Development of A-SSI Learning Media (*Android Social Scientific Issues*) to Improve Science Literation in Earth Coating Subject for First Grade of Junior High School

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Abstract. This study aims to provide an alternative learning process that was supported by the use of A-SSI media (*Android Social Scientific Issues*) by including actual issues so that they could train and improve students' scientific literacy skills. The developing A-SSI media must be tested for feasibility based on three aspects, they were validity, effectiveness, and practicality. This study used a pretest-posttest design and tested on grade VII junior high school students. A-SSI media that would be used in learning process is validated by experts through a validation sheet. The results obtained based on the validators' assessment are 88.5% with the criteria “very good”. In addition, effectiveness of A-SSI media is tested through literacy tests and student responses. The results obtained in the literacy test, literacy skills of students were increased with an average n-gain of 0.66 with “moderate” category, there was a response given by students in the learning process with A-SSI media, 88.9% students gave a positive response of the using of A-SSI media. Then in the last aspect, that was practicality of media was reviewed through student activities and implementation of learning. The results obtained in the implementation of learning, 89.8% of activities designed in RPP were carried out well, while the activities of students based on the results of observation were very good and showed activities that supported scientific literacy skills.

1. Introduction
Science is a way of thinking, science as a way of investigating, science as a body of knowledge, and interactions with technology and society, so it means that science learn about object and phenomena that occur in nature. Studying science is one way to develop thinking skills to investigate objects and phenomena that occur in daily life. Through the investigation activities, facts and concepts will be obtained then can be developed. Science’s learning process should contain three dimensions, they are product, process, and development of scientific attitude. This statement shows that science’s learning process is not only focused on facts and concepts, but also work processes, ways of thinking, problem-solving processes, and development science attitude. These three dimensions can be fulfilled with the help of the teacher as a facilitator in establishing learning strategies. One of the suitable strategies for creating right science learning process is by associating science learning with literacy.
Science literacy is one of the important aspects for students to understand the environment, health, economy, and other problems faced by modern society. The problems around students can be used as a source of learning to understand them in terms of science. Unlike the case that happened in school shows that science learning in Indonesia still not supportive of science learning based on natural science itself. Based on PISA’s research, shows literacy skills of students. Although Indonesia has increased literacy skill compared to 2012’s result, Indonesia’s literacy skills are still low compared to the OECD average. The suitability of scientific literacy with the purpose of science learning, it is expected that scientific literacy can improve students’ skill in understanding and solving problems. Science learning will be better if it is supported by using suitable technology, such as smartphones. Smartphones are one of the important aspects of the life of digital generation like today. In this modern era, many things that were previously only can be done through computers but can be done by using mobile phone. Users of this smartphone are not only adults but also students who are sophisticated in operating a smartphone. The use of smartphones in science learning process will help students to package science concepts effectively that can be accessed anytime and anywhere.

In this case, the use of smartphones as a media for science’s learning process will help students gain meaningful experience, and make the information more memorable. This is in line from [1] which states that using media especially in science materials can help students gain meaningful experiences through observation, exploration, and experimentation, and make it easier for students to understand abstract scientific concepts to be more concrete. The learning media developed in this study is APK (Android Application Package), an android package which is generally used to store applications and then operate it on android device. In addition, this APK media developed because researchers have not found any research that develops ap media to improve student’s literacy skills. APK media developed in this study was made on powerpoint that has been edited in such a way as to add videos or photos if needed which are converted in form of WTPPT then can be changed to APK through an even application so it can be operated on android-based smartphones. Applications that need to be prepared in developing this media are WTPPT, Make APK Tool, Java, Flash Player, Any Video Converter and PowerPoint.

Apk media in this study consisted of concept maps, earth layer’s material. There are pictures and videos that are expected to help students to understand the information. Researchers also included authentic problems to help students associate information that has been obtained with those problems or phenomena. Based on these problems, the researchers will do research with the title “Development of A-SSI Learning Media (Android Social Scientific Issues) to Improve Student’s Science Literation in Earth Coating Subject for First Grade of Junior High School”.

