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The Development of an E-book Based on Local Wisdom Around Bromo Tengger Semeru National Park to Train High School Students' Creative Thinking Skill

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ABSTRACT

Objective: This research aims to produce an e-book based on local wisdom on the use of medicinal plants by the people around Bromo Tengger Semeru National Park on plantae material to train students' creative thinking skills. **Method:** The research uses the ADDIE development model (analysis, design, development, implementation, and evaluation). Data retrieval through a validation process by three validators, namely education experts, material experts, and biology teachers, practicality through readability tests. **Results:** The results of the e-book validation get an average high score with very valid criteria. The practicality of the e-book is measured based on the readability test. The readability test results show the readability level at level 10 so that it is suitable for use by grade X students. **Novelty:** Students' creative thinking skills can be trained by integrating local wisdom with various learning media such as books, modules, and student worksheets, both printed and electronic.

INTRODUCTION

21st-century learning aims to develop and improve high-order thinking skills, for example, the ability to think creatively. Teachers are required to be able to facilitate the students so that they can practice these abilities. Creative thinking is an activity in which creativity appears in someone or thinking to produce something new for himself (Rachmantika & Wardono, 2019). Several indicators of creative thinking include fluency, flexibility, originality, and elaboration. Along with the era and student needs, teachers must be able to facilitate the ability of students, especially to practice 21st-century abilities and skills with appropriate learning media or teaching materials.

The teacher can use teaching materials that meet students' needs and existing conditions (Suprihatin & Manik, 2020). Interactive teaching materials such as e-books are appropriate because they have followed technological developments in their presentation. E-books take advantage of technological advances to be utilized in learning. E-books are published books in a digital or electronic form consisting of text, images, and multimedia that can be read on computers, laptops, smartphones, or other portable electronic devices (Alsadoon, 2020; Alsalhi et al., 2020; Saphira et al., 2023). E-books allow more student study time, where students can study the material being studied not only during these lesson hours. The presence of e-books is the right solution to be used as teaching materials that support online and offline teaching and learning

activities because e-books are very flexible so that students can read e-books without being limited by time and place.

The e-book development based on local wisdom still needs to be widely used in schools. Therefore, this e-book is developed and integrated with local wisdom, packaged interestingly and interactively so teachers can facilitate students in optimizing their creativity (Karyada et al., 2022). Creativity is an essential aspect of the world of work. One of the local wisdom in the East Java region that is still adhered to today is using plants as medicine by the Tengger tribe in healing disease. The Tenggerese people also concoct these plants based on their experiences gained by their ancestors, and some have been continued from generation to generation.

Based on the results of observations of traditional medicine, it is carried out by the Tengger people using several types of plants and various parts of plant organs by boiling, pounding, drinking, lulling, or rubbing the plant parts and rubbing them on the affected part. Apart from using plants, the primary traditional medicine for the Tengger tribe is carried out using the medium of *sujuk* or prayer. The majority of treatments carried out using plants are to cure mild ailments. Plants used as medicine are widely used to cure diseases such as fever, rheumatic pain, dizziness, rheumatism, and shortness of breath. To treat fever, shallots or leeks. Rheumatic disease is treated by using muscle flour. Meanwhile, rheumatism can be treated by using fennel plants. Dizziness and breathlessness can be treated using sprays, and itching is treated with *physalis anngulata* or *ciplukan*. The traditional knowledge of the Tengger people regarding medicinal plants is quite good and has been passed down from generation to generation (Hadi, 2019; Zulkarnain & Raharjo, 2019). Nowadays, it is threatened with extinction due to sociocultural changes that generally affect social values, and the younger generation is looking for alternative treatments that are more practical.

