



The Development of Android-Based Mobile Learning on Materials for Preparation and Proclamation of Indonesian Independence for Class VIII Blind Students at MTs Yaketunis Yogyakarta

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Abstract

This research aims to find out the feasibility of mobile learning product. This research refers to the development model by Alessi & Trollip. The procedure of mobile learning development consists of (1) planning, (2) designing, and (3) developing that was equipped with component attributes including standards, ongoing evaluation, and project management. The product testing consists of alpha test assessed by media experts, material experts, and instructional experts, while, the beta test involves impairment students. The data collection techniques used questionnaire. The instrument of data collections used questionnaire. The data analysis techniques used descriptive analysis techniques. The research results showed the feasibility of the product was considered as highly-feasible based on the assessment of media experts, material experts, instructional experts, and the first students' responses. Mobile learning is considered as effective way for improving learning outcomes in the subject of preparation and the proclamation of Indonesian independence, it seen from the average pre-test score of 58.89, has an increase of 88.89 in the post-test with a gain value of 0.73 with high criteria. Based on the analysis, it can be concluded that the mobile learning application is very feasible to be use as the one of main student learning platform.

Keywords:

Mobile Learning, Android, Materials for Preparation and Proclamation of Indonesian Independence, Blind Students

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INTRODUCTION

In accordance with the mandate in Article 31 of the 1945 Constitution (UUD 1945), every citizen of Indonesia deserve to get a decent education. However, some citizens do not possess the same capacity and capability to receive an equal education, one of the causes is physical condition of the student. Therefore, the education of special needs requires the responsibility of some parties such government as policy implementers, to teaching staff as the spearhead in providing a decent education.

The level of urgency in responding to students with special needs is quite high, based on data from 2003, 2006, 2009 and 2012 National Socio-Economic Surveys (SUSENAS) shows that people with disabilities increase annually, according to the following data:



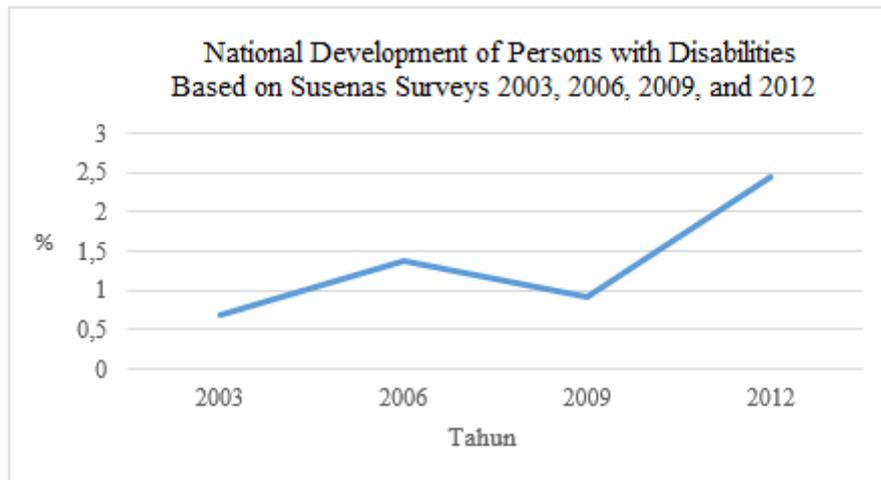


Figure 1. Graph of Development of National People with Disabilities Based on Susenas Surveys 2003, 2006, 2009, and 2012. (Source: Center for Data and Information of the Health Ministry of the Republic of Indonesia, 2016.)