Media comes from Latin, namely medium. The term can be defined as an intermediary of information from the source to the recipient in [2]. According to [3], learning media can increase learning motivation and quality in learning process. This is also indicated because learning process contains five components, they are teacher as a communicator, learning material, students as communicants, and learning purpose. The cognitive function of visual media is shown by the use of visual symbols or images to facilitate goals to be achieved. Whereas the last, compensatory function of learning media can be seen from the results of research that show visual media provides content for understanding text, so students who are weak in reading can understand text and remember it again. Based on [4], states many benefits by using media in learning process, including learning process will be more interesting so that it will grow student learning motivation. In addition, by using media, the teaching and learning process will increase students’ activity.

2. Methods

The type of research used in this study is Research and Development (R&D) with a 4D development model (define, design, develop, disseminate). Implementation of the development of this research is limited to 3 stages, namely define, design, and develop. This 4D model used in this study uses a model proposed by [5].
Figure 1. The development phase of 4D is divided into 4, namely define, design, develop, and disseminate. (available from http://conferences.uin-malang.ac.id for academic purpose only).

The research was conducted using a pre-experimental research design, one group pretest-posttest design to investigate the students’ learning outcomes of Earth layer material. This research was tested in a limited way to 10 people of class VII junior high school students who were randomly selected by considering a number of groups and students. So the trial was carried out in 3 groups with each group consisting of 3-4 people. Instruments used in this study amounted to 5 instruments, namely: media validation sheet, teacher activity observation sheet, student activity observation sheet, student response questionnaire, and learning outcomes test.

Analysis technique used to assess each aspect related to the feasibility of A-SSI media is feasibility validity is obtained from average percentage of validators, where A-SSI is declared feasible and valid if the percentage of each aspect in instrument reach minimum 61%. Practicality is obtained based on observation sheet of teacher activities, observation sheet of students activities. The observation sheet of teacher activities is obtained from observer assessments as long as the teacher manages class based on the lesson plan. Media learning can be concluded practical if the percentage of each aspect reach minimum of 61%. The observation sheet of student activities is obtained from observer’s assessment during learning process, in which students are assessed every 5 minutes. Effectiveness is obtained based on the complete competencies of student learning outcomes with different completeness value. Outcome test that is given to students is literacy question with level range from 1-5. Besides learning outcome, effectiveness of media is showed by questionnaire responses. Questionnaire responses of students were obtained from the average results of percentage of student assessment after using A-SSI media and said
to be feasible if the average score percentage for each aspect of a positive or negative question scored minimum 61%.

3. Discussion

The results of the feasibility media include the results of feasibility in terms of validity, practicality, and effectiveness. This results can be seen in Table 1 below:

| No. | Validated Aspects         | Percentage (%) | Criteria       |
|-----|---------------------------|----------------|----------------|
| 1.  | General Aspects           | 89.3           | Very good      |
| 2.  | Material Aspects          | 89.5           | Very good      |
| 3.  | Technical Aspects         | 86.7           | Very good      |
|     | Average                   | 88.5           | Very good      |

Based on [6] states in order to know the validity of developed media, the product must have been validated or assessed by an expert. Therefore, the feasibility based on this validity’s aspect is reviewed from the validator’s assessment of A-SSI media. Media validation consists of three aspects, namely general, material, and technical aspects. Based on [7], media can be categorized as good or very good if the percentage obtain minimum of 61%. Based on table 1, the results of media validation can be seen that A-SSI media is stated to be very feasible with an average percentage of 88.5% with “very good” criteria.

The practicality of a media seen from the ease of users in using A-SSI media. Practicality can be measured from three aspects, implementation of learning, student’s response. Besides, this practicality also can be assessed from student’s activities. The result of teacher activities is shown in Table 2 below:

| No. | Observed Aspects         | First Meeting | Second Meeting | Third Meeting |
|-----|--------------------------|---------------|----------------|---------------|
|     |                          | Percentage (%)| Criteria       | Percentage (%)| Criteria       | Percentage (%)| Criteria       |
| 1.  | Initial activity         | 89.3          | Very good      | 91.1          | Very good      | 89.6          | Very good      |
| 2.  | Main activity            | 94.2          | Very good      | 92.5          | Very good      | 92.1          | Very good      |
| 3.  | Closing activity         | 84.7          | Very good      | 85.9          | Very good      | 88.7          | Very good      |
|     | Total Aspects            | 89.4          | Very good      | 89.8          | Very good      | 90.1          | Very good      |