Developing teaching materials based on local wisdom is one form of effort to preserve local wisdom. Teaching materials based on local wisdom make it easier for students to understand, communicate, and solve problems with the information obtained. Learning will be meaningful by applying local wisdom-based learning (Saphira et al., 2022). The purpose of integrating local wisdom into the school's learning activities is to continue paying attention to environmental preservation. It is hoped that students can expand and empower their respective regional potentials, allow them to more easily recognize local natural resources as a source of learning, and make it easier for students to remember teaching materials with real natural resources learning and accessible. Integrating local wisdom in learning can also help students understand and appreciate the cultural richness of the local community (Supriyanto, 2017). By compiling an e-book based on local wisdom on the use of medicinal plants by the community around Bromo Tengger Semeru National Park, it is hoped that it can train creative thinking skills and foster a conservation spirit for high school students so they can maintain and preserve the local potential that exists around their area. This aligns

with research conducted by Melati et al. (2020), who developed a booklet based on local wisdom on plantae material.

Research conducted by Basaroh et al. (2020) stated that according to an analysis of student learning difficulties, 70.00% of students chose *Plantae* material as data was complex to learn. The difficulty of students learning *plantae* material is because the material in the book is less attractive for students to study in the book and the learning atmosphere in class. *Plantae* material can be innovated using e-books that utilize local wisdom in the area where students live so that students not only study plant diversity from books but also have knowledge and sensitivity to the surrounding environment (Puspita et al., 2017). Research by Shaddono et al. (2019) shows that developing interactive e-books filled with local wisdom can increase student learning motivation. Moreover, Pratiwi (2021) stated that there was an increase in the learning results by utilizing e-books based on Jember local wisdom. Syafani and Tressyalina (2023) believe interactive e-books based on local wisdom can improve student learning effectiveness. Based on the previous research, the researcher considers that there needs to be more research on developing e-books based on local wisdom to improve students' creative thinking skills. For this reason, in order to help teachers facilitate students so that they can optimize their creativity and are expected to foster a conservation spirit in students, an e-book will be developed which will present local wisdom around the Bromo Tengger Semeru National Park area regarding medicinal plants which are packaged attractively and interactively.

RESEARCH METHOD

This research is development research with the ADDIE development model, which has stages like analysis, design, development, implementation, and evaluation. Each stage is evaluated to reach the next stage (Rizki et al., 2023; Saphira et al., 2022). The analysis phase includes curriculum analysis, student analysis, material analysis, and formulation of learning objectives. The design phase includes determining the type, topic, title, time allocation, and material. The development stage includes compiling the entire e-book, which the experts then validate. The implementation phase includes limited trials and practicality assessment of the e-book through readability tests. The evaluation stage is a revision of the e-book that has been developed. The trial was applied to 20 8th State Senior High School Surabaya students. Each step of this research method can be seen in **Figure 1.**

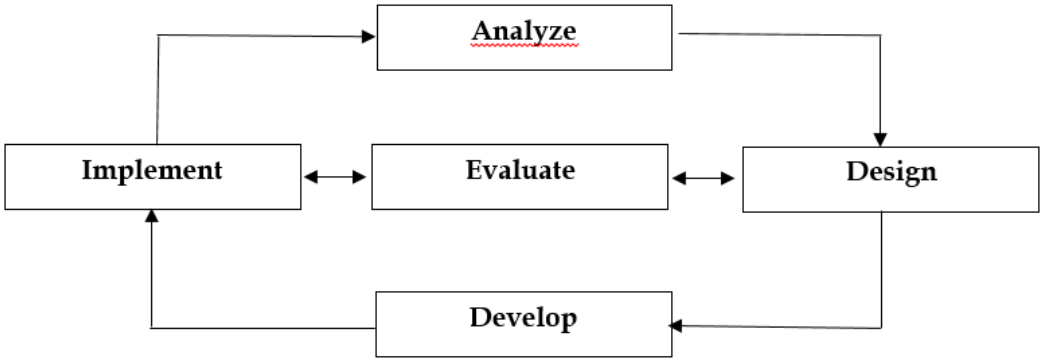


Figure 1. Research method.

