



Effectiveness of Using Moss Plant E-Book with a Scientific Approach to Improve Student Learning Outcomes

Abdullah Muamar[✉], Amin Retnoningsih, Yustinus Ulung Anggraito

Pascasarjana, Universitas Negeri Semarang, Indonesia

Article Info

Article History :
Received December 2020
Accepted January 2021
Published August 2021

Keywords:
Effectiveness, E-Book,
Moss, Scientific
Approach

Abstract

E-book This moss plant is an alternative learning resource for students to help them understand the concept of the moss plant material because it is presented in a detailed material coverage accompanied by colorful pictures and equipped with videos that can increase student understanding. The development of the moss e-book has been validated by instructional media experts, material experts and teachers at the Semarang City Biology Subject Teacher Community (MGMP) forum, and it is stated that the moss plant e-book is very suitable for use in the learning process and can improve student learning outcomes.

[✉] correspondence :
Pascasarjana, Universitas Negeri Semarang, Indonesia
Jalan Kelud Utara III No. 37, Semarang, Jawa Tengah, Indonesia
50237
E-mail: abdullahmuamar11@gmail.com

INTRODUCTION

Learning in Indonesia currently faces two challenges, namely changing perceptions about learning and the development of information and telecommunications technology (ICT) (Taufiq et al., 2014). 21st century competence requires students to be able to take advantage of Information and Communication Technology (ICT), be creative and think critically in solving problems (Suryanda et al., 2016). The widespread use of ICT can be utilized in the development of learning with an online system (Yuberti, 2015). This condition is potential for learning that does not require time and place (Eliana et al., 2016). This very rapid development of technology must be in line with the improvement of the quality of human resources (HR) so that the direction of development of science and technology can lead to the right target (Mulyadi, 2015).

The development of information and communication technology also affects the development of teaching materials, namely the difference between print and digital (Sugianto et al., 2013). The book publishing industry currently has a shifting pattern, namely starting to publish ebooks or electronic books. E-books are expected to be a reading tool that is more accessible than printed books. (Puspita & Irwansyah, 2018). So that student learning resources are also more diverse and interesting, one of which is electronic books (e-books) (Marsiyamsih et al., 2015).

E-books are very important in learning because they aim to convey information from sources to message recipients and to stimulate students to take part in learning activities (Ambarwulan & Mulyati, 2016). Independent learning tools that contain materials, methods, and ways of evaluating which are designed systematically and attractively can help students achieve the expected learning competencies according to their level of competence (Bahri, 2016). Students can study e-books either individually or in groups inside or outside class hours (Qomariah et al., 2019). E-books can help students obtain information about learning materials (Parmin & Peniati, 2012).

The results of the questionnaire analysis of 30 students at SMA N 12 Semarang City. Students' desire to use e-books (100% of students). The e-

book was considered practical (93.33% students), economical (13.33% students), modern (56.66% students), environmentally friendly (23.33% students) and supported the latest information (83.33% students).

The plantae material consists of three main materials, namely moss, nails, and seed plants. Plantae material has a high level of difficulty, it is due to a difficult classification system because it has a structure, characteristics and properties that vary between species and has a complicated metagenesis stage. This is supported by research (Muslikah, 2017; Saputra, 2016) that students' mastery of plantae material is still low, students are confused about distinguishing examples of species in plantae material.

The level of student learning difficulty on the plantae material was 48.02% with a fairly high category. The highest difficulty is in the indicator of compiling the classification of the divisions in the plant world (62.63%) and the lowest learning difficulty is in the indicator of identifying general characteristics of the plant world (25%) (Zarisma et al., 2016).

Moss is a sub material in plantae material. Moss material is a material that is quite difficult for students to understand because of several factors including 1) the small size of the moss plant because it does not have true roots, stems and leaves, 2) a difficult classification system because it has different structures, characteristics and properties. species, 3) have a complicated metagenesis stage and 4) phenetic and phylogenetic analysis have not been studied in various teaching sources.

