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Development of Geographic Learning Media with Android for Improving Spatial Thinking Ability Using Subject of Anthroposphere Dynamics

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Abstract: Goals of the research are: (1) Knowing the characteristics of geography android learning media by not only students, but also teachers (2) Knowing feasibility of geography android learning media (3) Knowing the effectiveness of geography android learning media towards spatial thinking This is Research and Development with Thiagarajan model. Techniques of collecting data used are questionnaire analysis of needs, validation from material experts, validation from media experts, validation from teacher, validation from student's, trying of questionnaire, tests, also documentation. Result of this study include: (1) characteristics of geography android learning media, from results obtained data that most of characteristics of geography android learning media with characteristics of students' learning styles on visual, color selection in blue and Comic Sans M font selection. (2) According to evaluation of validation from material experts and validation from media experts who gave score 5 (very good category), and also the evaluation of validation from teacher and validation from which had score 4 (good category). that it is feasible to use. (3) the geography android learning media was effective to improve spatial thinking ability according value of pre-test and post-test. Spatial thinking ability was increased especially in region aspect. The effectiveness of using geography android-based learning media improves spatial thinking significantly at 95% confidence level (Sig 0.007 <0.05).

Keywords: Media Development; Android; Spatial Thinking Ability

INTRODUCTION

The success country in facing revolution of industrial 5.0, is determined by the quality of teachers. Teachers are required to adaptability to adaptation technologies and global revolution. In this situation, each educational institution must prepare for new orientations and literacy in the field new era, old literacy which includes reading, writing and arithmetic must be strengthened by new literacy, namely data literacy, technology literacy and human resources literacy. Data literacy is the ability to read, analyze and use information from data in the digital world. Technological literacy is the ability to understand mechanical and technological systems in the world of work. At the same time, human resource literacy is the ability to be good at communication, not rigid and individual. Mastering the age of Industrial Revolution 5.0 requires education that produces a generation

that is creative, innovative and competitive. One of the ways to achieve this is to use technology in the education world.

Android-based smartphones can be used not only for communication, but also for learning, such as using interesting learning media. Most students know that Android apps are a form of entertainment and a challenging and fun way to learn. Of course, if Android can be used as a medium to convey interesting stories in the form of photovovela, it can also be used to convey learning materials [1]. This certainly serves as an opportunity for educators to use it as a learning medium Android-based systems can run on various types of smartphones and tablets. The system is a next-generation mobile platform that offers developers the opportunity to develop as intended.

One of the hardware that can be developed such as learning media with criteria that can provide a wide learning environment is a smartphone or mobile phone [2]. Learning media using mobile technology can be used as an alternative in learning because it is flexible which can be carried anywhere and can be used at any time. This mobile learning medium is often referred to as mobile learning M-Learning [3].

Currently, geography teaching can prepare high school students to face competition and challenges to improve their skills, namely spatial thinking skills [4]. The competition of this period required the planning and understanding of geosphere phenomena in the form of specific spaces. The need for the role of spatial thinking abilities in this era can be exemplified by avoiding impending natural disasters. Relevant job opportunities require skills that require training from the start, such as learning geography. In this study, the role of spatial thinking ability is used to analyze the dynamics of population growth and is associated with the impact caused by the dynamics of population growth in a certain space. This study discusses how to design and build an geographic learning application. The applications can be run on the Android platform. With this application users or students can be helped in improving spatial ability. By using this application students can also study anywhere and anytime

METHOD

The present study was held in SMAN 1 Gemolong which located in Sragen Regency under the following considerations; (i) SMAN 1 Gemolong Sragen is a school that has implemented android-based evaluation so that it can be ensured that all students already have android facilities. (ii) There has never been any research related to the development of android-based geography learning media.

