15 students of class X MA NW Tarekat and reassessment by the economics teacher.

Referring to Table 4, it showed from all aspects assessed, and the feasible results are obtained, namely an average of 92.2%. Further results of each aspect can be explained in Table 5. Based on Table 5, it is demonstrated that the response of students in small-group trials to the aspect of eligibility of interests obtained very good criteria with a percentage of 95%. As for the aspect of the feasibility of the material/content, it also got very good criteria by 90%. For linguistic eligibility also obtained very good criteria with a 90% percentage.

c. Field Trial

Field trials were conducted by making Android-based economic teaching materials as one of the learning media used during teaching and learning activities take place. Researchers replace the position of the teacher when teaching and learning activities take place. The role of the teacher is to oversee the ongoing teaching and learning activities. Before teaching and learning activities, researchers provide questions to determine the level of student understanding of the material that has been learned at a previous meeting. After completing the answers, the teacher will explain the material with different example problems. The researchers then gave the same problem as before. Therefore, researchers can compare how effective the improvement of student learning outcomes are before and after using Android-based economic teaching materials. The questionnaire responses of students and teachers conducted were filled out in the last session. The success rate of developing Android-based economic teaching materials to improve student learning outcomes is equal to 93%. Meanwhile, for students' responses to android-based, economic teaching materials in field trials can be seen in Table 6.

Table 6 shows from all aspects that are assessed that the results are feasible, namely an average of 88.1%. Further results of each aspect can be explained in Table 7. Table 7 demonstrates that the students' responses to the field trials for the feasibility aspect of the



interest obtained very good criteria with a percentage of 89.7%. As for the aspect of material/content eligibility obtained, good criteria of 84.4%. Linguistic eligibility also obtained very good criteria with a percentage of 89.4%. The results of responses by students in the development of android-based economic teaching materials obtained an average score of 88.1%.

From the result of data analysis, it can be concluded that the Android-based economic teaching materials are feasible to be used by students in MA NW Assyafiyah Tarekat without needing revision. For a large-scale assessment by a teacher in the field of economic studies, the following results are obtained in table 8.

This paper demonstrates the research and development that has been carried out by researchers in the development of Android-based economic teaching materials. The aim of this research is to improve student learning outcomes through the process of developing learning media and the effectiveness of instructional media. The process of developing this learning media goes through five stages, as described in the above research results. This research is in line with the research findings of Fahrurrozi et al. (2016), Fahrurrozi & Sari (2018), and Sukardi et al. (2019).

Some stages carried out in the development process in this study include (1) preliminary research, in which at these stage researchers conducted observations and interviews with students and teachers of economic subjects. These interviews attempted to find out some problems that occur at school during the teaching and learning process in the area. This stage is also carried out by spreading questionnaires to students to analyze the needs of the learning model applied by the teacher and which will be used later by the researcher. (2) Initial product development, where at these stage researchers have begun compiling products to be developed, namely products developed in the form of Android-based economic teaching materials. (3) This stage involved design validation. At this stage, the researcher conducts expert validation on the products that have been made against two validates, namely, material experts and media experts, to find out how valid the products are made before being trialled. (4) Product trials, at these stage researchers, conducted product trials directly on small groups and then revised if there were deficiencies. (5) Completing the product, at this last stage, the researcher conducted a field trial, to find out the level of success of the learning model that has been developed by the researcher and to make the product permanently (Dana & Yendol-Hoppey, 2019; Duflo et al., 2007; Grix, 2018; Hair Jr et al., 2019).

The effectiveness of this learning media can be seen from three key aspects, namely the teacher's response, student response, and learning outcomes (Fahrurrozi & Sari, 2018). In seeing the effectiveness of this learning media, the class chosen as the test subject is the class X which consists of 15 students at the time field trials conducted. The effectiveness of this Android-Based Economic Teaching Material is 31%. This is in line with the Classical



Completeness theory proposed by Mulyasa (2009). The effectiveness of teaching materials can be seen one of them by looking at student scores above 75 (above KKM) and with the provisions classical by 85%. This because the results of this study reached 93%, the development of Android-Based Economic Teaching Materials was declared effective in improving student learning outcomes. While the response of teachers in economic studies gets an average of 95% aspects of overall aspects and 87% of students' responses. Therefore, this learning model is feasible to be applied in teaching and learning. It is in line with the eligibility test criteria tested by a descriptive analysis of the percentage of response results obtained above 85.01%. It is feasible or unnecessary to be revised (Akbar, 2013). The results of the teacher's response in the field of economic studies and student responses get result ⁵ above 95%, the Android-Based Economics Teaching Material is declared suitable for use ^{in the teaching and learning process}.

