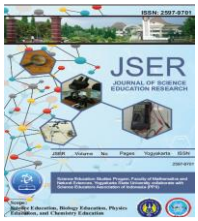
JSER 2021, 5(1), 6-13

JSER

Journal of Science Education Research

Journal homepage: www.journal.uny.ac.id/jser



Content validity test on moss plant e-book media with aiken formula

Abdullah Muamar *, Amin Retnoningsih, Yustinus Ulung Anggraito

Universitas Negeri Semarang. Sekaran, Gunung Pati, Semarang, Jawa Tengah 50229, Indonesia
* Corresponding Author. Email: aminretnoningsih2016@mail.unnes.ac.id

Keywords:
Moss Plant, E-book Media, Content Validity Test, Aiken Formula

ABSTRACT

Plantae material consists of three primary materials, namely moss, ferns, and seed plants. Moss plant material is difficult for students to understand. Hence, It is necessary to develop an e-book on moss plants that can provide learning solutions related to moss plant material. This study aims to measure the level of validity, feasibility assessment by High-School Biology Subject Teacher Forum (STF) in Semarang City, and student readability. The research and development method used is the 4-D development model. Several stages in the development research are define, design, develop and disseminate. The development stage includes expert validation, feasibility, and student readability tests. The research subjects are students of class X SMA N 12 Semarang. The data collection instruments are expert validation sheets, assessment sheets, and readability sheets. The analysis technique used is descriptive data analysis. The result of the e-book validity test for the material content, presentation, and language assessment aspects are 96% (very good), 96% (very good), and 94% (very good), respectively. The results of the assessment by learning media experts is 93% (very good). The e-book feasibility test by STF in Semarang is 95% (very good), and the e-book readability test is 90% (strongly agree).

INTRODUCTION

A large number of internet users and the ease of accessing it in Indonesia need to be utilized to develop digital learning media. One of these digital media is an e-book that is in demand by many students (National Literacy Trust, 2015). In the future, the need to read e-books in Indonesia is predicted to increase. The results of the Gramedia survey (2019) show that e-books are the most popular digital media. 85% and 56% of e-book users are millennial generations (25 - 40 years). The reasons for using e-books are practical (79%), economical (52%), modern (53%), support the latest information (31%), and environmentally friendly (31%).

The use of e-books in the world of education improves scientific (Istifarida *et al.*, 2017), critical (Rosida *et al*., 2017), and also creative (Mulyadi *et al*., 2016) thinking skills. Moreover, e-books also could foster learning independence (Pramana & Dewi, 2014), increase scientific literacy (Firdaus & Setiawan, 2019), improve learning outcomes (Budiarti *et al*., 2017), and train digital literacy (Misbah *et al.*, 2018).

Plantae material consists of three main materials, namely moss, ferns and seed plants. Moss material is difficult for students to understand due to 1) the small size of the moss plant because it does not have true roots, stems, and leaves, 2) the classification system is difficult because it has different structures, characteristics, and properties between species, 3) it has complex metagenesis stages, and 4) its phenetic and phylogenetic analysis has not been studied in depth in various teaching sources.

The results of the questionnaire analysis on 30 students at SMA N 12 Semarang City showed that students had difficulty answering questions about the reproduction (77%), properties and characteristics (83.33%), structure (80%), classifying (50%), phenetic and phylogenetic analysis (86.66%) of mosses. Most students used teaching materials in the form of worksheets that contain very narrow material summaries. The students' interest in reading worksheets was 40%. According to the student, the sudent worksheet had incomplete material coverage of mosses; it was colorless, lack of pictures, and very few examples of moss species.

Along with the development of information and communication technology (ICT), many students choose to bring laptops or gadgets instead of carrying textbooks. It is evidenced that digital media users in

2019, such as the iPhone Operating System (iOS), which reportedly reached 82.38% and Android was 17.62%. Textbooks are thick and heavy, making them difficult for students to bring to school. Therefore, students want everything to be practical and accessible through gadgets, so they do not have to bring heavy books to school.