This research is Research and Development (R&D) with the Thiagarajan model. Thiagarajan model which is known the 4D model research and development model consists of 4 stages, namely; define, design, develop, and disseminate [5] The 4D development model can be adapted into 4P, namely; definition, design, development, and deployment. The steps of the development procedure from the four steps of the Thiagarajan development model can be described in Figure 1.
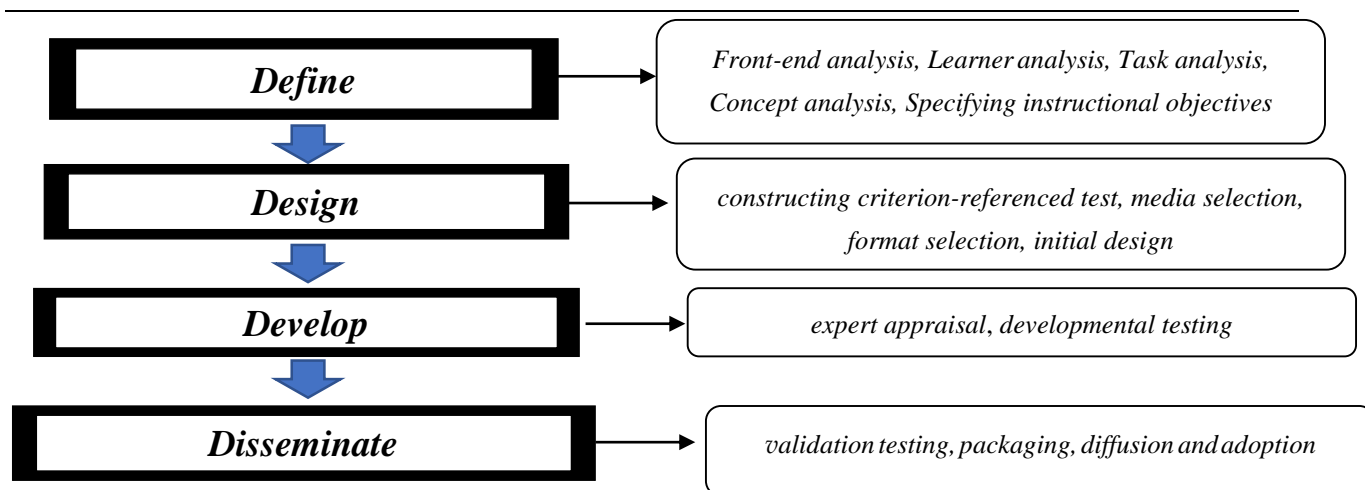
Figure 1. Chart of Steps for Developing Android-Based Learning Media

The population which becomes the target of the research was all students of class XI IPS SMA Negeri 1 Gemolong Sragen, and the samples used were students of class XI IPS 1, XI IPS 2 and XI IPS 3. Samples were taken by using in the purposive sampling technique. Purposive sampling technique determine research samples with certain considerations aimed at making the data obtained later representative. Selection of a representative sample based on data on the value of student learning outcomes and on the basis of the advice of geography teachers.

The data collected in this study are in the form of primary data and secondary data, both qualitative and quantitative. Primary data is data obtained directly from the respondent or subject under study or has something to do with the studied. The primary data was collected from needs analysis data, validation of learning media data, pretest and posttest data. Secondary data is data obtained from pre-existing data, so the researcher is the second hand who obtained the data. Secondary data in this study include, a list of student names, data on student learning outcomes, syllabus, lesson plans, and other data derived from the required school documents.

Data Analysis

The collaboration technique was conducted by following the triangulation manner, in which the validity of experts (material experts and media experts), and product trials which include: individual trials (one to one evaluation), small group trials (small group evaluation) and field trials (field trial evaluation). The primary data collected through the questionnaire were analyzed qualitatively and quantitatively.