Conclusions

Based on ⁶ the discussion ^{that} has been presented, ^{it can be concluded that the development of Android-based economic teaching materials is carried out through several stages starting from preliminary research, initial product development, initial product, final product trial, and final product. As for the various stages, some validation needs to be done to determine the validity level of the product that has been made so that what has been developed can be applied according to the purpose. The validator's assessment of material experts is workable, with an average score of 84%. The evaluation of the validate of the media expert is quite decent, with an average score of 83.3%. After the validation, the process was carried out, then proceed to a small-group trial consisting of 5 students of class X by 92.2% and economics teachers. The results obtained are feasible, with an average score of 95%. Field trials also get a decent assessment of 88.1% of the responses of 35 students and 100% of the responses of teachers in economics. The conclusions of this study reveal that the development of Android-based economic teaching materials is appropriate for use in economic learning in the classroom and is categorized very well for all students. Development of Android-based economic teaching materials can be done on economic learning, and students can be independent in learning without lag accompanied by the teacher.}

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⁴ The head of ^{the research team would like to thank the school for making it easy to provide information and data. To those who helped to carry out this research.}



Table 1. Assessment Criteria

No	Interval%	Category
1	$80.01 \geq x \leq 100$	Very good
2	$60.01 \geq x \leq 80.00$	Good
3	$40.01 \geq x \leq 60.00$	Enough
4	$20.01 \geq x \leq 40.00$	Less good
5	$0.00 \geq x \leq 20.00$	Not good

Table 2. Results of Validation by Material Experts

Aspect	Percentage (%)	Validation criteria	Conclusion
Content	83.5	Valid enough	Fair enough/ No revision needed
Presentation	90	Valid	feasible / No revision needed
Language	78.5	Valid enough	Fair enough/ No revision needed
Assessment	87.5	Valid	feasible / No revision needed
Average	84.0	Valid enough	Fair enough / No revision needed

Table 3. Results of Validation by Media Material Experts

Aspect	Percentage (%)	Validation criteria	Conclusion
Icon Size	75	Valid enough	Fair enough / No revision needed
Cover	87.5	Valid	feasible / No revision needed
Content	85.7	Valid	feasible / No revision needed
Illustration	75	Valid enough	Fair enough / No revision needed
Average	83.3	Valid enough	Fair enough / No revision needed

Table 4. Student Responses Regarding the Development of Android-Based Economic Teaching Materials

No	Assessed aspects	results	Maximum score	Percentage (%)
1.	Interest (Display)			
	The appearance of these economic teaching materials is interesting	19	20	39
	this teaching material made me more enthusiastic in studying economics	20	20	40
	By using this teaching, the material can make learning economics not boring.	19	20	39
	These economic teaching materials support me to master economics,	18	20	38



	especially the market			
	With the Android-based economic teaching materials can motivate to learn the material	19	20	39
	Average score	95	100	95
2.	content (materials)			
	The material presented in this teaching material is easy for me to understand	19	20	29
	In this economic teaching material, there are several sections for me to find my concepts	17	20	27
	This economic teaching material contains an evaluation test that can test how far I understand the market material	18	20	28
	Average score	54	60	90
3	Linguistic			
	The sentences and paragraphs used in this teaching material are clear and easy to understand	20	20	40
	The language used in these economic teaching materials is simple and easy to understand	17	20	37
	The letters used are simple and easy to read	17	20	37
	Average score	54	60	90
	Whole Average score	203	220	92,2

Table 5. Student Response Results in Small Group Trials

No	Aspect Assessed	Percentage (%)	Validation criteria	Conclusion
1	Attraction	95	Very good	Very Good/ no revision needed
2	Material (content)	90	Very good	Very Good/ no revision needed
3	Linguistic	90	Very good	Very Good/ no revision needed
	Average	92.2	Very good	Very Good/ no revision needed



Table 6. Results of Student Responses in Field Trials

No	Aspect assessed	Research result	Maximum score	Percentage (%)
1.	Interest (Display)			
	The appearance of these economic teaching materials is interesting	56	60	93.3
	this economic teaching material made me more enthusiastic in studying economics	56	60	93.3
	Using these economic teaching materials can make learning economics not boring.	56	60	93.3
	These economic teaching materials support me to master economics, especially the market	48	60	80
	With the existence of economic teaching materials can motivate to study the material	53	60	88.3
	Average score	269	300	89.7
2.	Content (materials)			
	The material presented in this economic teaching material is easy for me to understand	50	60	83.3
	In this economic teaching material, there are several sections for me to find my concepts	48	60	80
	this economic teaching material contains an evaluation test that can test how far I understand the market material	54	60	90
	Average score	152	180	84.4
3	Linguistic			
	The sentences and paragraphs used in this teaching material are clear and easy to understand	55	60	91.7
	The language used in these economic teaching materials is simple and easy to understand	51	60	85
	The letters used are simple and easy to read	55	60	91.7
	Average score	161	180	89.4
	Overall Average Score	582	660	88.1



Table 7. Results of Analysis of Student Responses in Field Trials

No	Aspect Assessed	Percentage (%)	Validation criteria	Conclusion
1	Attraction	89.7	Very good	Very good /no revision needed
2	Material (content)	84.4	Good	Good /no revision needed
3	Linguistic	89.4	Very good	Very good /no revision needed
	Average	88.1	Very good	Very good /no revision needed

Table 8. Overall Aspects of Assessment

No	Research subjects	Assessed aspects	Assessment result	Maximum score	Percentage (%)	Conclusion
1	Material expert	Content, presentation, language, and assessment	74	80	84.0	Feasible enough/ no revision needed
2	Media expert	Icons, covers, contents, and illustrations	50	60	83.3	Feasible enough/ no revision needed
3	Five students	Display, content, and language	203	220	92.2	Very good/ no revision needed
4	Two teachers of economics	Software engineering, learning design, and visual communication	114	120	95.0	Very good/ no revision needed
5	15 students	Display, content, and language	582	660	88.1	Very good/ no revision needed
6	One teacher in economics	Software engineering, learning design, and visual communication	60	60	100	Very good/ no revision needed



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