The results of the questionnaire analysis on 30 students at SMA N 12 Semarang City. Students have difficulty answering metagenesis questions (77% of students), understanding the nature and characteristics (83.33% of students), explaining the structure of mosses (80% of students), distinguishing mosses based on characteristics and characteristics (50% of students) and phenetic and phylogenetic analysis (86.66 % of students).

Learning will be interesting if the teacher masters the material and is skilled at developing teaching materials. Based on research Sunarmi et al. (2019) show that teachers still have difficulty understanding KD related to metagenesis, principles of classification, description, nomenclature, and plant identification. In addition,

teachers still have difficulty implementing creative, innovative and effective plantae learning.

The lesson plan (RPP) at SMA N 12 Semarang City has used a scientific approach. The learning model used is Project Based Learning, Problem Based Learning and Discovery Learning. The learning process has been done well. However, because it is difficult to find examples of moss plants in a school environment, the application of the scientific approach is less than optimal.

METHODS

The type of research used in this research is experimental. The research design used is the Pre-Experimental Design with the One-Group Pretest-Posttest Design model. This design is used because there is a pretest before being treated, the treatment results can be found to be more accurate because they can be compared with the situation before being treated. This design can be described as follows:

O1 ----- X ----- O2

Information:

O1 : tesawal (pretest)

O2 : final test (posttest)

X : Treatment (learning moss using e-book)

This research was conducted in SMA Negeri 12 Semarang City. The population in this study were all students of class X IPA with a total of 240 students who all have relatively the same abilities. Sampling was carried out using simple random sampling technique, this was done with the consideration that the position of students in the class was applied randomly regardless of the grade, gender of the student, and class of students, so that the students were randomly distributed in the specified class. In addition, there are many students in the same class, students get material based on the same curriculum, and students get the same lesson time. Based on the simple random sampling technique, this study selected students of class X2 as the research sample. The independent variable in this study is the use of moss plants e-book with a scientific approach. While the dependent variable in this study is the learning outcomes of students in a positive aspect.

The data collection methods used were tests, questionnaires, documentation, and observation, while to analyze the data used the normality test (to

find out whether the data obtained was normally distributed or not), homogeneity test (to determine whether or not the variance of samples taken from the same population was uniform.), t test, gain test (to find out how much improvement from pre-test and post-test results data), and effectiveness test (to determine the level of effectiveness of treatment (treatment)).

The test method used in this study is a formative test in the form of multiple choices as an assessment of cognitive aspects (pretest and posttest). The questionnaire method (questionnaire) in this study is intended for media experts, material experts, the assessment of the Semarang City Biology MGMP forum and for students as a means to determine the level of student understanding of the moss plants e-book.

The documentation method is used to obtain data on the student list, curriculum, syllabus, lesson plans, formative test scores for subjects on plantae material. The method of observation in this research is to look for student learning activeness when learning Plantae.

The instruments used in this study were questionnaires and tests. The questionnaire used in this study used a Likert scale answer. Likert scale is used to measure attitudes, opinions, and perceptions of a person or group about social phenomena. The test used in this study is a formative test in the form of multiple choices. The test questions consist of 30 items. Test the validity of the test instrument is done by testing the validity, reliability testing, level of difficulty and differentiation.

RESULTS AND DISCUSSION

The development of this learning media goes through four stages, namely: the define stage, the design stage, the develop stage and the dissemination stage. The research stages are as follows:

Definition stage (Define)

The initial analysis was carried out several times, distributing questionnaires to determine the needs of students for the need to use the moss e-book. The questionnaire questionnaire was distributed to students of SMA N 12 Semarang City in class XI. In addition, interviews were also

conducted with teachers who taught biology subjects.