RESULTS AND DISCUSSION

The feasibility of android-based geography learning media as a learning media on anthroposphere dynamics material and its impact on life can be known from the results of the validation test of a team of experts (material experts and media experts), and product trials which include: individual trials (one to one evaluation), small group trials (small group evaluation) and field trials (field trial evaluation). The aspects assessed by the material expert are the quality of the material / the accuracy of the material and the expediency of the material. Material expert validation data is obtained through media validation questionnaires that use the Likert Scale parameter, namely with a score range between 1 - 5 on a predetermined assessment sheet with certain criteria to determine its feasibility. The results of the expert assessment of the material can be seen in a histogram as presented in Figure 2.
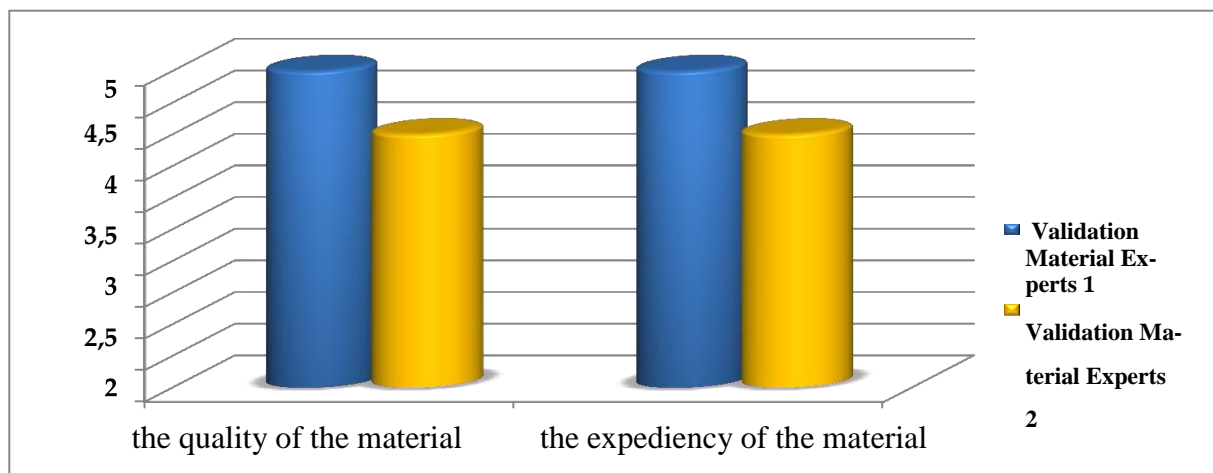
Figure 2. The Result of Validation Material Experts

Based on the diagram, it can be seen that the mode value in the aspect of material quality / accuracy of the material expert 1 is 5, which is included in the excellent category, while in the same aspect the mode value of the material expert 2 is 4, which is included in the good category. The mode value of the material expediency aspect of the material expert 1 is 5, which is categorized as excellent, while the mode value of the material expert 2 is 4, which is categorized as good. In general, the assessment of the material expert on the material content in the learning media product developed is very good and can be said to be worth using, but improvements must still be made according to the input / suggestions of the two material experts.