Based on the data above, it can be concluded that the enhancement of students with special needs demand special methods to handle it. If we look at the percentage of students with disabilities with visual impairments, it has a higher percentage compared to those with other special needs. This is in accordance with the following data from the Ministry of Health of the Republic of Indonesia:

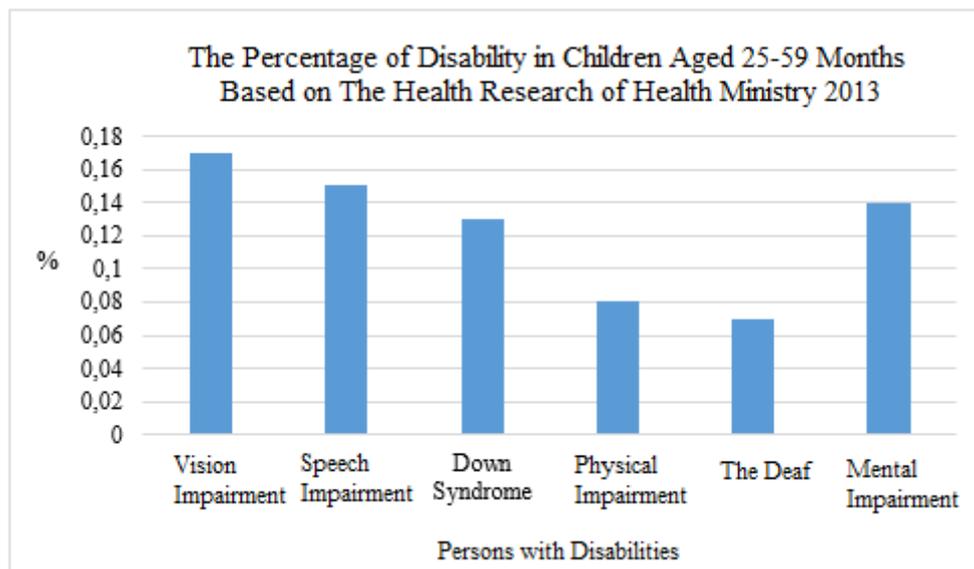


Figure 2. Graph of the Percentage of Disabilities in Children aged 24-59 Months Based on the Research of Basic Health of Health Ministry 2013 (Source: Center for Data and Information of Indonesian Health Ministry, 2016)

Observing at the data above, it can be seen that people with visual impairment occupy the highest percentage, and require special treatment. Those who experience vision impairment have to receive special education according to their physical condition. In fact, this is confirmed in the National Education System Law no. 20 of 2003 article 32, which

states that special education is an education for citizens who have difficulty in participating in the learning process due to physical, emotional, mental, intellectual, or social disorders. Thus, special education is needed for students who have vision impairment without any discrimination against one another.

Physical deficiencies in terms of vision impairment will have a considerable distraction in obtaining information. The normal physical condition of students will receive information easily through the five senses such as eyes and ears as well as taste buds. In contrast to students who have vision impairment, it has a message distortion of the information conveyed. As explained by Sunanto (2010, p.164), that vision is one of the important sensory information in human life because most of the information is obtained through the sense of sight.

The main obstacle for blind students is vision. In short, the abnormalities in the sense of sight imply limitation in receiving information in the form of visuals. As a consequence, students with visual impairments will lose or lack visual information. In fact, Census & Munir (2016, p.1), explained that the malfunctioning of the sense of sight raises limitations including: limitations in concepts, limitations in interaction with the environment, and limitations in mobility. Therefore, for blind students who no longer have visual perception abilities, requires certain tools and methods in their learning activities so that they can learn without involving the sense of sight.

In terms of learning activities, blind students also take the same education as other students at school. One of the subjects learned is the preparation and proclamation of Indonesian independence. In this materials, students to learn about the preparation efforts for Indonesian independence, events about the proclamation, and the process of establishment of the Unitary State of the Republic of Indonesia. Starting from the preparation moment until the proclamation of independence took place. The materials are delivered to blind students in the form of dialogue, and proclamation text that certainly be more memorable when it is played on audio.

