

# Development of e-Book with Flip PDF Professional Based on Scientific Literacy

Nadi Suprpto, Tamlikhotut Tafauliyati, Vivin Khoiri Yanti

*Universitas Negeri Surabaya, Surabaya, Jawa Timur, Indonesia*

**Abstract** – Technological developments can be used to support learning. One example of technological development is replacing printed books with non-printed books (e-Books). E-books can be used as interactive learning resources because they can be integrated with images, animations, videos, and flash to make them more exciting and look natural. This paper is one of the results of developing an e-Book based on scientific literacy on temperature and heat concepts. This study aims to produce a good e-Book used to support learning. This research uses ADDIE model development research (Analysis-Design-Development-Implementation-Evaluation) with descriptive-quantitative data analysis data collection techniques using validation sheets to determine the validity of e-books. The results show that the scientific literacy-based e-Book that has been developed is very valid to be used as a learning resource. The percentage value of validity from the media aspect was 92.98%, while the material aspect was 94.73%. Finally, the percentage value of the validity of the language aspect was 94.60%.

**Keywords** – validity, science literacy, e-Book, learning tools.

## 1. Introduction

Education is a conscious and planned effort to create a learning atmosphere and learning process.

---

DOI: 10.18421/TEM112-44

<https://doi.org/10.18421/TEM112-44>

**Corresponding author:** Nadi Suprpto,  
*Universitas Negeri Surabaya, Jawa Timur, Indonesia*  
**Email:** [nadisuprpto@unesa.ac.id](mailto:nadisuprpto@unesa.ac.id)

*Received:* 12 March 2022.

*Revised:* 11 May 2022.

*Accepted:* 16 May 2022.

*Published:* 27 May 2022.

 © 2022 Nadi Suprpto, Tamlikhotut Tafauliyati & Vivin Khoiri Yanti; published by UIKTEN. This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 4.0 License.

The article is published with Open Access at <https://www.temjournal.com/>

Students actively develop their potential to have spiritual strength, self-control, personality, intelligence, noble character, and skills needed by society, nation, and state [1]. Using education and quality, Human Resources (HR) can be created to support the development of a country. Developing countries believe that education is the primary key to happiness and financial protection in the future [2]. Education can be interpreted as a process where its implementation occurs formally or non-formally. One example is learning in schools. In practice, the learning process in schools is carried out so that learning objectives are achieved according to what is desired, one of which is in science education. Science education aims as a forum for students to learn about themselves and their natural surroundings and apply it in everyday life [3]. Thus, learning science requires students to acquire knowledge indicated by good cognitive values. Still, it is necessary to apply that knowledge to solve problems in everyday life.

The quality of education in Indonesia is still relatively low compared to other countries. It can be seen from the low level of scientific literacy achievement of students in PISA (Program for International Student Assessment). PISA defines scientific literacy as the ability to use scientific knowledge, identify questions, and draw conclusions based on scientific facts and evidence, to understand and make decisions regarding nature and its changes through human activities [4]. For individuals who have high scientific literacy skills, one of the characteristics is that they can master concepts and understand their use and application in everyday life and technology. Facts about the 2018 PISA results, Indonesia was ranked 70th out of 78 participating countries with a score of 396. This score was below the average [5].

The research results of the Research and Development Institute (Balitbang) of the Ministry of Education and Culture in researching the level of student scientific literacy revealed that in developing scientific literacy in Indonesia, there is still a shortage of excellent teaching materials compared to other countries so that these factors affect the lack of student scientific literacy [6]. In examining grade eleven textbooks, it was stated that the textbooks

only emphasized scientific knowledge. At the same time, the link between science and technology, and everyday life was still very lacking [7]. Presenting books that balance scientific literacy competencies are associated with social and community phenomena is one of the efforts that can be made to improve students' scientific literacy skills [8].

Based on the questionnaire given to 60 students, it was stated that 56.67% of students indicated that physics learning was less attractive. The main reason was the lack of use of digital media in learning, such as interactive e-books, so students found it difficult to understand concepts. About 80% of students stated that teachers taught using the lecture method with the help of student textbooks and teacher notes, and 78% of students have difficulty learning physics because of a lack of initial concepts and assume that what is taught in physics lessons is only formulas. This situation is supported by an interview conducted with one of the physics teachers, stating that they have not used digital media such as e-books with attractive appearances in learning physics due to limited time in learning.