The moss e-book was developed through the pro flipbook maker application. This application can present moss plant material to be more attractive with original visualization because it utilizes photo and video media, also it is easy to operate on laptops and mobile devices. The development of an e-book with a flipbook maker pro can increase student motivation (Istiqfar *et al*., 2018), metacognitive awareness (Mulyani *et al.*, 2016), learning achievement (Kodi *et al*., 2019), science process skills (Watin & Kustijono, 2017) and curiosity (Apsari & Kustijono, 2017).

The e-book with the pro flipbook maker is considered appropriate because it may be access through online or offline. Furthermore, there is no development yet of a moss plant e-book with a flipbook maker pro for class X high school learning. The desire of students to develop this moss e-book is 100%. Thus, it is necessary to conduct a content validity test on the moss plant e-book media.

METHOD

The research and development method used was the 4-D development model proposed by Thiagarajan *et al*. (1974). The stages in the development research were define, design, develop, and disseminate. The development research only reached the development stage, i.e.: expert validation, feasibility tests, and students' readability tests. The research subjects were students of class X SMA N 12 Semarang city. The data collection instruments were expert validation, assessment, and readability sheets. Then, the analysis technique used was descriptive data analysis.

RESULT

Product Development Process

The initial step of the product development process was the definition stage. This stage analyzed the needs of the moss plant e-book design, which includes the functional requirements analysis stage regarding the features that would be presented in the e-book, and concept analysis to determine the content of the e-book material. The task analysis was carried out to identify the main tasks that would be carried out by students, which consist of core competency (CC) and basic competency (BC) analysis. Furthermore, analysis of the learning objectives was also carried out to determine the indicators of learning achievement based on material and curriculum analysis. Moreover, analysis of procedures was carried out to determine the processes to be presented in the moss plant e-book. This needs analysis is important to obtain initial information for the development process (Setyosari, 2015).

The results of the needs analysis showed that SMA N 12 Semarang city has used the 2013 Curriculum. One of the CCs is the Plantae material. This material is taught to achieve two BCs according to the revised 2013 Curriculum in 2018, namely BCs number 3.8 and 4.8. BC 3.8 is applying the classification principle in classifying plants into their divisions based on the observation and metagenesis of plants and linking their role in the continuity of life on earth. Furthermore, BC 4.8 is being able to present the observed data and phenetic and phylogenetic analysis of plants. Plantae material consists of three main materials, namely moss, ferns, and seed plants. Moss plant material is difficult to study because of the variety of moss plant species, the small size, and the reproductive organs of mosses. This small size requires a tool when identifying the morphology of mosses.

The learning implementation plan (LIP) at SMA N 12 Semarang city used the scientific approach. The learning model used was project based learning, problem based learning, and discovery learning. The learning process has occurred very well. However, the difficulty of finding examples of moss plants in the school environment made the application of the scientific approach not optimal. Thus, field exploration is required in the development of the moss plant material content to optimize the scientific approach.

Then, the compiled plant material was packaged into an e-book based the flash Kvisoft flipbook to make it more interesting and detailed in accordance to the original visualization. Through the use of moss plants, photo and video media can provide understanding to students.

Product development results

The output of this study was a teaching product of an e-book on Plantae materials and moss plant sub-material. The development of the moss plant e-book provided detailed material on the structure, metagenesis, classification system, and phenetic and phylogenetic analysis of mosses, complete with CC, BCs, indicators,

and learning objectives. The material is also completed with color pictures and videos, followed by evaluation, practicum, glossary, and references that were arranged coherently. The followings are some views of the moss plants e-book that have been developed.

Figure 1. Cover view (top), material displays of mosses structure (second from the top) and classification (third from the top), and also display of explored moss species.

Validation test of the moss plants e-book

The teaching material assessment instrument from the National Education Standards Agency (NESA) was used, which was validated by instructional media experts and botanists. The results of the learning media expert's validity test are presented in Table 1.