In addition, in presenting the material for the preparation and proclamation of Indonesian independence, teachers will not simply transfer the materials to the minds of blind students, there are several obstacles related to the facilities and infrastructure that support student learning activities. Based on research conducted by Rahmawati (2017, p.84), the first obstacle is the limited learning tools such braille books. Second, the lack of student accessibility to these facilities and infrastructure. Then, the physical condition of the students, because braille book is breakable due to sweaty hands. In addition, based on observations made by the author at MTs Yaketunis Yogyakarta, when the learning activities is going on, students less prefer writing dictation. It was shown when they recorded the teacher's explanation using a device. At the time of history subject, students seemed sleepy because learning such as historical facts and memorizing facts such as actors, date or year of events, and places of occurrence are less interesting and boring. Students become passive and only listen to the material delivered by the teacher; and the minimum of learning aids for blind students.

Based on the description above, the delivery of historical material through learning media that designed by stories via audio is very appropriate for blind students. It provide an understanding of some historical events in the subject of the preparation and proclamation of Indonesian independence. The design of messages conveyed through these media can attract attention, so that students will not easily feel bored. Therefore, to create learning media application that facilitate student in understanding the historical subject and to interest blind students, it needs an educational technology as a field of cultivation, and its role and function in learning. Through these creation, application, and managing appropriate technological processes and resources enforce education technology as a tool to support the development of knowledge for students, and it facilitates students in

achieving their learning goals. This has been proven by Findarno (2013, p.1), that audio media can significantly improve listening skills. In his experiments, it was proven that students who learned English by audio media in the experimental class had a higher average score than students who learned by lecture method and textbooks in the control class.

Hulme & Traxler (Behera, 2013, p.24) defines mobile learning or m-learning is a learning produced by the use of portable computing devices. Sarrab (2012, p.31) explains that mobile learning is a new research topic, as a tool for the education system. Mobile learning can be used to improve the overall learning experience of students and teachers. Mobile learning is part of electronic learning or e-learning.

The benefits of mobile learning according to Boyinbode & Akinyede (2008, p.387) is to increase productivity that can be utilized by students in anywhere and anytime. Mobile learning is one of appearances of evolution of educational technology (McQuiggan et al., 2015, p.8).

Based on the definitions that have been described, mobile learning is an innovative learning model carried out cross-areas or environments and easy to carry during the learning activity, thereby it increase the efficiency and effectiveness of the learning process and results. Mobile learning effects the availability of materials that can be accessed at any time and interests students. The purpose of developing mobile learning itself is to get long life learning, students can be more active in the learning process and save time.

The application of mobile learning in the learning process for blind students applies the principles. Lowenfeld (D'Andrea & Farrenkopf, 2000, p.4), a pioneer of blind education identified three basic principles needed to teach blind students. These principles are: (1) provide concrete experiences; (2) unify the experience; (3) encourage learning by doing.

Referring to the principles of learning for the blind proposed by Lowenfeld, the learning approach for blind students applies the principles of verbal, concrete experience, and stimulation. Carney, Engbretson, Scammell, & Sheppard (2003, p.43) explained that the learning process for blind students gives opportunities for students to explore new objects and places and various experiences. Students must experience a variety of textures, shapes, weights, temperatures, sounds, smells and tastes to build meaningful relationships and concepts about knowledge.

The application of the learning principles of blind students in mobile learning, such as: (1) self- learning or group learning activity is applied by teachers to students in using mobile learning products; (2) the cultivation and delivery of attitudes is expressed through the text of the subject matter contained in the mobile learning product; (3) tactile learning is given to students through the sense of touch on the android device screen and feedback through the sense of hearing on audio. In addition, the tactile learning given is in term of braille as product manual book.

Learning theory also underlies the use of media as a learning resource related to its function. Learning theory according to Degeng (2013, p.20), is a theory that studies how a person learns. Learning theory pays attention to the relationship between the variables that determine learning outcomes.

Behavioristic theory is a theory that focuses on changes in behavior that can be observed (Dahar, 2011, p.26). Behaviorism focuses on a pattern of repetition behavior until it becomes automatic (Smith, 2010, p.73). Behavioristic theory views learning as a change in behavior as a result of the interaction between stimulus and response (Slavin, 2000, p.143). A person is considered to have learned something if he has been able to show a change in behavior. This theory explains that the most important thing in learning is the input of a stimulus and output of a response. Stimulus is anything that is given by the teacher to students while the response is the reaction of students to the stimulus given by the teacher.