The problem encountered was the book used in the learning process that students (96.66%) used the LKS book developed by the Semarang City Biology MGMP Forum. Students' interest in reading LKS MGMP (40% of students), difficulty level in understanding the material (60% of students). The drawbacks of this teaching material are the incomplete coverage of moss plant material, colorless images, and very few species examples. The next questionnaire analysis showed that students at SMAN 12 Semarang City still had difficulty working on moss plant problems. These difficulties include answering the metagenesis of mosses (77% of students), discussing the properties and characteristics (83.33% of students), explaining the structure of mosses (80% of students), classifying mosses (50% of students) and analyzing plant phenetics and phylogenetics. moss (86, 66% of students). After going through various kinds of considerations regarding the learning problems experienced by students, it is necessary to have learning media that can be an alternative solution to improve student learning outcomes on moss plant material, namely in the form of e-books that are easy to operate on laptops and mobile devices. 100% of students desire to use the ebook in the learning process. Students assess that the ebook is considered practical (93.33%), economical (13.33%), modern (56.66%), environmentally friendly (23.33%) and contains the latest information (83.33%). Therefore, e-books can be one of the right media to improve the quality of learning, especially in the era of the Industrial Revolution 4.0 which demands the implementation of ICT in all fields.

Planning stage (Design)

The first step in designing is selecting the media. Media selection is carried out to identify learning media that is relevant to the characteristics of the material. Media design is divided into several stages, starting from designing to manufacturing. The resulting product is in the form of media to improve student understanding and learning activities.

The second step is to choose the form of presentation. The choice of format in development is intended by designing the learning content,

selecting the approach, and learning resources. The resulting product is an e-book to improve student learning outcomes. The learning media material is an e-book that has an attractive design, with colorful and clear images and is equipped with videos to increase students' insight about moss plant material.

The third step is the preparation of research instruments. The instrument used in this study was a questionnaire, the first questionnaire of media feasibility was given to 5 instructional media experts, the second questionnaire was given to 5 material experts. This questionnaire is used to obtain data about the quality and feasibility of the moss e-book both in terms of media and material.

The final step is the initial design. The initial product of the development media in the form of a moss plant e-book. This learning development is structured in an attractive appearance, accompanied by explanatory images, color and good image quality and is equipped with videos. Products will be available in the form of e-books and hardfile books. This e-book and printed book are made as learning media for students and can be used as teaching materials and applied every time the learning process of moss plants. The complete appearance of the moss plant e-book is as follows:

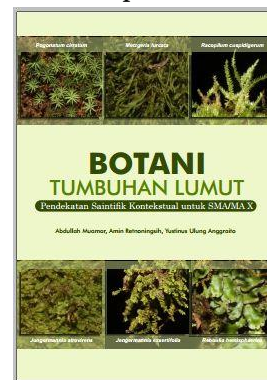


Figure 1. Moss e-book view

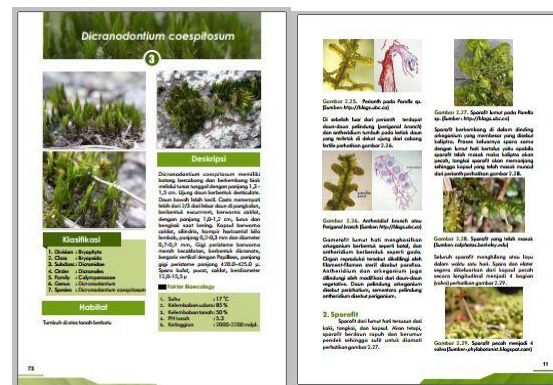


Figure 2. Display of e-book contents.

Development Stage (develop)

This stage aims to produce a revised moss e-book media based on expert input and development trials.