Table 1. Result of the e-book validation test from learning media experts

No	Instrument	Average	Criteria
1.	Cover design	3.8	Very good
2.	Use of letters	3.9	Very good
3.	Cover illustration	3.5	Very good
4.	E-book layout	3.8	Very good
5.	Content illustration e-book	3.6	Very good
	Average	3.7	Very good

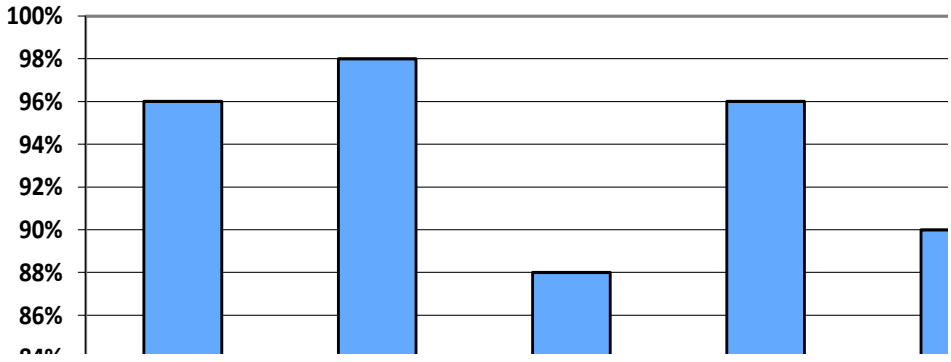


Figure 2. Percentage of learning media assessment

The results of the learning media expert's assessment showed that the moss plant e-book had met the criteria for the assessment instrument from NESA. E-books have the consistency of systematics presentation and graphic aspects. The design images are very good and interesting, and follow scientific writing rules. Based on the evaluation of the three validators, the average scores of the cover design, letters, and e-book layout aspects were 3.8, 3.9, and 3.8, respectively, which fall in the very good criteria (see Figure 2 in percentage). The average score for the five assessment aspects was 3.7 in the very good criteria (see Table 1).

In the assessment of the material expert validation, there are three aspects of assessment, viz.: material content, material presentation, and language. The results of the moss plant material expert's assessment are presented in Tables 2, 3, and 4.

Table 2. Result of content assessment of moss plant material

No	Instrument	Average	Criteria
1.	Content aspect	3.85	Very good
2.	Concept Accuracy	3.8	Very good
3.	Encourage curiosity	3.83	Very good
	Average	3.83	Very good

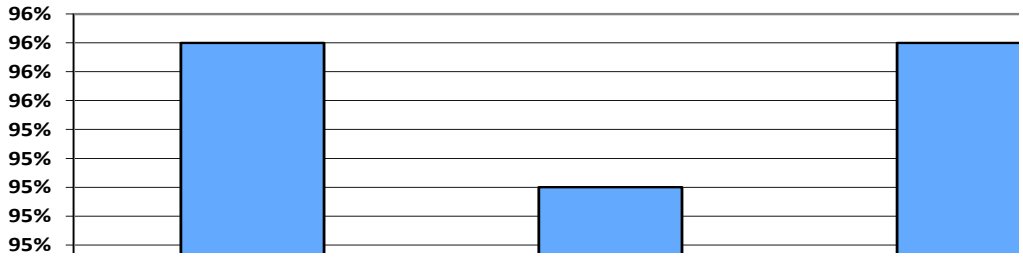


Figure 3. Percentage of material content assessment.

Assessment of the material content consisted of three aspects, namely content, accuracy of concepts, and encourages curiosity. Based on the evaluation of the three validators, the score of the content aspect was 3.85 (very good), which means that the material compiled is under the CC, BCs, syllabus, teaching needs, and indicators to be achieved. The score of the concept accuracy was 3.8 (very good). This showed that the concepts, definitions, data, facts, examples, cases, pictures, illustrations, and terms of the moss material are accurate. The score of curiosity was 3.83 (very good), which indicated that the e-book being developed can encourage curiosity and create questioning abilities. The percentage of material content assessment can be observed in Figure 3. The average value of the three aspects above was 3.83 with a very good criteria.

Table 3. Result of presentation assessment of moss plant material.

