Elite (E-Book Literacy) for Junior High School Student’s Scientific Literacy in Solar System Material

A T Kusumawati 1, Wasis 2, I G M Sanjaya 2, and Abd. Kholiq 2

1 Science Study Program, Postgraduate Universitas Negeri Surabaya
Jl. Lidah Wetan Surabaya 60213, Indonesia
2 Physics Department, Faculty of Mathematics and Natural Sciences, Universitas Negeri Surabaya
Jl. Ketintang Surabaya 60231, Indonesia

E-mail: anggraeniteti89@gmail.com

Abstract. Many researches on e-book development have been done, but they are different from the development of e-book literacy (ELITE). The developed ELITE has several advantages, including features that can be utilized to train students’ scientific literacy, the integration as a source of student learning, and teacher’s teaching material in learning. This study aims to produce ELITE which is reliable in terms of validity, practicality, and effectiveness review. The e-book developed is said to be worthy if at least it has good enough criteria. Type of research that is appropriate with the design of ELITE media development to practice scientific literacy is ADDIE (Analysis, Design, Develop, Implement, and Evaluate). The data collection employed included validation, observation and questionnaires. The obtained results show that the validity was in very valid category (learning 91.67%, material 92.71%, media 94.27% and language 90.74%). The practicality results are categorized very good with a percentage of 87.50%. The results of effectiveness based on the pre-test and post-test results are as follows: the scientific literacy competence to explain the phenomenon scientifically increased by 52% and the scientific literacy competence to interpret data and scientific evidence increased by 59%. The results of this effectiveness are included in the quite good category. In addition, the effectiveness results based on students’ positive responses are categorized very well (85.71%). Based on the analysis results, it can be concluded that the ELITE media developed is feasible to be used to train junior high school students’ scientific literacy particularly on solar system material.

1. Introduction
Natural science learning has significant contribution in the development of technology it becomes the basic science that underlies the development of technology [1]. International Council of Associations for Science Education (ICASE) states that students need to have adequate scientific literacy in order to be able to live productively and obtain the best quality of life as the goal of science education. This is in accordance with research [2][3], which state that science is very fundamental in all aspects of life, thus it needs to be studied so that all citizens, including Indonesia, are able to achieve the scientific literacy (Science Literacy Community) with still having good character.

In relation to the demand, the Program for International Students Assessment (PISA) as an examination system that is initiated by the Organization for Economic Cooperation and Development
(OECD) aims to evaluate the education system of 72 countries around the world every three years. [4] PISA defines scientific literacy as the capacity to use scientific knowledge, identify questions, and draw conclusions based on facts and data to understand the universe as well as make decisions from changes that occur due to human activities [5]. One characteristic of individuals who have high scientific literacy skill is that able to master concepts and understand their application in life and technology. The results [4] show that the level of Indonesian students’ rank for scientific literacy in 2015 was 62 of 70 countries participating on the test with the score of 403 [4]. This score indicates the level of scientific literacy of Indonesian students is considered still low category.

One of the efforts to foster students’ scientific literacy in learning process is by using learning media that utilizes technology. As we all know, at the time of current rapid development of information and technology (IT), it is considered to be easier for educators to convey information to the students. One of the strategies is by using electronic book (e-book) media. In a study that evaluates the use of e-books and digital broadcasting around the world, [6] e-book is defined as digital forms of some or all printed books or those of which are produced entirely in a digital environment, which can be read and accessed through portable devices such as computers and tablet. In a different definition, it is stated that e-books are a combination of software and hardware that allows text to be designed in an electronic environment or text in document and pdf format that can be viewed with devices other than computers [7]. E-books may change the traditional reading habits, so that the obtained information by students is believed to greater and may affect the transfer of knowledge from the educators to the students.

In addition, the use of digital books in the learning process is very appropriate. The developed literacy digital book in this study called ELITE (e-book literacy) has several potential advantages compared to the existing e-books. The developed ELITE has a more attractive look, some menus equipped with images, and animations and videos about contextual phenomenon that are equipped with instructions for activities that should be carried out by students. So that this e-book is expected to be one of the solutions to instil the culture of scientific literacy, especially for students and the community in general. The purpose of making this ELITE is to foster a culture of scientific literacy among students.

2. Method
The research used the ADDIE research design model (Analysis, Design, Development, Implementation, and Evaluation) [8]. In order to make this developed ELITE conceptually feasible, it requires validation from the experts. The eligibility criteria are evaluated from the aspects of learning, material, media and language. This ELITE can be said to be feasible (> 61%) if the results of experts’ validation for respected aspects are at least in good category. In terms of practical aspects, the developed ELITE was considered practical if it meets adequate criteria. In addition, in terms of effectiveness, the developed ELITE is considered effective if it meets the good enough criteria [9].