Validation of instructional media experts

The moss plant e-book has been validated by three instructional media experts, with aspects of assessment covering aspects of cover design, use of letters, cover illustrations, e-book layout and illustration of e-book content. The scores obtained were analyzed using content validity ratio analysis and content validity index. The results of the analysis can be categorized as valid if they meet the minimum limit of CVR, which is 0.736 and CVI can be said to be able to say that the appearance of Chapter 7, the benefits of moss, display of Chapter 8, analysis of moss 49 is good if you get a minimum score of 0.34. The results of the cvr and cvi e-book tests of moss plants are presented in Table 1. below:

Table 1. CVR and CVI scores of instructional media experts

| Assessment aspects | (CVR) | (CVI) |
|--|-------|-------|
| Cover design, use of letters, cover illustrations, layout and illustration content | 0.87 | 0.87 |

Based on the table above, all the criteria were declared valid by 5 learning media experts because CVR had met the Lawshe minimum limit value of 0.87. In addition, the CVI value obtained falls into the 0- 1 range, namely 0.87. The next stage of the assessment is analyzed by calculating the average score obtained from each item of the e-book assessment sub-component. The results of calculating the average score of each item are presented in Table 2. below:

Table 2. Results of validation of instructional media experts

| Aspects of Assessment | Σ | Criteria |
|--------------------------------|------|-----------|
| Cover design | 3.9 | Very good |
| Use of letters | 3.65 | Very good |
| Cover illustration | 3.7 | Very good |
| Ebook layout | 3.73 | Very good |
| Illustration of ebook contents | 3.77 | Very good |
| Amount average | 3.75 | Very good |

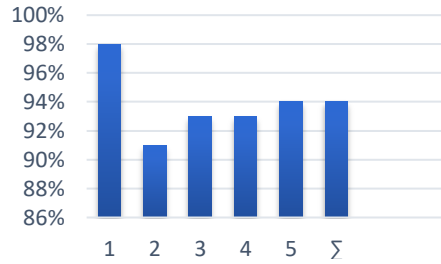


Figure 3. Percentage of Validation Results from Media Experts

Based on the assessment of the five validators, learning media experts get an average score of 3.75 or 94% (very feasible) which shows that the layout elements on the front, back and back covers harmoniously have rhythm and unity as well as be consistent and clarify functions.

Learning will be easy for students to learn if it contains colorful images in learning resources (Arafah et al., 2012; Rahmatih et al., 2017). Color can be a form of von-verbal communication that can convey instant and more meaningful (Ami et al., 2012). Imtihana et al., (2014). convey teaching materials that students like when the design is neatly arranged and attractive. Learning using pictures can provide an overview of something more concrete and is also a tool and physical material in the student environment to present messages for learning activities so that it can stimulate students' visual abilities to learn (Rizki & Wildaniati, 2015)

Material expert validation.

Evaluation of material expert validation, there are three points of assessment, namely assessment of material content, assessment of material presentation and assessment of language. The score obtained is first analyzed using the Content Validity Ratio and Content Validity Index analysis. The CVR and CVI test results of the moss e-book are presented in Table 3 below:

Table 3. CVR and CVI value of material experts.

| The assessment aspect | (CVR) | (CVI) |
|--------------------------|-------|-------|
| Content of the Material | 0.92 | 0.92 |
| Presentation of material | 0.78 | 0.78 |
| Language | 0.85 | 0.85 |

Based on the table above, all criteria were declared valid by 5 material experts. Based on the assessment of the content aspect, the CVR score was 0.92 and the CVI was 0.92, the assessment of the material presentation aspect got a CVR score of 0.78 and CVI 0.78 and an assessment of the language aspect got a CVR score of 0.85 and CVI 0.85. The next stage of the assessment is analyzed by calculating the average score obtained from each item from each aspect of the material expert's assessment. The results of calculating the average score from each aspect of the assessment are presented in Table 4 below:

Table 4. Recapitulation of the results of the material expert's assessment

| Instrument | Σ | Criteria |
|--------------------------|----------|-----------|
| Content aspect | 3.86 | Very good |
| Presentation of material | 3.63 | Very good |
| Aspects of language | 3.61 | Very good |
| Amount average | 3.70 | Very good |

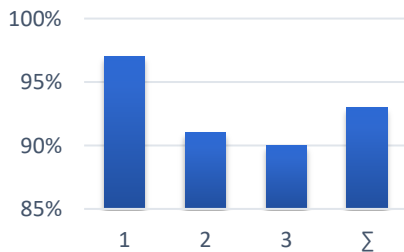


Figure 4. Percentage of Material Expert Judgment

Based on the assessment of five material expert validators, they get an average score of 3.70 or 93% (very feasible) which indicates that the moss plant e-book in the aspects of material content, material presentation and language is suitable for use in the learning process.