No	Instrument	Average	Criteria
1.	Material presentation technique	3.89	Very good
2.	Supporting material presentation	3.73	Very good
3.	Presentation of learning	4.00	Very good
4.	Coherent and sequence	3.67	Very good
	Average	3.82	Very good

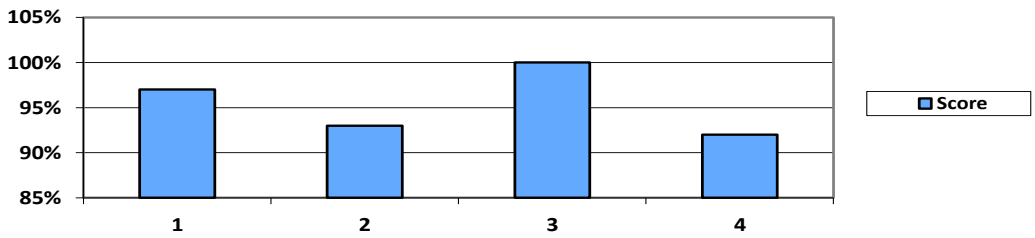


Figure 4. Percentage of material presentation assessment

The assessment of material presentation consisted of three aspects, namely presentation techniques, support, and coherence and sequence material. The score of the presentation technique was 3.89 (very good). This showed that the concepts were coherent and systematic. The score of of presentation support was 3.73 (very good), which means that the practice questions, practice, glossary, the bibliography have been well prepared. The score of coherence and sequence was 4.00 (very good), indicating that the e-book has a relation in each paragraph and has a complete meaning in every learning activity. From the results of the material expert questionnaire, the average value of the four aspects above is 3.82 with a very good criteria. The percentage of material presentation assesment can be seen in Figure 4.

The language assessment consisted of five aspects, i.e.: directness, communicative, interactive, student development, and language rules. The score of directness aspect was 3.89 (very good). The score indicated that the e-book has sentences that consistently represent the content of messages or information. The sentences used were also simple and to the point, and the terms used were following The Great Dictionary of the Indonesian Language (GDIL). The score of the communicative aspect was 3.67 (very good), which means that messages or information were conveyed in interesting and common language in Indonesian written discourse. The score of the interactive aspect was 4.00 (very good). which showed that the language arises a feeling of pleasure when students read it completely. The score of the student development aspect was 3.33 (very good), indicating that the language used in explaining a concept follows the level of students' cognitive development. Finally, the score of the language compliance rule was 4.00 (very good), which showed that the grammar was good, the correct Indonesian grammar rules were used, and the spelling refers to the general guidelines of Indonesian spelling (GGIS). The mean of the five aspects above was 3.78 with a very good criteria. The percentage of the language assessment can be oberved in Figure 5.

Table 4. Results of language assessment

No.	Instrument	Average	Criteria
1.	Directness	3.89	Very good
2.	Communicative	3.67	Very good
3.	Interactive	4.00	Very good
4.	Following student development	3.33	Very good
5.	Compliance with language rules	4.00	Very good
	Average	3.78	Very good

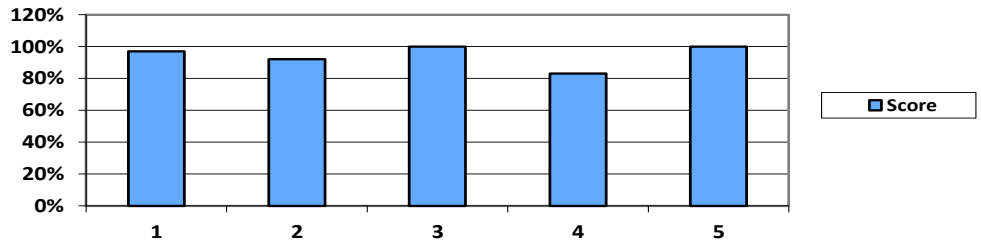


Figure 5. Percentage of language assessment

Based on the results of the validation provided by the experts, it can concluded that the moss plant e-book with a scientific approach based on the flash Kvisoft flipbook was feasible for use in the learning process. This is seen from the results that all aspects of assessment produced a very good criteria.

Feasibility test of the moss plant e-book

Results of the e-book validation were used to determine the assessment of the STF in Semarang city. The results of the feasibility test of the STF were presented in table 5.