Based on Table 2, results of observation of teacher activities can be seen that learning with science A-SSI media on earth layer material was carried out well in first, second, and third meetings with the percentage of each meeting is 89.4%, 89.8%, and 90.1%. Overall, the observation of teacher activities has been very good with an average percentage of 89.8%. The results of observation of students activities during learning using A-SSI media are presented in Table 3 below:
Table 3. Observation of Teacher Activity

| Appeared Activity        | Percentage of student's activities (%) | Average (%) |
|--------------------------|----------------------------------------|-------------|
|                          | Pert I       | Pert II      | Pert III     |             |
| Observing                | 30.00        | 24.99        | 24.99        | 26.66       |
| Asking                   | 15.00        | 10.62        | 11.25        | 12.29       |
| Doing an experiment      | -            | 13.12        | -            | 4.37        |
| Discussing               | 18.12        | 13.12        | 14.99        | 15.41       |
| Doing the worksheet      | 15.00        | 15.62        | 18.12        | 16.25       |
| Communicating            | 7.50         | 8.12         | 10.62        | 8.75        |
| Other activities         | 13.75        | 14.37        | 17.50        | 15.21       |

Student activities observed in this study are student activities that support the learning process using A-SSI media. The observed activities consisted of 7 activities, namely observing, asking, conducting experiments, discussing, working on LKPD, communicating, and other activities. Observations were made by observers to observe 5 randomly selected students. Observations are carried out for 5 minutes in three meetings.

Based on Table 3 above, it can be seen that those activities of students as a whole start from observing to the teacher, asking question, answering, reading, working with tools, discussing, and doing the worksheet in a row to obtain an average percentage of 26.66%, 12.29%, 4.37%, 15.41%, 16.25%, 8.75%, and 15.21%. The most frequent student activity is observing. The last aspect of practicality is student response. Student responses show how student’s responses after learning process using A-SSI media. Student response is presented in Table 4 below:

Table 4. Student Response

| No | Rated Aspect                                                                 | Yes (%) | No (%) |
|----|------------------------------------------------------------------------------|---------|--------|
| 1  | Does the use of A-SSI (Android Social Scientific Issues) media make the learning process more enjoyable? | 100     | 0      |
| 2  | Is the appearance of A-SSI (Android Social Scientific Issues) interesting?    | 100     | 0      |
| 3  | Is the A-SSI (Android Social Scientific Issues) media easy to use?            | 90      | 10     |
| 4  | Can A-SSI (Android Social Scientific Issues) media help you to understand the material of Earth Layer? | 90      | 10     |
| 5  | Can the A-SSI (Android Social Scientific Issues) media function properly when used in science learning process? | 90      | 10     |
| 6  | Are the components in A-SSI (Android Social Scientific Issues) media safe to use? | 100     | 0      |
| 7  | Does the use of S-SSI (Android Social Scientific Issues) media can make you active in learning process? | 70      | 30     |
| 8  | Does A-SSI (Android Social Scientific Issues) media help students to relate learning material to the phenomena that occur? | 80      | 20     |
| 9  | student’s ability to analyze the phenomena happened around them?              | 80      | 20     |

Average 88.9 11.1
Based on Table 4, it can be observed that the student responses of A-SSI media were 88.9% with very good criteria. It means the media were easy to use. Practicality assessed based on product design that can be used realistically in [6]. In this research, a simple product can be states as realistic or not through the trial phase. Feasibility based on practical aspects in terms of observation of teacher activities as in Table 2, student activities as in Table 3, and student response as in Table 4. According to [7], observation of teacher activities can be organized as good media if the percentage obtained reaches minimum of 61%. Therefore, observations of teacher act as a whole are categorized very well with a percentage of 89.8%.