The learning media for the moss plant e-book is said to be feasible because the results of media and material validation are very feasible. These results are in accordance with the opinion expressed by Arsyad (2013) where learning media are all things or objects and tools that can be used in the learning process in order to clarify and make it easier for students to understand the material of a lesson.

Based on research by Rahmawati et al., (2016), language in learning media must be easy to understand and communicative. Sentences will be

effective if they successfully fulfill the requirements correctly, use straightforward word choices, logical relationships between parts, and the spelling must be correct (Oktaria et al., 2017).

Field Trial (Readability)

The legibility test aspect includes 8 aspects of assessment, namely the aspect of conformity to the PUEBI rules, the aspect of using symbols, clarity of writing, communicative, does not cause multiple interpretations, clarity of images, clarity of videos and the size of the written font. The readability aspect of the e-book was tested on 30 students before it was used to test the effectiveness of using the moss e-book. The students' readability scores were first analyzed Content Validity Ratio and Content Validity Index. The CVR and CVI test results of the moss e-book are presented in Table 5 below:

Table 5. CVR and CVI readability scores of students.

| Assessment aspects | (CVR) | (CVI) |
|---------------------|-------|-------|
| Student readability | 0.87 | 0.87 |

Based on the table above, students assess that the moss plant e-book is very good, seen from the acquisition of a CVR score of 0.87 from the minimum limit of 0.300 (30 respondents) and the acquisition of the CVI score obtained falls into the range 0- 1, which is 0.87 which means that e-books can be read well by students. the next stage of the assessment is analyzed by calculating the average score obtained from each student's readability assessment item. The results of calculating the average score of each aspect of the assessment are presented in Table 6.

Table 6. Student Readability Results.

| Aspects asked | Σ | Criteria |
|---|----------|-----------|
| Sentences according to PUEBI rules | 3.7 | Very good |
| Symbols are easy to read | 3 | Very good |
| Writing Clear | 3.5 | Very good |
| Communicative language | 3 | Very good |
| Language does not create multiple interpretations | 3.7 | Very good |

| | | |
|--------------------------|-----|-----------|
| Image clarity | 3.9 | Very good |
| | 6 | |
| Video clarity | 3.6 | Very good |
| | 3 | |
| Font size | 4 | Very good |
| Average number of scores | 3.7 | Very good |
| | 5 | |

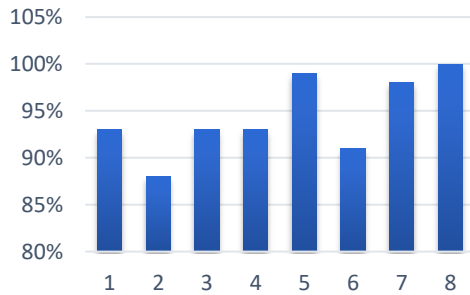


Figure 5. Percentage of student readability assessment

Based on table 6. it is known that the readability of students in 8 aspects of the assessment obtained an average score of 3.75 or 94% in the very good category. The results of students' responses regarding the readability of the moss plant e-book showed that the sentences, symbols, pictures, font sizes in the e-book were easy to read and the language used in the e-book was communicative and did not cause multiple interpretations. In line with what was expressed by Imam et al., (2018) that the use of readability aims to predict and determine the level of readership, both SD, SMP, SMA or students. So that the text in learning resources is effectively used in the learning process.

The level of readability is needed to identify difficult words and identify the reactions of people who read in order to understand the words contained in the text (Yuliana et al., 2012). The readability factor can affect the reading ability of students to become easy or difficult to understand, because the length of short sentences greatly affects students' memory (Rizqi & Bintari, 2015).