Table 5. Assessment results of STF

No.	Instrument	Average	Criteria
1.	Material suitability	3.67	Very good
2.	Material accuracy	3.62	Very good
3.	Aspects of Language	3.63	Very good
	Average	3.64	Very good

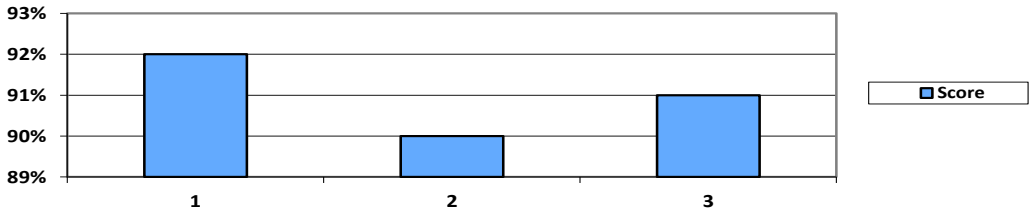


Figure 6. Percentage of STF assessment

The STF assessment consists of three aspects, viz.: the material suitability, accuracy, and language. The score of the material suitability was 3.67 (very good), which showed that the material presented starting from concepts, definitions, procedures, output displays, examples, cases, exercises, and interactions between concepts followed the level of education in senior high school and accordance with the BCs. The score of the material accuracy was 3.62 (very good), indicating that the examples, cases presented, images, and videos were following reality and can improve students' understanding. The description, exercise or case presented can encourage students to do the exercises. Furthermore, these exercises can foster creativity. The examples and cases presented were in accordance with the situations that occur in everyday life. The score of the language aspect was 3.63 (very good), indicating that the concepts and definitions presented did not lead to multiple interpretations and in accordance with the concept definitions in the moss plant material. Also, facts and data were presented in accordance with the reality and efficiency to improve students' understanding. Finally, the average score for the three aspects above was 3.64 with a very good criteria. The percentage of the STF assessment is given in Figure 6.

Student readability results

After the feasibility test was conducted by STF in Semarang city, then students' readability test was carried out in using the moss plant e-book. The results of the student readability test were presented in Table 6 and Figure 7 (in percentage).

Table 6. Students' readability results of the moss plant e-book

No.	Aspects	Average	Criteria
1.	Sentence according to GGIS	3.7	Very good
2.	Symbols are easy to read	3.5	Very good
3.	The writing is clear	3.7	Very good
4.	Communicative language	3.7	Very good
5.	Language does not create multiple interpretations	3.7	Very good
6.	Image clarity	3.9	Very good
7.	Video clarity	3.6	Very good
8.	Font size	4.0	Very good
	Average	3.6	Very good

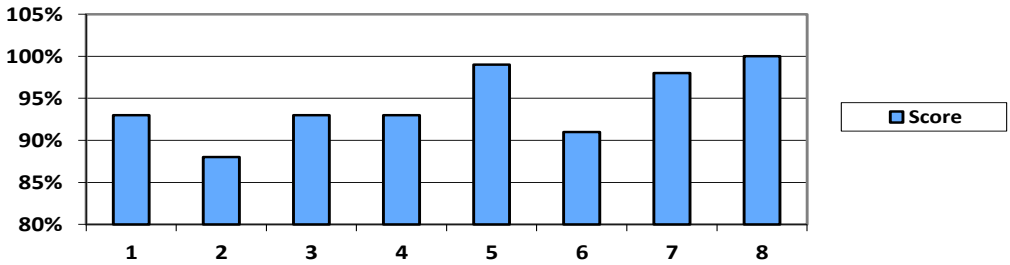


Figure 7. Percentage of readability assessment

The assessment of students' readability consisted of eight assessment aspects, namely conformity with the GGIS, symbol, writing clarity, communicative, language do not cause multiple interpretations, image clarity, video clarity, and font size. Based on Table 6, the scores of conformity with GGIS, symbol, writing

clarity, communicative, language did not cause multiple interpreations, image clarity, and font size were 3.7; 3.5; 3.7; 3.7; 3.7; 3.9; 3.6; and 4.0, respectively. The average of the eight assessment aspects was 3.6 with a very good criteria.

From the data, it can be concluded that the students' readability level of the moss plant e-book was very good. The results of students' responses on the readability of the moss plant e-book showed that the sentences, symbols, images, and font sizes were easy to read and the language was communicative, and did not cause multiple interpretations.

The advantages of this moss plant e-book compared to other teaching materials were (1) packaged with a comprehensive presentation of material to meet the BCs; (2) the material was completed with clear and colorful pictures, and a video to support the explanation of the material; (3) the e-book can be accessed either through a laptop or Android; and (4) the e-book was interactive and effective in asssessing students' understanding as the questions were designed using a program to accelerate the assessment process.