In relation to the development of mobile learning, the stimulus application is given to the blind students through mobile learning products in the learning process. Response is everything that reflects the action of students in utilizing the product of which produces voices from touched buttons. Reinforcement is presenting exercises in the product.

In addition, Januszewski & Molenda (2008, p.25) explain that a person uses memory and thought processes to generate strategies, store, and manipulate ideas and mental representations. When a new information absorbs, it will be stored in short-term memory then the information must be repeated again, and when it settled, it will absorb in long-term memory. If the information is not repeated then the information will fade and disappear. Information and skills stored in long-term memory are merged by students as cognitive strategies or skills to complete complex tasks.

Ausubel said that the learning process occurs when a person is able to assimilate the knowledge he already has with new knowledge. Clark & Mayer (Reiser & Dempsey, 2007, pp. 314-315) explains that these stages consist of: (1) centralization of attention is needed, because working memory has a limited capacity; (2) activation of prior knowledge by combining subject matter and those stored in long-term memory; (3) encoding, is a process that occurs between working memory and long-term memory. Working memory is the initial stage of processing information of phonetic and visual information; (4) transfer of learning, it should be positive when a new knowledge is received and stored in long-term memory, and can be remembered when students need it in learning; (5) the management of learning, it is related to metacognitive which consists of defining goals, planning, conducting supervision; (6) motivation, is a variety of factors that influence students to start and keep doing activities to achieve learning goals.

The application of information processing theory of mobile learning consists of: (1) the narrative of learning materials. When students have learned certain materials, students are reminded again of the material at last; (2) exercises are provided as a means for students to practice their new knowledge. Feedback will be given when students have answered all the exercises; (3) Students can practice knowledge of learning materials through a challenge. This challenge trains material information stored in students' long-term memory. In the challenge, students must present the material orally.

Based on the description that has been presented, the researcher tries to develop learning media that utilizes smartphones, tablet or computers based on Android. The device was chosen because Android is a kind of text to speech technology and has a screen reader application. Text to speech is a software that can pronounce words written in text so that blind students can interact and learn through devices by functioning the senses of hearing and touch.

The research limits the blind students who requires media and learning resources to facilitate them in understanding of historical material, so that it is necessary to develop mobile learning by utilizing text to speech technology as an Android-based learning media, to overcome the learning media problem of blind students. The research problems are formulated as follows: (1) how is the feasibility of mobile learning products for the preparation and proclamation of Indonesian independence subject matter of blind students in class VIII at MTs Yaketunis Yogyakarta?; (2) how are the learning outcomes of blind students after utilizing the mobile learning products?, while the research objectives are: (1) to determine the feasibility of mobile learning products for the preparation and proclamation of Indonesian independence subject matter of blind students in class VIII at MTs Yaketunis Yogyakarta; (2) finding out the usefulness of mobile learning products in improving the learning outcomes of blind students.

METHODS

This study used the development research as the research methodology. The developmental research can be defined as the systematic study of creating, producing, and assessing instructional programs, processes, and products that must fulfil criteria of internal consistency and effectiveness, as opposed to basic instructional development (Rita, 1994). In the realm of instructional technology, developmental research is very essential. The most prevalent forms of developmental research are those in which the product development process is investigated and explained, and the product is assessed. The influence of the product on the learner or the organization is the subject of a second type of developmental study. A third form of research focuses on a broad examination of design creation or assessment processes as a whole or as individual components. A basic difference should be noted between reports of real developmental research (practice) and reports of theoretical development research (theory).

The development research was chosen, because the educational media in forms of application, needs to be continually upgraded, based on the user experience. Educators may use research to understand more about how children learn best so they can develop better method, as from the children physiology as the user experience. It also aids in the development of new teaching methods and strategies, as well as allowing educators to delve deeper into various topics and concepts.