Operational Field Trials (Effectiveness)

The normality test used the Kolmogorov-Smirnov test (One Sample KS). data is said to be normal if the probability or (Sig.) > 0.05. It shows that the pretest and posttest data are normally distributed.

Homogeneity test was analyzed using the Test of Homogeneity of Variance using the SPSS 25.0 analysis program. homogeneous data if the probability (Sig.) > 0.05 and if the probability (Sig.) < 0.05 is not homogeneous. It shows that the test used is homogeneous.

Test results paired sample t-test

Paired sample t-test was used to analyze the pre-test and post-test before and after being given treatment. Different tests are used to evaluate certain treatments on the same sample at two different observation periods. If t-count > t table and probability (Asymp.Sig) < 0.05 then Ho is rejected and Ha is accepted. Table 4.11 shows that the Sig (2-tailed) value is 0.000 < 0.05. It can be concluded that there is a significant difference between the pretest and posttest results.

N-Gain Test Results

Table 7. N-Gain Test Results.

| Average Pre | Post | N-Gain | Criteria |
|-------------|-------|--------|----------|
| 47.27 | 87.07 | 0.75 | High |

Normalized Gain (N-Gain) was conducted to determine the increase in student cognitive learning outcomes after being given treatment. This increase was taken from the pretest and posttest scores obtained by students.

Based on table 10, from the pre-test results obtained an average value of 47.27 and an average post-test obtained an average value of 87.07. The N-gain obtained from giving the pretest and posttest of 0.75 is included in the high category. It can be concluded that the increase in student cognitive learning outcomes after being given treatment is 0.75 with a very high category.

Learning outcomes are often used as a benchmark to determine how far students have mastered the material that has been taught (Kartika et al., 2014). E-books are said to be effective if the results of students' cognitive tests reach classical completeness. Classical completeness is achieved when 85% of students can achieve individual completeness with a score of 80 (Mulyasa, 2016).

The ability of the module to improve student cognitive learning outcomes can be caused by several things, namely the indicators required in the

test have been understood by students well because they have been explained in the e-book. The application of e-books as a learning resource for biology has a significant effect on learning achievement in the positive, affective and psychomotor domains (Purnomo et al., 2013). Research conducted by Ardan et al. (2013) related to the development of e-books said that this learning outcome test was also carried out to measure the achievement of basic competencies and indicators of learning using the e-book developed. The effectiveness of using e-books in addition to being supported by learning outcome tests is also influenced by student responses to the ebook (Kalsum et al., 2016).

Maulana et al. (2018) also argued that the use of e-books in learning is one way that students can be active and motivated, this is because e-books are independent teaching materials that contain a series of learning experiences that are systematically arranged and can help students achieve learning goals. . E-books can make students active and not depend on the teacher because learning activities in e-books are arranged systematically. Student learning motivation can increase because the e-book is written in an attractive design, the discussion is presented in detail, colorful and clear images and is equipped with Videos so that, using e-book moss students can achieve learning goals according to their respective abilities.

Spread (Dessemination)

The final stage in this research and development is the dissemination and implementation stage. The purpose of this stage is to socialize and disseminate research and development products in the form of electronic modules so that they can be used by biology teachers in schools. The strategy used at this stage was door-to-door, namely distributing moss e-books with a revised Kvisoft Flipbook flash-based scientific approach by visiting schools one by one.

The targets of the dissemination stage are biology teachers in 10 public schools in the city of Semarang, consisting of: SMA N 1 Semarang City, SMA N 2 Semarang City, SMA N 5 Semarang City, SMA N 6 Semarang City, SMA N 7 Semarang City, SMA N 11 Semarang City, SMA N 12 Semarang City, SMA N 16 Semarang City. The data obtained from the dissemination stage are

responses, suggestions or input, as well as an assessment questionnaire of the moss plant e-book that was developed, so that the e-book can be used by teachers and students as an alternative teaching material.