From this description, efforts can be made by directing 21st-century competencies, utilizing existing technology as learning media to support the learning process by referring to scientific literacy skills, one of which is replacing printed books with non-printed books (e-books), which has several advantages, such as being more affordable and more practical. E-books that need to be developed do not only refer to scientific literacy skills, but book designs need to be integrated with images, animations, videos, and flashes to make them more attractive and look real so that students can easily understand concepts [9]. The use of e-books with interesting features further enhances students' literacy skills compared to printed books, where students who are tested using e-books have better reading comprehension skills than students who use printed books [10]. Interactive e-books can be used as an alternative to improve students' scientific literacy skills by integrating with six contents, including animations, videos, hyperlinks, interactive questions, worksheets, and evaluations [11]. In addition, e-books, by being integrated with virtual laboratories, can also be used as an alternative for schools that do not have laboratories, so the development of e-books developed can be the answer to technology integration in the 21st century [12].

Many physics e-books have been developed to support learning in the 21st century. However, most of these e-books, like printed books, have not been integrated with video and virtual laboratories and have not emphasized scientific literacy skills. Therefore, the author developed an e-book based on scientific literacy combined with several features that

can train students' scientific literacy skills. This research aims to produce an excellent scientific literacy e-book used as a learning resource.

## 2. Method

### 2.1. Design

This research is a type of development research with the ADDIE model, consisting of 5 stages: Analysis, Design, Development, Implementation, and Evaluation. However, this research only reached the Development stage to determine the validity of the e-Book. Visually, the steps of the ADDIE model can be seen in Figure 1.

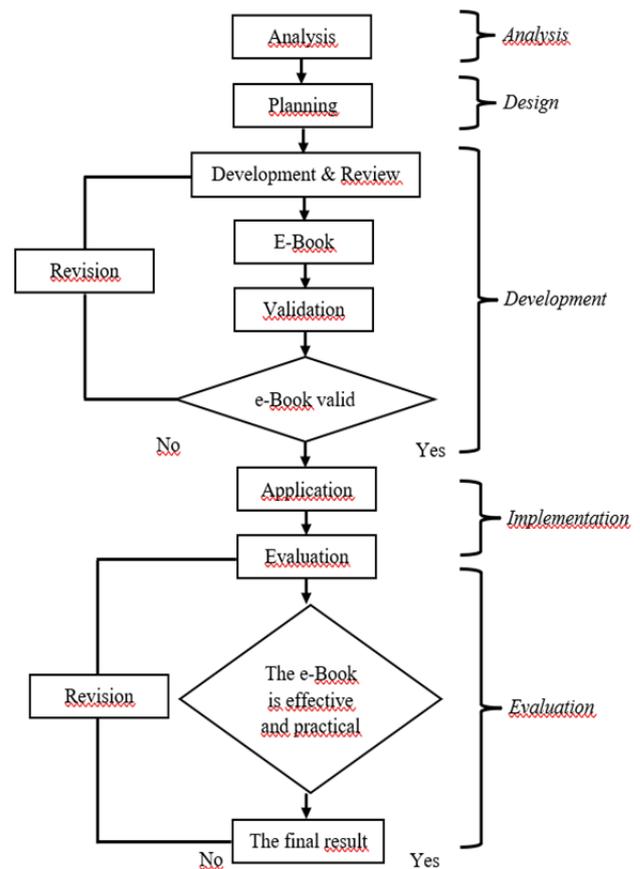


Figure 1. ADDIE Development Model Schematic

### 2.2. Data Analysis

This study obtained data from validation scores by three media expert lecturers. Data collection techniques to determine the validity were carried out using a validity sheet instrument developed previously based on three aspects, namely material, media, and language. The score obtained can be interpreted according to the interpretation of the data adapted by Riduwan [13] to describe the validity of the developed e-book.

### 3. Results and Discussion

This study describes the development of scientific literacy-based e-books. Based on the explanation in the method, research on the development of scientific literacy e-books was conducted using the ADDIE research design (Analysis, Design, Development, Implementation, and Evaluation). The following explains the steps for developing a scientific literacy e-book that has been created.