The validity of local wisdom-based e-books is measured based on the results of validation by experts in education, materials, and high school biology teachers using an e-book validation sheet containing several aspects like presentation, content, and language. The validation assessment refers to Likert Scale 1-4 (Riduwan, 2013), then the score data obtained is analyzed using the following formula:

$$\text{Validation Score} = \frac{\sum \text{all criteria score from validator}}{\sum \text{Validator}}$$

The results of these calculations will be interpreted based on the criteria in the assessment criteria adapted from Riduwan (2013). An e-book is declared valid if it obtains a value ≥ 2.51. Table 1 is the assessment criteria.

Table 1. E-book validity criteria.

Value Intervals	Criteria
3.26 – 4.00	Very Valid
2.51 – 3.25	Valid
1.75 – 2.50	Less Valid
1.00 – 1.75	Invalid

(Source: Riduwan, 2013)

The practicality of e-books based on local wisdom is measured using the readability test. The readability test method is carried out by selecting the initial, middle, and final reading of the e-book of 100 words. Then, count the number of sentences and syllables. The number of syllables obtained is then multiplied by 0.60. The number of sentences and syllables obtained is then converted into a Fry chart. The readability test was repeated three times. The readability of an e-book is feasible if the intersection of the vertical line indicating the number of sentences per 100 words and the horizontal line indicating the number of syllables per 100 words is at levels 9-11. The readability rating of the discourse should be increased by one level and reduced by one.

RESULTS AND DISCUSSION

Result

The analysis phase includes curriculum, concept, and student needs analysis. The curriculum used in developing e-books based on local wisdom on the use of medicinal plants refers to the 2013 curriculum. The Basic Competency (BC) used in plantae material is Core Competencies 3.8 and 4.8. The concept of plantae material presented in the e-book includes mosses (*bryophyta*), ferns (*pteridophyta*), and seed plants (*spermatophyta*). It includes characteristics, classification, life cycle, role, and information regarding the local wisdom of medicinal plants. The analysis of the student needs includes an analysis of student characteristics, task analysis, and teaching materials needed by students. The e-book based on local wisdom on medicinal plants has been developed for limited trials to grade X students of 8th State Senior High School Surabaya aged 15-16 years. The tasks presented in the e-book are formulated according to indicators and concepts or material taught to students to achieve the learning objectives. The assignments given to students in learning activities using the e-book consist of individual and group assignments focusing on training students' creative thinking skills. Learning media that students need at this time are learning media that are interactive and flexible and keep abreast of technological developments (Prahani et al., 2022). Therefore, the teaching materials developed are electronic books because they can be accessed anytime and anywhere using software such as mobile phones, laptops, or computers.

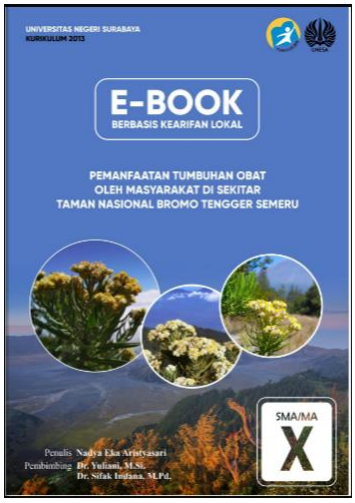
Design

At this stage, designs or e-book designs based on local wisdom on the use of medicinal plants are being made. The design of the e-book is made based on the needs at the analysis stage, consisting of e-book covers, instructions for using the e-book, Core Competencies (CC) and BC, and e-book characteristics that contain e-book features such as Bio info, Bio Knowledge, Bio local wisdom, Bio Notes, and Bio evaluation. The designs that have been made are then saved in PDF Pro format to make it easier for students to use the e-book. Table 2 shows the appearance and features of the e-book based on local wisdom on the use of medicinal plants.