Aspects of assessment by biology teachers include the suitability of the material, the accuracy of the material and conformity to Indonesian rules. This assessment was carried out on 10 Biology Teachers from 10 Public Senior High Schools in Semarang City.

The prior assessment score acquisition is analyzed Content Validity Ratio and Content Validity Index. The CVR and CVI test results of the moss e-book are presented in Table 8 below:

Table 8. CVR and CVI values of the Biology MGMP Forum.

| Assessment aspects | (CVR) | (CVI) |
|---|-------|-------|
| The suitability of the material, the accuracy of the material and the suitability of the language | 0.69 | 0.69 |

Based on the table above, all the criteria were declared valid by 10 biology teachers with a CVR score of 0.69 from the minimum limit that had met the Lawshe minimum limit value of 0.520 (10 respondents) In addition, the CVI value obtained fell into the range 0- 1, 0.69 which means that the e-book being developed has good content validity.

The next stage of the assessment is analyzed by calculating the average score obtained from each item from each aspect of the assessment of the Semarang City High School Biology MGMP Forum. The results of calculating the average score from each aspect of the assessment are presented in Table 9 below:

Table 9. Results of the assessment of the Biology MGMP forum.

| Instrument | ∑ | Criteria |
|----------------------|------|-----------|
| Material suitability | 3.65 | Very good |
| Material accuracy | 3.68 | Very good |
| Aspects of Language | 3.3 | Very good |
| Total score average | 3.54 | Very good |

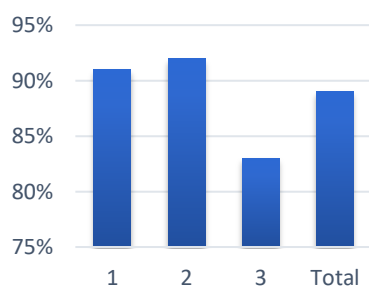


Figure 6. MGMP forum assessment percentage

The results of the assessment showed that the average score from the Biology MGMP forum was 3.54 or 89% with the very feasible category. The large percentage indicates that the moss plant e-book can be used in the learning process of public high schools in Semarang City.

CONCLUSION

The E-book moss plant is an alternative learning resource for students to help them understand the concept of the moss plant material because it is presented in a detailed material coverage accompanied by colorful pictures and equipped with videos that can increase student understanding. The development of the moss e-book has been validated by instructional media experts, material experts and teachers at the Semarang City Biology MGMP forum, stating that the moss plant e-book is very suitable for use in the learning process.

REFERENCES

- Ambarwulan, D., & Mulyati, D. (2016, June 30). The design of augmented reality application as learning media marker based for android smartphone. *Journal of Research and Development of Physics Education*. 2 (1), 73 -80.
- Ami, MS, Susanti, E., & Raharjo. (2012) developing a Pocket book on the human excretion system in SMA / MA class XI. *Bioedu Journal*. 1 (2), 10-13.
- Arafah S. F, Ridlo S, Priyono B., (2012). Development of worksheets based on critical thinking on Animalia material. *Unnes Journal of Biology Education*. 1 (1), 47-53
- Ardan, A. s., Ardi, M., Hala, Y., Supu, A., & Dirawan, GD (2015). Need assessment to development of biology textbook for high school class X based on

the local wisdom of timor. *International education studies*, 8 (4), 52-58.