This research uses the model of development research proposed by Allesi & Trollip (2001). Generally, this development model has three stages such as planning, design, and development, as well as three attribute components that exists at each stage including standards, continuous evaluation, and project management as complementary and consideration in product development.

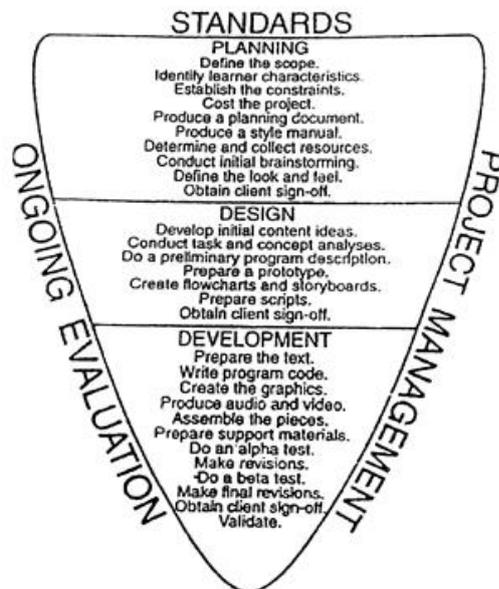


Figure 3. The model of development proposed by Allesi & Trollip (source: Allesi & Trollip, 2001)

This research was conducted from September to October 2017, obtained by utilizing the structured questionnaire data collection method, which can be described as A structured questionnaire is a document that has a series of standardized questions with a predetermined system that sets the exact language and sequence of the questions in order to collect data from respondents (Cheung, 2014) . The questionnaire is closed, where the respondent has been given a choice of answers so that the respondent only needs to choose the answer that is in accordance with the respondent's beliefs. The alpha test also used questionnaire which involved media experts, material experts, and the blind learning experts. And the beta test used a questionnaire filled out by the observer.

The sample respondent consists of 12 students of the social class VIII at MTs LB/A Yaketunis Yogyakarta, with the different criteria, who has a low vision disability and non-low vision, which can be described as follows:

Table. 1. Research Respondent (Source: Author)

No.	Name	Sex	Age	Disablement	
				Lowvision	Total
1.	Student 1	Male	15		√
2	Student 2	Female	14	√	
3	Student 3	Female	15		√
4	Student 4	Male	21	√	
5	Student 5	Female	14		√
6	Student 6	Female	16	√	
7	Student 7	Male	19		√
8	Student 8	Female	15	√	
9	Student 9	Female	16	√	
10	Student 10	Male	15	√	
11	Student 11	Female	15	√	
12	Student 12	Male	21		√

The development carried out to make mobile learning begins with the pre-survey stage. The aim is to conduct research on the analysis of material needs of what topics discussed on the development of products, and what facilities and infrastructure are available for product application. The next stage is implementing the model of the Alessi & Trolip development model. These stages are planning, there are 4 steps, such as (1) determining the scope of learning materials; (2) identify the characteristics of students; (3) determine and collect material sources; and (4) brainstorming.

Second, at the design stage takes 3 steps, as follows (1) developing learning content ideas; (2) describe the preliminary program; and (3) create flowcharts and storyboards. Third, at the development stage takes 7 steps, as follows: (1) preparing the text or text of the subject matter; (2) create a product, the material text that has been prepared is then combined and merged by a programming language using the Android Studio application that is adapted to flowcharts and storyboards; (3) doing alpha testing, the media that has been developed is tested by 2 media experts, 2 material experts, and 2 the blind learning experts; (4) carry out initial revisions, the media that has been tested by media experts, material experts, and the blind learning experts are improved according to the suggestions given so that it has a better media; (5) perform beta testing, the second stage of testing is carried out on the resulting product, the beta test is performed by students of MTs Yaketunis Yogyakarta, the purpose is to provide input or responses regarding the developed media for students; (6) make final revisions; the developed media is improved again based on beta testing so that there are no more errors and the product is ready to be used for field testing; (7) product validation test, after the product is perfected, then

conducting field tests or known as product validation, the purpose is to determine the effectiveness of the product through the achievement of learning outcomes.