Media expert validation data is also obtained through media validation questionnaires that use the Likert Scale parameter, namely with a score range between 1 - 5 on a predetermined assessment sheet with certain criteria to determine its feasibility. The results of the expert assessment of the media can be seen in histogram in Figure 3.
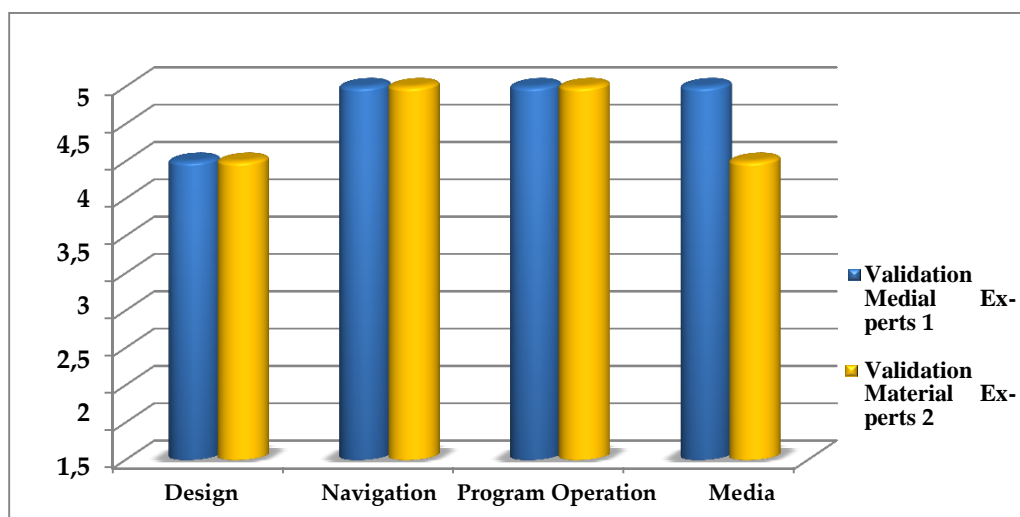

Figure 3. The Result of Validation Media Experts

Based on the diagram above, it can be seen that the mode value in the media design aspect of the material expert 1 is 4, which is included in the good category, while in the same aspect the mode value of the media expert 2 is 4, which is included in the good category. The mode value of the media navigation aspect of the

media expert 1 is 5, which is categorized as excellent, while the mode value of the material expert 2 is 5, which is categorized as excellent. The mode value of the operating aspect of the learning media program of the media expert 1 is 5, which is categorized as excellent, just like the media expert 1, the media expert 2 also gives a mode value of 5, which is categorized as excellent. The media efficacy aspect of the mode value of the media expert 1 is 5, which is categorized as excellent, while the mode value of the media expert 2 is 4, which is categorized as good. In general, the assessment from media experts of the learning media products developed is very good and can be said to be worth using, but improvements must still be made according to the input / advice of the two media experts.

Educator validation data is obtained from the educator validation questionnaire which uses the Likert Scale parameter, namely with a score range between 1 – 5 on the predetermined assessment sheet according to certain criteria to determine its eligibility. The educator validator in this study is one of the teachers who teach geography subjects. There are four aspects of assessment, namely ease of product operation, product visualization, quality / accuracy of materials, and product presentation. Thus, in general the assessment of educators of learning media products developed from all aspects of assessment gets a score of mode 4, which means it is good and can be said to be worth for using.

Individual trials are carried out to determine the assessment of students and get input and suggestions on learning media products before being carried out to the next stage, namely small group evaluation. Based on the result of individual trial results, it can be concluded that the geography android-based learning media product gives a positive impression and is very happy with the innovation of learning media in geography subjects.

After conducting individual trials, the next stage is to conduct small group trials. Small group trials conducted by 7 students. The students selected are suggestions from teachers of geography subjects who are considered capable of representing the characteristics of students. Technically, the implementation is the same as that carried out during individual trials, namely by asking students to try to integrate learning media. Based on the results of small group trial results, it can be concluded that learning media products developed in all aspects of student assessment in the small group trial stage are considered feasible to use with good criteria.

The last stage in the feasibility assessment of learning media products is field trials. Field trials conducted by 21 students. Based on the results of field trials, it can be concluded that learning media products developed in the field trial stage are considered feasible for use without revision with good criteria. Overall, students make a positive impression on the development of this learning media product.

The effectiveness of android-based geography learning media is known through a quasi-experimental or pseudo-experimental approach, namely by looking at the comparison of learning outcomes between classes that are treated in learning using developed media and classes whose learning used media used by geography teachers in schools, namely Microsoft Kaizala. After the learning process is complete, students are given a posttest which aims to find out the learning outcomes and spatial thinking ability of students by utilizing these media. that the average class score on the pretest was 65.8 and the student's score at the time of posttest increased with the grade average of 78.4. Based on the results of posttest and pretest, the average class value in the pretest was 65.8 and the student's score at the time of posttest increased with a grade average of 78.4. Based on these value data, it is known that there is an increase in learning outcomes and the spatial thinking ability of students with an average difference in class 12.6.