- Azhar Arsyad. 2013. *Learning Media*. Jakarta: Rajagrafindo Persada
- Bahri, S., Adnan, Suryani, I. (2019). Development of flipbook-based human circulatory system teaching materials to increase metacognitive awareness of students at SMA Negeri 3 Makasar. *Journal of Biology Teaching and Learning*, 2 (1), 73-80
- Imtihana, Sukmawati L. & Gerina A. (2014). Development of Teaching Materials for Authentic Assessment. *Journal of Pasri*. Vol. 2 (10), 17-29
- Kalsum, U., Mustami, KM, & Ismail, W. (2018). Development of biology learning module with ecosystem material based on contextual teaching and learning (CTL) approach. *Lentera Pendidikan Journal*, 21 (1) 97-109.
- Marsiyamsih, Fadiawati, N., Tania, L. (2015). E-Book Development Based on Multiple Representations on Material Classification Discussions. *Journal of Chemistry Education and Learning*, 4 (2), 732-743.
- Maulana S., Desnita., Raihanati. (2018). The Development of Knowledge Enrichment Books Concerning Ice and Snow Physical Studies for High-School Students. *Journal of Research and Development of Physics Education*. 4 (2), 83-90
- Mulyadi, DU, Wahyuni, S., Handayani, RD (2016). Development of flipbook flsh media to improve students' creative thinking skills in science learning in junior high schools. *Journal of Learning Physics*, 4 (4): 296-301.
- Oktaria, Dinari, Andayani & Kundharu, S. (2017). Mastery of effective sentences is the key to improving exposition writing skills. *Metalingua* 15 (2).
- Purnomo, Dwito, Meti, I., & Pguguh, K. (2013). The effect of using the module on the results of pollution research in the Pepe River Surakarta as a learning resource for the subject of environmental pollution on student learning outcomes. *Journal of Biology Education* 5 (1).
- Puspita, GA, Irwansyah. (2018). The shift in reading culture and the development of the book publishing industry in Indonesia: Case studies of e-book readers through the Ipusnas application. *Journal of library and information studies*. 2 (1): 13-20.
- Qomariah, W., Muhdar, MHI, & Suarsih, E. (2019). Implementation of problem-based learning modules with the SQ3R method of biodiversity material to improve scientific literacy and environmental care attitudes. *Journal of Education: theory, research, development*, 4 (3), 374-381.

- Rahmatih, AH Yuniastuti, A., & Susanti. (2017). Development of Booklets Based on Potential Studies and Local Problems as Supplement to Vocational Agriculture Teaching Materials. *Journal of Innovative Science Education*. 6 (2), 163-169.
- Rahmawati, IS, Roekhan, & Nurchasanah (2016). Development of learning media to write fable text with macromedia flash for high school students. *Journal of Education*, 1 (7).
- Rizki, S., & Wildaniati, Y., (2015). the effectiveness of ICT-based teaching materials and media on the quadratic function equation material. *Journal of Mathematics Education*, 4 (2): 185-194.
- Rohmani, S., Sunarno, W., & Siti Amanah, N. (2015). Learning Physics Using the POE (Prediction, Observation, And Explanation) Model Through Experimental and Project Methods in terms of Student Creativity and Scientific Attitude. *Journal of Inquiry*, 4 (4), 10–15.
- Sugianto, D., Abdullah AG, Elvyanti, S., Muladi, Y. (2013). Virtual modules: basic multimedia flipbooks. *Digital techniques. Invotek Journal*, 9 (2): 101-116.
- Suryanda, A., Ernawati, Maulana, A. (2016). Development of a multimedia mobile learning module with android studio 4.1 material on biodiversity for class X high school students. *Journal of Biology Education (BIOSFERJPB)*. 9 (1): 55-64
- Taufiq, M. Dewi, NR, Widiyatmoko, A. (2014). The development of integrated science learning media with environmental characteristics with the theme of "conservation" with a science edutainment approach. *Journal of Indonesian Science Education*, 3 (2): 140-145.
- Yuberti. (2015). Online Group Discussion on Physics Learning Technology Subject. *Al-Biruni's Scientific Journal of Physics Education*, 4 (2), 145–153.
- Yuliana, E., Sadjati, M., & Fadila, I., (2012) assessing the readability of module material through formative evaluation. *Journal of Open and distance education*, 13 (2): 113-124.
- Yuliana, E., Sadjati, M., & Fadila, I., (2012) assessing the readability of module material through formative evaluation. *Journal of Open and Distance Education*, 13 (2): 113-124.