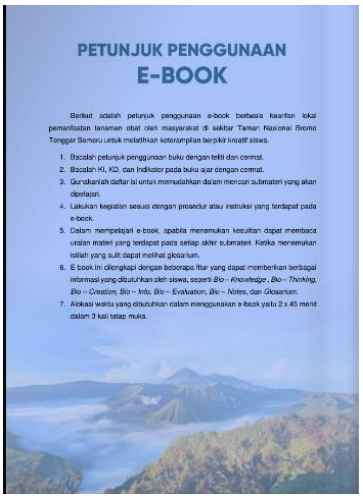
Table 2. Appearance and features of local wisdom-based E-books.

Views and Features of the E-book	Description
E-book cover	The e-book cover display is simple and quite attractive. The e-book is entitled *E-book Berbasis kearifan* Lokal. An illustration of Mount Bromo and medicinal plants is also displayed to give students an idea that the activities carried out are related to local wisdom in using medicinal plants by the community around Bromo Tengger Semeru National Park.
Instruction for using e-book	Students use instructions for use to be able to operate and understand the e-book and its features.

Views and Features of the E-book	Description
Characteristics of e-books	The characteristics of e-books are the features of e-books, such as bio notes, bio info, bio local wisdom, bio knowledge, and bio evaluation.
Bio local wisdom feature	The "bio local wisdom" feature presents the local wisdom information related to plants used as medicine by the Tengger tribe community, and there are questions to train students' creative thinking skills (fluency, flexibility, elaboration, originality).

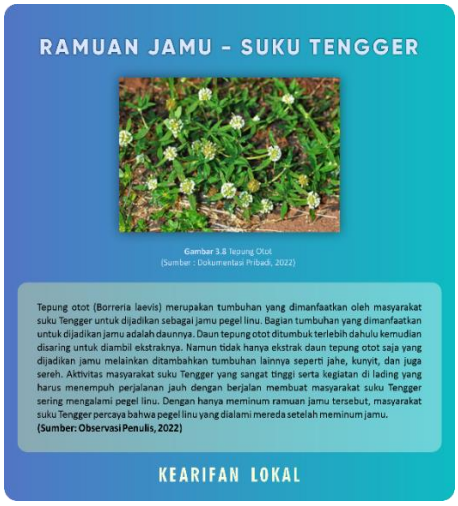


(a)



(b)

Figure 2. (a) display of the e-book cover and (b) display of the user manual for the e-book.



(a)

(b)

Figure 3. (a) display of the characteristics of the e-book and (b) display of the Bio local wisdom feature.

The e-book contains the competencies and learning objectives students must obtain during the learning process. Students will also be able to know local wisdom in the form of plants used as medicine by the Tengger people so that they can better understand the concepts in plant material. The e-book is equipped with instructions to make it easier for students to operate the e-book independently (Ormancı & Çepni,

2020). Evaluation questions in the e-book are answered via the Google form so that this e-book can be used online or offline.

Development

The results of the E-book design based on local wisdom on the use of medicinal plants are then validated at the development stage. E-books based on local wisdom on the use of medicinal plants on Plantae material were feasible and ready for limited trials to students (Sudarmin et al., 2020). Validation was carried out by two expert lecturers and one biology subject teacher using a validation sheet consisting of presentation, content, and closing aspects. Before validation, the e-book was first reviewed and received several suggestions, namely, the cover page's design to be more attractive so that students could be more motivated to learn and adding videos to the material to encourage students to think creatively in solving problems. The review results from the supervising lecturer are then used as a reference for revision. The revised e-book can then be validated.

Validation Test Results

The results of validation by two expert lecturers and one biology teacher for each aspect are in Table 3.

Table 3. E-book validation results.