Aspects of spatial thinking ability used in test instruments are: comparation, aura, region, transition, analogy, hierarchy, pattern, and association. Based on the application of learning media developed to improve learning outcomes and students' spatial thinking ability obtained through posttest at the end of learning after

using the media. This posttest is in the form of multiple-choice questions totaling 25 questions made by including 8 aspects of spatial thinking ability based on the anthroposphere dynamics material. After the posttest was held, it can be seen that the spatial thinking ability of students has also improved. Figure 4 provides an explanation of the research results of 8 spatial thinking abilities of students.
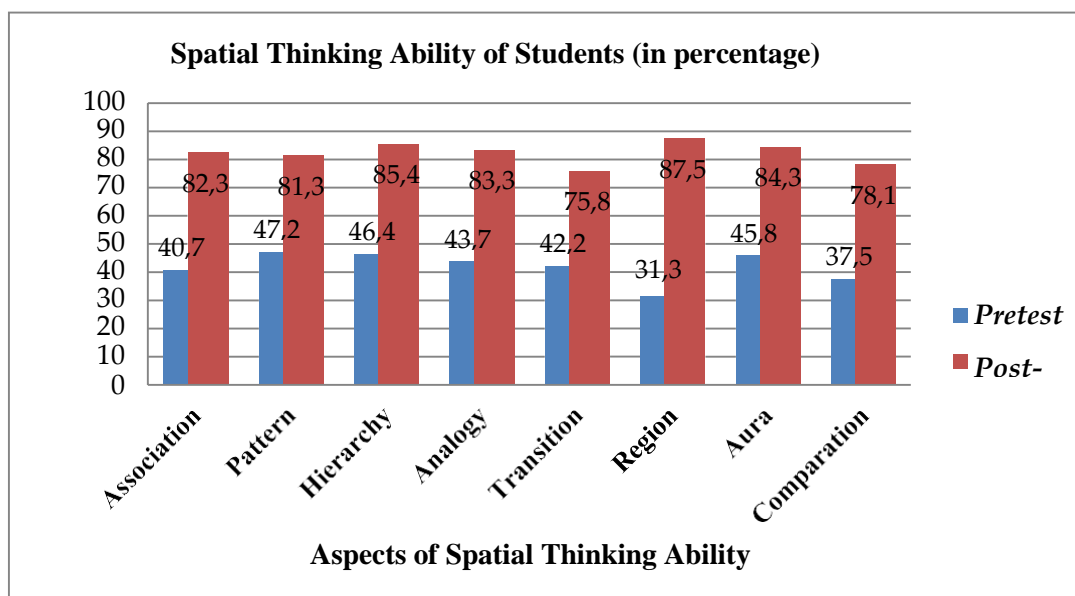

Figure 4. The Result of Spatial Thinking Ability

The spatial thinking ability of students also increased after using learning media products, especially in the regional aspect, which increased by 56.2%. Obstacles and limitations in the use of this media are that they require adequate facilities such as computer devices and internet networks. However, in reality not all schools have such facilities. If there is, it is sometimes constrained due to the limited number of computers and poor internet network.

CONCLUSION

Android-based geography learning media declared worthy of use in learning. It is based on assessment results from material experts and media experts who get the category very good, while the assessment of product trials in general is the awarded by educators and learners get good categories. Android-based geography learning media effective for improving learning outcomes and spatial thinking ability learners are compared to Microsoft Kaizala media. Spatial thinking ability students experience an increase after using learning media this is mainly on the aspect of the region. limitations in the use of this media are that they require adequate facilities such as computer devices and internet networks. However, in reality not all schools have such facilities. If there is, it is sometimes constrained due to the limited number of computers and poor internet network.

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