#### 3.1. Analysis Stage

This analysis stage includes an analysis of the purpose and background of making this e-book. Based on the 2018 PISA, the level of scientific literacy achievement of students is still relatively low [5]. In addition to the PISA results, the results of the scientific literacy test on temperature and heat material given to 60 students showed that as many as 85% of students were in the inferior category, 11.67% of students were in the poor class, and 3.33% of students were in the moderate category. It is due to the lack of use of technology in physics learning. This situation is supported by the results of the questionnaire that has been given, stating that 56.67% of students indicated that physics learning was less attractive. The main reason is the lack of use of digital media in learning, such as interactive e-books, 80% of students stated that teachers taught using the lecture method with the help of worksheets and teacher notes, and 78% of students have difficulty in studying physics due to the lack of initial concepts and assume that physics lessons have many formulas. It is supported by interviews with physics teachers who stated that they had not used digital media such as e-books. Therefore, an e-book based on scientific literacy was developed using professional flip PDF software. The software has been produced before and is suitable for use in learning. The development of e-books using professional PDF flip software carried out by the author certainly has differences from the previous one, namely differences in the purpose of making e-books.

#### 3.2. Design Stage

At the design stage, the researcher designs the concept design and graphic design of the e-book that will be developed. The method of the e-book concept includes planning the idea of the material that will be associated with the phenomena of everyday life and current technology, as well as planning for adding graphics to the material to train students in analyzing. The graphic design of the e-book includes cover page design, material display design, and the addition of

supporting features to practice scientific literacy. The cover page is designed by integrating images related to the phenomenon of temperature and heat. The following is an e-Book cover page design, as shown in Figure 2.

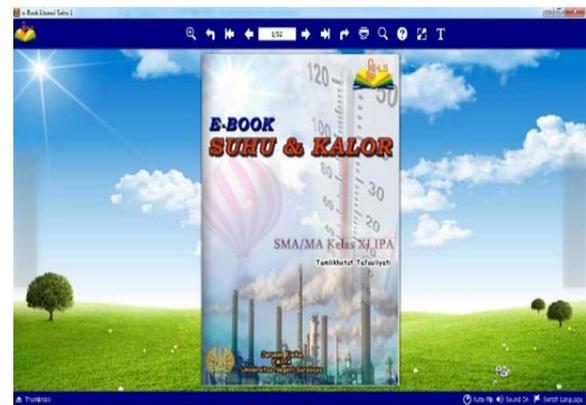


Figure 2. Cover Page

The e-book is integrated with additional features such as animation, pictures, music, videos, virtual laboratories equipped with student worksheets. With these other features, e-books will look more natural and attractive to support students' literacy skills than printed books [14]. In addition to these features, the e-Book is equipped with several navigations, as shown in Figure 3.



Figure 3. Navigation menu

In the figure above, there are several navigation buttons, including zoom, a switch to return to the cover page, a button to search for important words, a button to add notes, a button to select the desired page, and a button to go to the next and previous pages. To go to the next page, we can also press the corner of the e-book page. This navigation can make it easier for students to use e-books.

#### 3.3. Development Stage

At this development stage, namely the stage in making e-books, the designs that have been planned and the features that have been prepared are then built into e-books using a professional flip PDF. Using flip PDF professional software is because the software can add various multimedia, such as animation, video, YouTube, hyperlinks, music, and flash. In addition, the operation of the software is easy and fast. The following is a breakdown of the features added to the e-book:

- The addition of images and videos as supporting features is shown in Figure 4. The addition of pictures and videos is intended to support student

understanding. Besides that, it can also be used as motivation in learning. The video can be played at any time without any additional software as support.

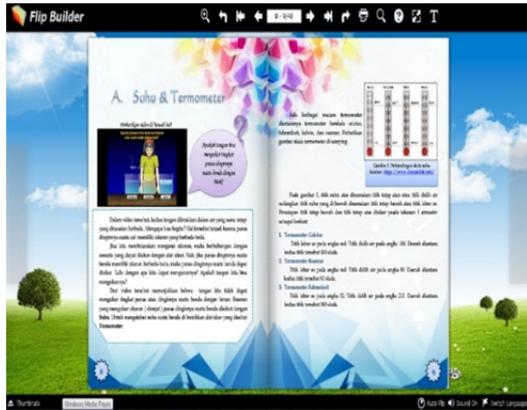


Figure 4. Adding Images and Videos in e-books

- The material in the e-book is associated with phenomena in everyday life and the use of technology by scientific literacy competence, namely explaining phenomena scientifically, as shown in Figure 5, where students are given the phenomenon of automatic electric irons. Then from this phenomenon, students are taught to explain the concept of temperature and heat. Additionally, they learn how to work together to maintain temperature. The explanation is integrated with an animated video on how to perform an automatic electric iron so that students can easily understand the concept.