Rated aspect	Average ($\bar{x}$)	Criteria
Learning	3.89	Very valid
Materials	4.00	Very valid
Media	3.79	Very valid
Language	3.67	Very valid
Local Wisdom	3.78	Very valid
Average	**3.80**	**Very valid**

Overall, the validity score of the developed e-book gets an average value of 3.80 with a very valid category, so it can be concluded that the e-book is very feasible for use in learning. The overall validity assessment graph is presented in **Figure 4.**

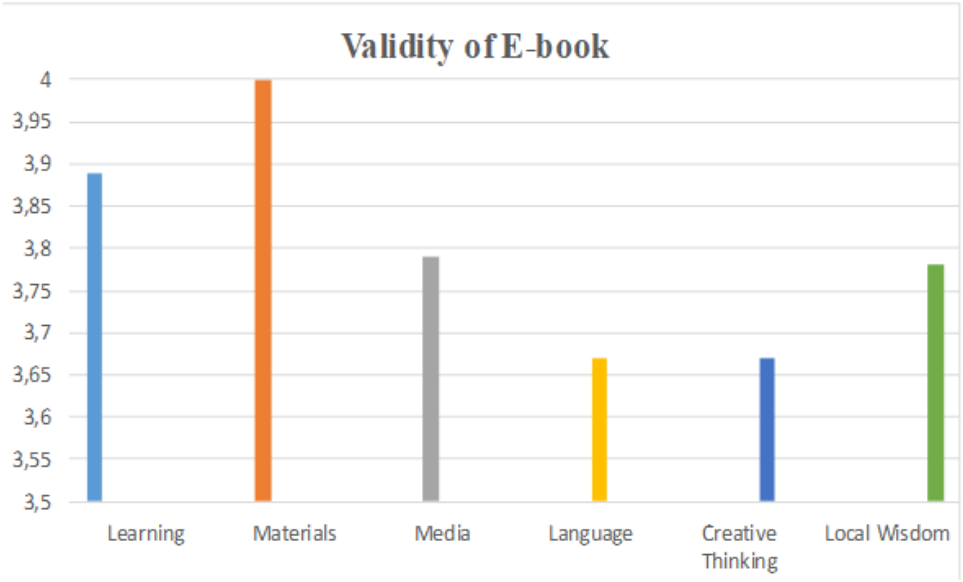


Figure 4. Graph of e-book validation results.

E-books get an average validity of the learning aspect 3.89, the material aspect of 4, the media aspect of 3.79, the language aspect of 3.67, the creative thinking aspect of 3.67, and the local wisdom aspect of 3.78.

Practicality Test Results

The practicality of the e-book is measured based on the readability test. The readability of the e-book is the level of ease of students in understanding and skills in reading media using 100 words taken from one page in the Fry Graphic Formulation e-book. Flipbooks that facilitate learning for ten graders of Senior High School are declared empirically feasible if the readability test results are between levels 9-11. The results of the readability test are presented in Table 4.

Table 4. Results recapitulation of readability test.

Reading Section	Number of Sentences	x 0.6	Level
Beginning	7.00	143.20	9
Middle	6.00	148.80	9
End	6.00	168.80	11
Average	6.30	153.60	10

Based on Table 4, the average reading on the e-book is at level 10, which can be interpreted as the e-book being measured having a readability level corresponding to the level for ten graders of senior high school. Hence, the e-book is suitable for Tenth-grade students at the high school level.