Data analysis techniques and product feasibility were carried out using quantitative data analysis techniques, it is quantitative descriptive data analysis for media feasibility and media influence on learning outcomes. To convert the assessment score into quantitative data, so it applies the instrument rating scale guidelines and instrument assessment criteria as seen in table 2 and table 3 (Mardapi, 2008, p.123).

Table 2. Guidelines for Instrument Score Rating Scale (Source: Mardapi, 2008.)

Qualitative data	Assessment
Very Good	4
Good	3
Enough	2
Less	1

Table 3. Assessment Criteria for Total Instrument Score (Source: Mardapi, 2008.)

Range of Score	Score	Category
$x \geq \bar{x} + 1 SBi$	4	Very Feasible
$\bar{x} + 1 SBi > x \geq \bar{x}$	3	Feasible
$\bar{x} > x \geq \bar{x} - 1 SBi$	2	Less Feasible
$x < \bar{x} - 1 SBi$	1	Not Feasible

The technique of analyzing of the pretest and posttest results is given by providing test questions for understanding the material and measuring the learning outcomes to see the level of effectiveness of the product. The increase of student learning outcomes toward before and after implementation, is calculated by the N-gain formula and determined based on the average gain. The gain score (g) obtained is the result of a comparison between the average pre-test and post-test scores. The average gain compared (N-gain) (Hake, 1998, p.65) is expressed in the following equation:

$$g = \frac{S \text{ post} - S \text{ pre}}{S \text{ maks} - S \text{ pre}}$$

Description:

S post : Average post-test score

S pre : Average pre-test score

S max : Maximum score

Furthermore, if this value is obtained, the value is then converted into the interpretation of the gain value (Hake, 1998, p.3) as shown in the following table:

Table 4. Gain Value Interpretation (Source: Hake, 1998.)

Value (g)	Clarification
$(N\text{-gain}) \geq 0,7$	High
$0,7 > (N\text{-gain}) \geq 0,3$	Medium
$(N\text{-gain}) < 0,3$	Poor

After conducting the data analysis on respondent, the interview also conducted by involving 2 media experts, this media expert test was to assess and evaluate the product before it was tested, 2 material experts, this material expert test was to assess the feasibility of the material before it was tested, and 2 blind learning experts, the blind learning expert test is to assess the learning before the product is tested, in which these three tests are included in the alpha test. Furthermore, the beta test was carried out on 3 blind students.

RESULTS & DISCUSSION

Results

This research and development focuses on developing mobile learning products, testing the feasibility of products based on media experts, material experts and learning experts, and product trials to assess the usefulness of products through student learning outcomes. The results of this research and development are learning media of mobile learning for the blind students.

Furthermore, it carries out product trials that include alpha and beta tests. The alpha test was conducted by 2 media experts, 2 material experts and 2 the blind learning experts while the beta test is done by 3 blind students. Media experts evaluate mobile learning from the visual, media, and technical aspects. Material experts evaluate the aspects of curriculum, material, and language. The blind learning experts evaluate the aspects of the material, learning strategies, and evaluation. The evaluation results of media, materials and learning are used to revise the product. After the revision, a beta test is then performed to obtain responses or input from students regarding the developed product.

In the alpha test, the results obtained from 2 media experts, 2 material experts and 2 the blind learning experts as seen in tables 6, 7 and 7.

Table.5. Media Expert Assessment Results (*Source: Data Analysis*)

Media Expert	Average	Category
1	3,4	very feasible
2	3,6	very feasible

The assessment results of media experts 1 toward all aspects obtain an average of 3.4 (Very Feasible) and media experts 2 obtain an average of 3.6 (Very Feasible). This score shows that the developed mobile learning has followed the criteria of learning media. These results indicate that the product is feasible to be used as a learning media in the preparation and proclamation of Indonesian independence subject for blind students by making improvements to parts according to the advice of media experts.