The development of the moss plant e-book with a scientific approach based on the flash Kvisoft flipbook was an alternative learning resource in supporting the learning of moss plants. Based on the assessment of material experts, learning media, STF in Semarang city, and students showed that the quality of the moss plant e-book was very good and to use as a learning resource. Hopefully, the moss plant e-book is useful as a learning resource to add insights of students.

CONCLUSION

This moss plant e-book was an alternative learning resource for students. It helped students to understand the concept of moss plant material as presented in detailed material coverage, completed by colorful pictures, and equipped with videos. The development of the moss plant e-book had been validated by experts and STF in Semarang city. Furthermore, the results of the validation showed that the moss plant e-book was very good for use in the learning process.

This interactive e-book was developed only until the readability test. It is highly recommended that this e-book is further tested to determine its effect in improving learning outcomes. A similar study can also be developed for determining the achievement of BCs for other materials.

REFERENCES

Apsari, A. N., Kustijono, R. (2017). Development of e-book using Kvisoft flipbook maker to train science process skill for senior high school students in curriculum 2013. *Jurnal Inovasi Pendidikan Fisika*, *6*(3), 285-291.

Budiarti, A., Handhika, J., Kartikawati, S. (2017). Pengaruh model discovery learning dengan pendekatan scientific berbasis e-book pada materi rangkaian inductor terhadap hasil belajar siswa. *Jurnal Pendidikan Teknik Elektro*, *2*(2), 21-28.

Firdaus, B. A., Setiawan, B. (2019). *Keefektifan interaktif e-book untuk meningkatkan kemampuan literasi sains siswa SMP*. Surabaya: Universitas Negeri Surabaya.

Istifarida, B., Santoso, S., Yusup, Y. (2017). Pengembangan e-book bebasis problem based learning-GIS untuk meningkatkan kecakapan berfikir keruangan. *Jurnal Penelitian Pendidikan*, *20*(2), 134-149.

Istiqfar, A. M., Wijaya, M., Nurmila. (2018). Pengaruh multimedia ncesoft flipbook maker pada materi pembelajaran pengendalian gulma terhadap motivasi dan hasil belajar siswa kelas XI ATPH SMK Negeri 1 Bone-Bone. *Jurnal Pendidikan Teknologi Pertanian*, *4*(1), 66-78.

Kodi, A. I., Hudha, M. N., Ayu, H. D. (2019). *Pengembangan media flipbook fisika berbasis android untuk meningkatkan prestasi belajar pada topic perpindahan kalor*. Seminar Nasional Pendidikan Fisika, ISSN: 2527-6670.

Misbah, Pratama, W. A., Hartini, S., Dewantara, D. (2018). Pengembangan e-learning berbasis schoology pada materi impuls dan momentum untuk melatih literasi digital. *Pancasakti Sciense Education Journal*, *3*(2), 109-114.

Mulyadi, D. U., Wahyuni, S., Handayani, R. D. (2016). Pengembangan media flash flipbook untuk meningkatkan keterampilan berfikir kreatif siswa dalam pembelajaran IPA di SMP. *Jurnal Pembelajaran Fisika*, *4*(4), 296-301.

Pranama, W., Dewi, N. R. (2014). Pengembangan e-book IPA terpadu tema suhu dan pengukuran untuk menumbuhkan kemandirian belajar siswa. *Unnes Science Education Journal*, *3*(3), 602-608.

Rosida, Fadiawati, N., Jalmo, T. (2017). *Efektivitas penggunaan bahan ajar e-book interaktif dalam menumbuhkan keterampilan berfikir kritis siswa*. Penelitian Magister. Lampung: Universitas Lampung.

Thiagarajan, S., Semmel, D., & Semmel, M. (1974). *Instructional development for training teachers of exceptional children.* Indiana: Indiana University Bloomington.

Watin, E., Kustijono, R. (2017). *Efektivitas penggunaan e-book dengan flip PDF professional untuk melatihkan keterampilan proses sains*. Skripsi. Semarang: FMIPA Universitas Negeri Semarang.