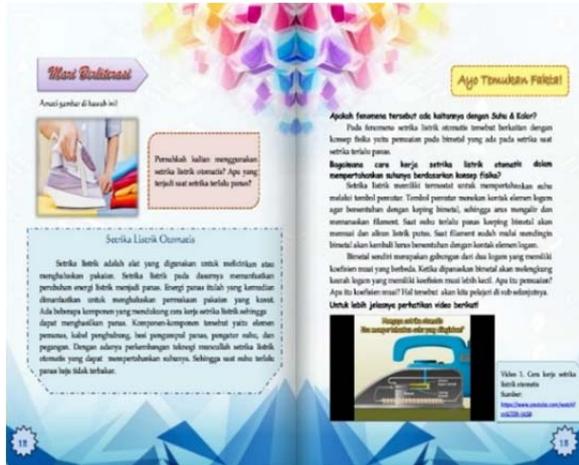


Figure 5. Overview of Material in e-Book

- Virtual laboratory on expansion sub-materials. The virtual laboratory is designed to provide several metals, including aluminium, copper, brass, iron, and glass. In the simulation, the temperature can be changed to determine the effect of temperature changes on increasing metal length (expansion). In addition, to assess the ability of some metals to expand. The image of the expansion simulation can be seen in Figure 6.

The simulation is by scientific literacy competencies, namely evaluating and designing scientific investigations. The simulation can be run without being supported by additional software, making it easier for students.

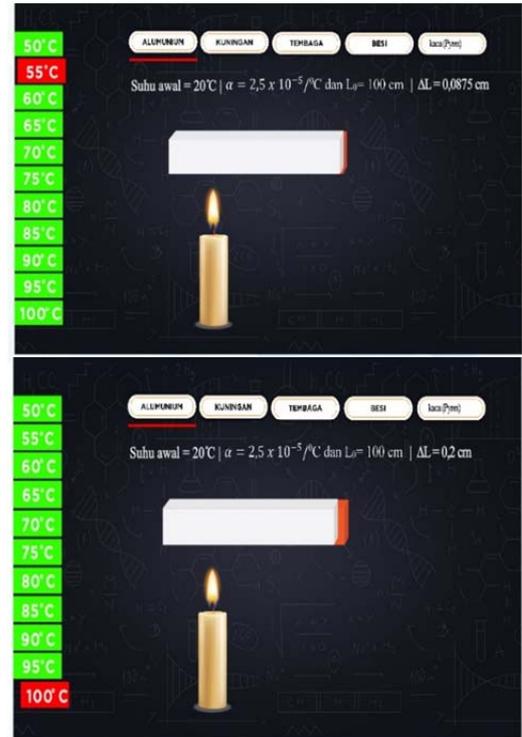


Figure 6. Substance Expansion Simulation Display

- The worksheet contains the steps in using the simulation and the purpose of the experiment.
- Examples of problems are equipped with answers and how to analyse them. An example of how to read and interpret graphs of experimental results is also exemplified.

At this stage of development, the e-book has been completed to determine if the e-book is valid; before it is realized in learning, it is necessary to have e-Book validity. The scientific literacy-based e-book was validated by three expert lecturers from the UNESA Physics Department. E-Book validation is reviewed from three aspects: media, material, and language. The verification results of the scientific literacy-based e-book can be seen in Figure 7.

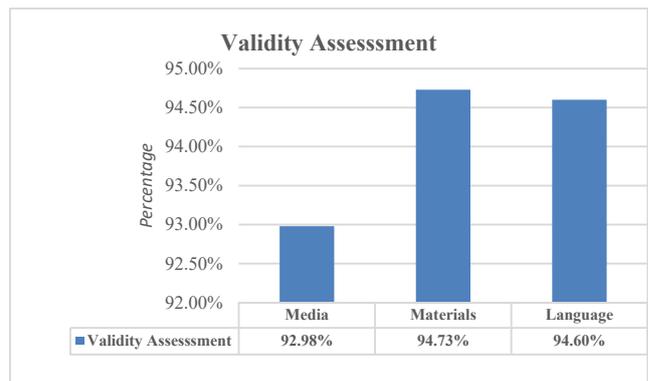


Figure 7. Percentage Validity of Science Literacy e-Book

Based on the graph in Figure 4, the percentage value of validity from the media aspect is 92.98%, the percentage value of truth from the material element is 94.73%, and the percentage value of reality is reality 94.60%. The percentage value of validity is very valid if the percentage value of truth is in the range of 81%-100% [13]. From these results, it can be concluded that the scientific literacy e-book is very valid in terms of these three aspects.

### 3.4. Implementation Stage

In the implementation stage, the scientific literacy e-books also need to be supported by learning materials that refer to science literacy-based e-books. The learning materials include the syllabus, lesson plans, students' worksheets, and assessment sheets. However, this paper is not focused on this stage.