Effectiveness is assessed based on the results of the use of product development [6]. In this study, A-SSI media were declared feasible based on aspects of effectiveness in terms of students' learning outcomes. Researcher gave literacy questions with 1-5 level range. Comparison of student’s literacy skills at pretest and posttest is shown in the graph below:

![Figure 2](image)

**Figure 2.** The graph shows significant differences in answered questions with different literacy levels at pretest and posttest.

The graph above shows a significant difference in scientific literacy skills at pretest and posttest of students. All literacy levels from level 1b-5 have increased with a range of 35%-70%. For pretest question, student’s ability to answer the lowest literacy level question 1b, get 40%, then level 2 and 3 are 30% and 20%. As for high level of literacy, levels 4 and 5 get 10%. Students have increased in answering questions of posttest, question with level 1b are answered by 90% of students, then at level 2, 100% of students can answer the question. As for the levels 3,4, and 5, get a percentage of 72%, 66.7%, and 62.5%. The problem of literacy in this study is divided into three knowledge content, namely content, procedural, and epistemic knowledge. Based on these three aspects of knowledge, the increase in student’s literacy skills is shown in the following graph:
Figure 3. N-gain in each literacy knowledge content that is content knowledge, procedural content, epistemic content, get different scores.

Literacy that was tested on students, the average n-gain obtained in the aspects of content, procedural, and epistemic knowledge was 0.69 (medium), 0.67 (medium), and 0.64 (medium). The improvement of student literacy aspects is supported by the existence of A-SSI media which lists issues that occur around students by linking science concepts, so media can train students scientific literacy skills. However, in using this media, media must go through validation process that is assessed by 3 validators to describe whether the A-SSI media developed is suitable in science learning process.

Student’s scientific literacy has increased supported by student’s activities during the learning process. Based on data in Table 2, activity with the highest percentage is in observation activity. Observations made on learning with A-SSI media are observing scientific issues through videos and articles. This is suitable with statement which explains that scientific literacy refers to aspects of understanding and knowledge related to science issues, especially related to physical knowledge, life and nature so that observing videos on science issues and reading articles on socioscientific issues that can help improve student’s scientific literacy skills. Then proceed with other activities, namely asking questions, conducting experiments, discussing, doing LKPD, communicating and other activities are activities that support student’s scientific literacy abilities.

The student’s activities who support learning process can not be separated from teacher’s activities as a mediator who can provide learning process that supports student’s activities. Through a good learning process with tools that support student activities, it can be seen whether the learning process can train student’s scientific literacy skills. The implementation of learning assessed by two observers received a percentage of 87.9% and 93.2% at first meeting. The second meeting of the implementation of learning received percentage of 90% and 91.4%. Whereas in the third meeting, observers 1 and 2 gave assessments of 90.1% and 92.8% respectively. These results are very good results which indicate that the teacher has carried out the learning process according to the design that has been made. In addition, students are also actively involved in learning.

This is suitable with [7] which states that teachers’ activity is good or very good if the percentage obtained minimum 61% so that the average activity that has been prepared in learning design has been carried out. These results are also in line with [8], which shows that the use of media supports activities of teachers, do the learning’s implementation is also good.

4. Conclusion

Based on problem’s formulation, research objectives, research results and discussion in this study, it can be concluded that A-SSI media is declared suitable for use based on aspects of validity, practicality, and effectiveness. This is supported by the results of study as follows: (1) The feasibility of A-SSI media to
improve student’s scientific literacy in first grade of junior high school in earth material is very good with an average percentage of general, material, and technical aspects of 88.9%. (2) The feasibility of A-SSI media to improve scientific literacy of students in earth layer material based on practical aspects was stated to be practical with the percentage of learning implementation 89.8% with very good criteria supported by activities shown by students in learning process and there was a response given by students in the learning process with A-SSI media, 88.9% students gave a positive response of the using of A-SSI media, (3) The feasibility of A-SSI media to improve scientific literacy skills in earth layer material based on effectiveness aspects was declared effective by increasing scores from pretest to posttest. Posttest’s average score was 70.5 with an n-gain category. Nine students' n-gain has “medium” category and 1 student with “high” category.

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