Table 6. The Results of Material Expert Assessment (*Source: Data Analysis*)

Material Expert	Average	Category
1	3,6	very feasible
2	3	very feasible

The average assessment given by 2 material experts, material expert 1 obtain an average of 3.6 (Very Feasible) and material expert 2 obtain an average of 3 (Very Feasible). These results indicate that the developed mobile learning is feasible to be used as a learning media for the Preparation and Proclamation of Indonesian Independence subject by making improvements to parts according to the advice of material experts.

Table 7. Assessment Results of The Blind Learning Experts (*Source: Data Analysis*)

The Blind Learning Expert	Average	Category
1	3,6	very feasible
2	3,1	very feasible

The average assessment given by 2 blind learning experts, the blind learning expert 1 obtain an average of 3.6 (Very Feasible) and the blind learning expert 2 obtain an average of 3.1 (Very Feasible). This result shows that the developed mobile learning is very suitable to be used as a learning mediafor the subject of Preparation and Proclamation of Indonesian Independence by making improvements to parts according to suggestions from blind learning experts.

The results of the beta test given to 3 blind students at MTs Yaketunis Yogyakarta obtain an average score of 3.5 with the very feasible category. Then it can be concluded if the mobile learning results is very suitable to be used as a learning media in the subject of preparation and the proclamation of Indonesian independence for blind students of SMP/MTs class VIII.

Discussion

The achievement of blind students' learning outcomes at the pretest (before mobile learning application) obtained an average of 58.89 while the posttest results (after mobile learning application) obtained an average of 88.89. All students (100%) obtained learning outcomes get beyond the minimum completeness score (KKM) of 75. This indicates that the product can improve student learning outcomes. Besides observing the average obtained from the pretest and posttest, it is also seen from the gain score. Based on the calculation of the gain score, the gain value (g) is 0.73 which is qualitatively included in the "high" classification (N-Gain 0.7). Thus it can be concluded that mobile learning products can improve student learning outcomes.

The developed mobile learning has several advantages including: (1) mobile learning products can be carried and operated anywhere and anytime; (2) students can access it whenever they needs it, so it facilitate them; (3) learning activities on mobile learning products can be controlled by students themselves; (4) the learning is combined with quizzes, so it is more fun; and (5) students can learn according to their respective abilities and speed in understanding the knowledge and information presented in mobile learning products. The weaknesses of the developed mobile learning include: (1) Text to Speech android cannot read or vocalize text more than 4,000 characters, so it needs programming

adjustments in software engineering ; (2) the difference of vocalizer on android devices causes differences in reading styles or the result audio; (3) the developed mobile learning product has several conflicts with the screen reader application when the screen reader application is active.

CONCLUSION

Mobile learning products are considered very suitable to be used as learning media for the blind students. This is reviewed based on the assessment results on the alpha test and beta test which are described as follows: (1) the results of the alpha test by two media experts obtained an average total of 3.5 with a very decent category, this is observed from the assessment of the button position and the selection of narration using attractive language. And it supported by clear instructions and ease of mobile learning products application based on mobile learning quality criteria and behavioristic learning theory; (2) the results of the alpha test by two material experts obtained an average total of 3.3 with a very decent category, this is observed from the assessment of curriculum aspects, material content, and language used in mobile learning products based on mobile learning quality criteria and information processing learning theory; (3) the results of the alpha test by two blind learning experts obtained an average total of 3.4 with a very decent category, this is viewed from the assessment of the material aspects of mobile learning products based on the quality criteria of mobile learning and the learning principles of blind students; and (4) the results of the beta test by three students obtained an average total of 3.5 with a very decent category, this is seen from student responses after using mobile learning products.

Mobile learning is considered as effective way for improving learning outcomes in the subject of preparation and the proclamation of Indonesian independence, it seen from the average pre-test score of 58.89, has an increase of 88.89 in the post-test with a gain value of 0.73 with high criteria. Based on the analysis, it can be concluded that the mobile learning application is very feasible to be use as the one of main student learning platform.

CONFLICT OF INTEREST

Concerning the research, authorship, and publication of this paper, the author(s) reported no potential conflicts of interest.

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