### 3.5. Evaluation Stage

At the evaluation stage, a thorough assessment is carried out regarding the developed e-book. A thorough evaluation was carried out to identify the weaknesses and strengths of the developed e-book [12], [14], [15].

## 4. Conclusion

Scientific literacy e-books on temperature and heat materials integrated with pictures, animations, music, videos, virtual laboratories, and worksheets have been developed. The validity of the scientific literacy e-Book that has been designed is assessed from three aspects, including media aspects, material aspects, and language aspects. From these three aspects, the validity value is in the range of 90-95%. Thus, the scientific literacy e-book that has been developed is declared very valid to be used as a learning resource.

## References

- [1]. Permendikbud. (2016). *Peraturan Menteri Pendidikan dan Kebudayaan Nomor 22 Tahun 2016 tentang Standar Proses Pendidikan Dasar dan Menengah*. Jakarta: Depdiknas.
- [2]. Thut, I. N., & Adams, D. (2005). *Pola-Pola Pendidikan dalam Masyarakat Kontemporer*. Yogyakarta: Pustaka Pelajar.
- [3]. Ramalis, T. R., & Purwanto, P. (2018). Pengembangan tes kemampuan literasi sains pada materi momentum dan impuls dengan Analisis Item Response Theory (IRT). *Jurnal Riset Dan Kajian Pendidikan Fisika*, 5(1), 40-45.
- [4]. OECD, S. (2003). U.: PISA Literacy Skills for the World of Tomorrow Further Results from PISA 2000: Further Results from PISA 2000.
- [5]. PISA, O. (2019). Results Combined Executive Summaries Volume I, II, & III. Paris, Perancis: OECD Publishing.
- [6]. Kemdikbud. (2016). *Peringkat dan capaian PISA Indonesia mengalami peningkatan*. Retrieved from: [www.kemdikbud.go.id/main/blog/2016/12/peringkat-dan-capaian-pisa-indonesia-mengalami-peningkatan](http://www.kemdikbud.go.id/main/blog/2016/12/peringkat-dan-capaian-pisa-indonesia-mengalami-peningkatan) [accessed: 20 January 2022].
- [7]. Maturradiyah, N., & Rusilawati, A. (2015). Analisis buku ajar fisika SMA Kelas XII di Kabupaten Pati berdasarkan muatan literasi sains. *UPEJ Unnes Physics Education Journal*, 4(1).
- [8]. Sandi I., M. I., Setiawan, A., & Rusnayati, H. (2014). Analisis buku ajar fisika SMA kelas X di kota Bandung berdasarkan komponen literasi sains. *Prosiding Seminar Nasional Fisika (E-Journal)*, 3, 94-102.
- [9]. Asniar, A., Permanasari, A., & Mudzakir, A. (2015). Efektivitas Software Pembelajaran IPA Terpadu Model Connected Untuk Meningkatkan Literasi Sains Siswa Pada Aspek Konten Dan Konteks Tema Rokok Dan Kesehatan. In *Prosiding SNPS (Seminar Nasional Pendidikan Sains)* (Vol. 2, pp. 515-523).
- [10]. Reid, C. (2016). Ebooks and Print Books Can Have Different Affects on Literacy Comprehension. Master's thesis: John Fisher College, Fisher Digital Publications.
- [11]. Firdausy, B. A., & Prasetyo, Z. K. (2020). Improving scientific literacy through an interactive e-book: a literature review. In *Journal of Physics: Conference Series* (Vol. 1440, No. 1, p. 012080). IOP Publishing.
- [12]. Adam, A. S., & Suprpto, N. (2019). One-Stop Physics E-Book Package Development for Senior High School Learning Media. *iJET*, 14(19), 150-158.
- [13]. Riduwan, M. B. A. (2007). Skala pengukuran variabel-variabel penelitian. *Alf. Bandung*.
- [14]. Kusumawati, A. T., Sanjaya, I. G. M., & Kholiq, A. (2020, March). Elite (E-Book Literacy) for Junior High School Student's Scientific Literacy in Solar System Material. In *Journal of Physics: Conference Series* (Vol. 1491, No. 1, p. 012070). IOP Publishing.
- [15]. Suprpto, N., Ibisono, H. S., & Mubarok, H. (2021). The use of physics pocketbook based on augmented reality on planetary motion to improve students' learning achievement. *JOTSE: Journal of Technology and Science Education*, 11(2), 526-540.