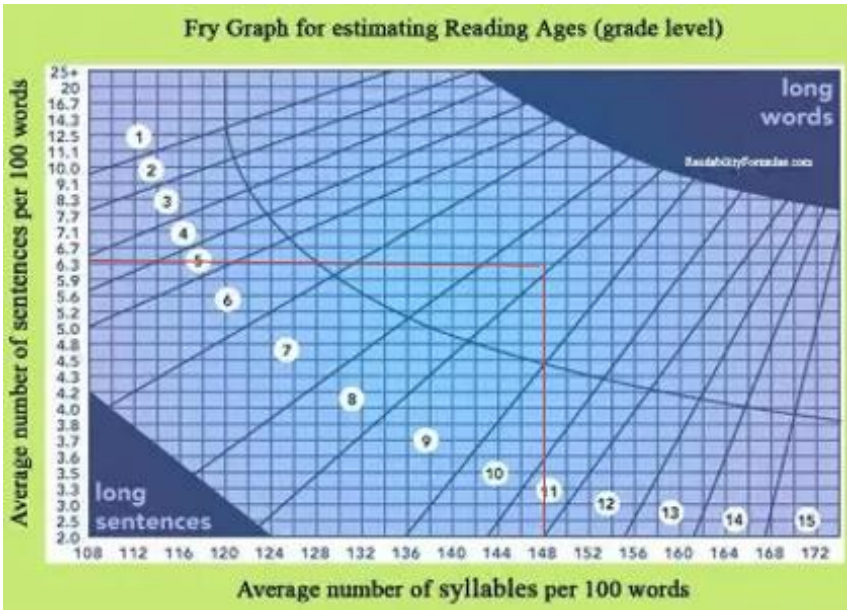


Figure 5. E-book Readability Test Results

Discussion

E-books get an average validity on the learning aspect of 3.89 with **very valid** criteria. The learning aspect is reviewed from the suitability of the e-book with the 2013 curriculum learning criteria and the competencies to be achieved or developed in improving creative thinking skills. E-books based on local wisdom contain knowledge and information about the use of medicinal plants by the Tengger tribe to broaden knowledge and foster a spirit of conservation in students towards their natural resources. In addition, bio-thinking and bio-creation features facilitate students to express and realize their creative ideas to solve everyday problems. E-books get an average validity on material aspects of 4 with very valid criteria. The material aspect is reviewed from the formulation and presentation of the material. E-books present material that is arranged coherently and systematically; besides that, in preparing the material, the level of usefulness, importance, and application of concepts in everyday life is considered to attract the attention of students to learn more. Writing words and sentences must be considered carefully because it will affect students' reading interest and understanding of concepts (Hermawan, 2019).

E-books get an average validity on the media aspect as a whole of 3.79 with very valid criteria. The media aspect is reviewed for the suitability of the media with the principles of good learning media, media work processes, and media appearance. E-books get an average score on the suitability of media with the principles of good learning media 3.67 so that e-books can be easy to see, attractive, simple, well-organized, coherent, practical, and interactive. An interactive design can improve student understanding and increase student learning outcomes. Lestari (2018) argues that if media such as images, graphics, and videos are packaged in e-books, it will attract students to increase interest in learning and make it easier to study material wherever and whenever. Then, in terms of media work processes, e-books get an average score of 4.00, so the boot speed, turning pages, accessing links, and navigation buttons are relatively fast. Furthermore, in terms of media appearance, e-books get an average score of 3.67, so the layout compatibility, font selection, content, color, and readability of information on e-books are classified as very good. A good e-book must contain the criteria of a good title, content, color, font selection, and readability information on the e-book. Interestingly, the presented media can encourage student interest in learning and help students understand the concepts (Wulandari et al., 2019).

E-books get an average validity on the language aspect of 3.67 with very valid criteria. The aspect of language is viewed from the use of language by linguistic rules, then the selection of practical and communicative language, as well as consistency in the use of terms, symbols, and symbols. Jumaiyah (2018) argues that the presented language must be communicative to properly understand the material and instructions. The language used in the developed e-book has been adapted to Enhanced Spelling (EBI) so that the sentences in the developed e-book are appropriate and well-organized (Falah et al., 2021).