3. Result and Discussion
3.1. Validity of ELITE
The produced e-book by researchers is an e-book literacy (ELITE), which is based on the concept of scientific literacy. In the e-book, there are some features that may assist the students to practice science literacy, for example, presented videos that may foster students’ scientific literacy attitudes. In addition, in this e-book, there are some activities of which students should carry out in order to work in the form of the student worksheet. The produced ELITE can be described with some good pictures, from the ELITE cover and some ELITE features that can be used to train junior high school students about scientific literacy.
Figure 1. (a) ELITE Cover; (b) ELITE features to train the scientific literacy aspect of explaining the phenomena

The results of expert validation by three validators are illustrated in the following graphic (Figure 2):

Figure 2. Diagram of expert validation on the ELITE

The diagram illustrates the results of expert validation in the ELITE which is reflected in terms of required aspects by the 2013 Curriculum (K13). These aspects are the minimum competency standard, content standard, process standard, and assessment standard. Based on the validation results, it was obtained an average score of validation results in terms of the learning aspect is equal to 91.67% with the category of very valid.

In terms of material, the evaluation results gains 92.71% which means as a very valid category. In the validation of this material, there are three aspects that to be assessed, namely the relevance, consistency and adequacy of the materials. The relevance of the materials includes the suitability of the materials with the main competency and the basic competency as stated in K13, suitability with the needs of the students, and the suitability with the reliability of the material substance in ELITE. The consistency aspect includes the number of basic competencies in accordance with the learning targets in the lesson plan, the clarity of indicators for learning objectives and competencies achievement, and the suitability with the literacy characteristic.
The results of expert validation in terms of media gains 90.74%, which is categorized as very valid. The validity evaluation of this media is based on the aspects of the e-book suitability with the principles of instructional media as well as the principles of K13, and the compliance with writing and systematic design.

In terms of language used in the e-book, the expert validation shows 94.27% score, meaning the e-book is categorized as very valid category. The reviewed aspects in this language validation include the suitability of the used language with the students’ development, the suitability of spelling with The Enhanced Spelling, the effectiveness of used language in the e-book, the clarity of information or messages in the e-book, the accuracy of vocabulary selection in Bahasa Indonesia, the ease of understanding material in the e-book, the use of language for the message delivery, the use of language in accordance with the Indonesia Dictionary, and the accuracy of the language on the button. The results of media validation, based on the suitability of the e-book with the principles of learning media aspects and the principles of K13, and also with the writing and systematic design, gains 94.27% which is a very valid category, with the validity of > 61% [9].

In line with the results of the study, as research by previous researchers, the developed interactive e-book was included in good categories [10]. Likewise, [11] it can be stated that the use of e-book has a strong potential for students to change their perspective in reading and consuming existing reading interactively and make them comfortable, where general books have pictures, narratives, and graphics, e-Book can contain various features such as audio, music, animation, and video.

3.2. Practicality of ELITE
Practicality of the implementation of the e-book was also observed. The observation of the learning implementation by the observer during the ELITE-assisted learning process took place by using the instrument of implementation observation and the results of the implementation was in very good category. For more clearly and in detail it is described in Figure 3.

![Figure 3](image-url)  
**Figure 3.** The results of the ELITE-assisted learning implementation diagram

Based on figure 3, the diagram it can be seen that the relative effectiveness of learning runs very well (>61%) [9], but the aspect of the student’s involvement in the learning process by using ELITE received a relatively moderate assessment of 66.67%, this is because the students learned for the first time by using ELITE. Related to his research [12] the development of learning system using interactive e-book for elementary school students there are two things that are studied namely the evaluation of system development and the effects that occur in learning. This research is also in line with [10] which states that the motivation and attention of e-book uses can be increased because in the
e-book there are interesting images, this shows that e-book makes learning easier and faster than using traditional books.

3.3. Effectiveness of ELITE
The effectiveness of ELITE media can be indicated from the improvement of students’ scientific literacy skills from the acquisition of the obtained values during pre-test and post-test. Based on analysis of the gain score, it was obtained 47.62% student obtained the gain score in the low category and 52.38% in the medium category. From the results of pre-test and post-test on each indicator of scientific literacy, it was found that the level of students’ scientific literacy increased by 52% in terms of the indicator of explaining the scientific phenomenon, while in the indicator of interpreting data and scientific evidence increased by 59%. In terms of scientific literacy ability of the students based on the process shows that the average score of scientific literacy in the competence of explaining the phenomenon is 8.83 and the scientific literacy ability for the competence of interpreting data and scientific evidence obtains a value of 50.83. Figure 4 shows the detail score:

Figure 4. Scientific Literacy Ability Diagram based on process and test

Figure 4 describes the student’s scientific literacy ability in explaining the phenomenon which gains the highest score (based on process), because the students implemented the ELITE and worked based on the student worksheet, students perceived the easiness and assisted. Based on test, however, the students obtained lower grades. This condition is in line with research [13] that interactive e-books with the addition of visuals in it can increase the attractiveness of the user so that it can increase the desire to gain more knowledge. The motivation to increase wider knowledge can increase the level of scientific literacy of the junior high school students.

4. Conclusion
The analysis indicates the developed ELITE is reliable material (with very valid category), with specific criteria like very practical criteria for the practicality and the effectiveness to be implemented for junior high school student. Therefore, it can be concluded that the developed ELITE is feasible to train junior high school students to improve their scientific literacy, especially in the solar system course.

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