E-books get an average validity on creative thinking aspects of 3.67 with very valid criteria. The Aspects of creative thinking include the four creative thinking skills: fluency, flexibility, detail (elaboration), novelty (originality). Based on these results, the average score for all indicators is 3.67. This shows that the content contained in e-books can facilitate well in improving students' creative thinking skills. Creative thinking skills have a purpose in that students can produce ideas or thoughts that are new or unique. To practice fluency and flexibility in creative thinking skills, students will be encouraged to provide arguments and strengthen answers to experiments or project work results. Project-based learning can motivate students to express opinions, generate new ideas, and create product innovations. Practicing elaboration creative thinking skills is done by asking students to design a formula to produce ingredients from plants used as medicine. Students will develop their ideas after understanding the given situation. In line with Ismuwardani's research (2019), making steps in a project can bring out students' creativity by giving them the freedom to develop their potential. Students are asked to express their ideas and ideas related to conservation efforts to preserve medicinal plants, and this can train originality and creative thinking skills. Noviyana (2017) argues that complex activities carried out by students, from planning to doing projects, can build creativity in solving problems with various new ideas.

E-books get an average validity on aspects of local wisdom of 3.78 with very valid criteria. Integrating e-books and local wisdom can improve the quality of education by increasing the relation between the subject matter and real life (Nuryanti, 2017). Aspects of local wisdom in terms of presentation of material based on local wisdom on the use of medicinal plants by communities around Bromo Tengger Semeru National Park, concrete examples of local wisdom on the use of medicinal plants by communities around Bromo Tengger Semeru National Park, as well as insights into the importance conservation or preservation of local wisdom on the use of medicinal plants by the community around Bromo Tengger Semeru National Park. The local wisdom of the Tengger people is in the form of traditional medicine using plants. Treatment is traditionally carried out using one or several types of plants and various parts of plant organs that are thought to be helpful by boiling, pounding, drinking, rubbing, or rubbing the plant parts and rubbing them on the affected part. In addition to using plants, traditional medicine for the Tengger people is primarily carried out using the medium of *suwuk* (a kind of traditional prayer ritual). The majority of treatments carried out using plants are to cure mild ailments. Plants used as medicine are widely used to cure diseases such as fever, rheumatic pain, dizziness, rheumatism, and shortness of breath. To treat fever, *bawang seprong* (scallions) are used. Pegel rheumatic diseases are treated using muscle flour. Meanwhile, rheumatism can be treated by using fennel plants. Dizziness and shortness of breath can be treated using sprays, and itching is treated with *ciplukan* (a tropical fruit).

The practicality of the e-book is measured using a readability test, which obtains the overall average reading on the e-book at level 10, which can be interpreted that the e-

book has a readability level corresponding to the level for a grader High School. Therefore, the e-book is suitable for tenth graders of high school students. This shows that the e-book was developed based on the level of thinking for ten graders of high school students. The suitability of the level of readability with the level of students' thinking is the central aspect that needs to be considered in compiling a textbook so that students understand its reading (Mahendri et al., 2022). The ease of students in using media is one of the practical values of the media. In connection with Indriyanti's research (2016), which calculated the readability level of textbook discourse using Fry's chart, the results were by the student's reading level with the results of the calculation 1) Number of sentences: 7.1 2) Number of syllables: 266 x 0.6 = 159, 6. So, if interpreted on Fry's chart, the discourse corresponds to the level of class X senior high school. Discourse that is said to have a high level of readability is easier to understand, and conversely, the lower the level of readability of a discourse, the more complex the discourse is the more difficult it is to understand. This means that a discourse that has a low readability level means that the discourse is not suitable for being presented at the target level (Nuryani, 2017).

CONCLUSION

Fundamental Finding: Based on the result, electronic books (e-books) based on local wisdom of the use of medicinal plants by the people of Bromo Tengger Semeru National Park (TNBTS) on plant material that has been developed are declared suitable to use for learning to train students' creative thinking skill for 10 grade students based on the aspects of validity and practicality. **Implication:** This e-book can be a reference if the teacher will develop a learning media by choosing learning materials that are appropriate to the context of local wisdom, which can be found around the area of the student's lives. **Limitation:** The research was limited to validity and practicality. Therefore, effectiveness still needs to be done. **Future research:** There is a need for a large-scale trial to prove that this e-book can train creative thinking skills.

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