DEVELOPMENT OF FLIPBOOK BASED ON PROBLEM BASED LEARNING ON ECOSYSTEM MATERIALS TO TRAIN STUDENT'S SCIENTIFIC LITERACY

Pengembangan Flipbook Berbasis Problem Based Learning pada Materi Ekosistem untuk Melatihkan Literasi Sains Siswa

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Abstract

Basically, the learning process for students is carried out in order to achieve learning outcomes with the help and encouragement of the teacher. Many teachers still use conventional methods in teaching, which can make students less interested and less motivated to learn. Thus, in order to optimize learning outcomes, teachers must use the latest approaches. This study aims to produce a flipbook based on Problem Based Learning on ecosystem material to train students' science literacy. The research method used is R&D (Research and Development). The flipbook based on Problem Based Learning on ecosystem material was tested on one class consisting of 30 students of class X SMAS Hang Tuah 4 Surabaya with a limited trial. The method used is the Four-D Model method. This study used student samples from two classes with different treatments. Data collection in this study consisted of validation techniques, observation, test, and questionnaire. The results showed that the validity of the flipbook reached 3.9 (very valid), the implementation of learning with flipbooks during classroom learning showed a value of 90% (very high category). This study shows that there are differences between classes X-5 and X-2 (t count 2.025> t table 2.003). The result of this study is that the treatment given to class X-5 gets a higher score and gets a score of 86.5 (value> 75) or above the minimun completeness criteria. The conclusion of this research is that flipbook are feasible and can be used in biology learning ecosystem material.
Keywords: flipbook, science literacy, problem based learning.

Abstrak

Pada dasarnya proses pembelajaran untuk siswa dilakukan guna mencapai hasil belajar dengan bantuan dan dorongan dari guru. Banyak ditemukan guru yang masih menggunakan metode konvensional dalam mengajar, yang dapat membuat siswa kurang tertarik dan kurang termotivasi untuk belajar. Dengan demikian, guna mengoptimalkan hasil pembelajaran, guru harus menggunakan pendekatan terbaru. Penelitian ini bertujuan menghasilkan flipbook berbasis Problem Based Learning pada materi ekosistem melatihkan literasi sains siswa yang layak. Metode penelitian yang digunakan adalah R&D (Research and Development). Flipbook berbasis Problem Based Learning pada materi ekosistem diujicobakan pada satu kelas yang terdiri dari 30 peserta didik kelas X SMAS Hang Tuah 4 Surabaya dengan uji coba terbatas. Metode yang digunakan adalah metode Four-D Model. Penelitian ini menggunakan sampel siswa dari dua kelas dengan perlakuan yang berbeda. Pengumpulan data pada penelitian ini terdiri dari Teknik validasi, observasi, tes, dan angket. Analisis data penelitian menggunakan analisis-analisis seperti hasil validasi, hasil observasi, literasi sains, dan hasil angket dengan bantuan SPSS 23. Hasil penelitian menunjukkan validitas flipbook mencapai 3,9 (sangat valid), keterlaksanaan pembelajaran dengan flipbook saat pembelajaran di kelas menunjukkan nilai 90% (kategori sangat tinggi). Penelitian ini menunjukkan terdapat perbedaan antara kelas X-5 dan X-2 (t hitung 2,025 > t table 2,003). Hasil penelitian ini adalah perlakuan yang diberikan pada kelas X-5 mendapatkan skor lebih tinggi dan mendapatkan nilai 86,5 (nilai > 75) atau di atas KKM. Kesimpulan dari penelitian ini adalah flipbook layak dan dapat digunakan pada pembelajaran biologi materi ekosistem.
Kata Kunci: *flipbook, literasi sains, problem based learning.*

INTRODUCTION

The learning process is carried out by students in order to achieve learning outcomes under the guidance of a teacher. But there are still teachers who use conventional methods at school, it is like delivering material only by the lecture method in the class or without any feedback from students (Sadikin & Hamidah, 2020). A conventional learning process can make students less interested and less motivated during learning (Mustaqim & Wijayanti, 2019). Therefore, as a teacher will be required to master various kinds of learning media that can help students in learning, such as being more creative in creating media to achieve learning goals and objectives (Yulianda, et al, 2019). The 21st century is changing more and more, one of which is to replace physical books with electronic technology-based learning books. In fact, students become more independent in solving problems in learning with electronic technology (Muthoharoh & Sakti, 2021).

Learning Outcomes at the end of phase E, namely students have the ability to create solutions to problems based on local, national or global issues related to understanding ecosystem components and interactions between components. To achieve these learning outcomes, appropriate learning media is needed. An example of the learning media needed is a flipbook. This is because flipbook media can be given animations that support learning materials such as videos or moving animations, student centered oriented, can be opened at any time, and can be opened on all computers / laptops. With the advantages of flipbook media, it is hoped that it can help students to maximize their learning abilities. Flipbook itself presents a book with a virtual form.

In Biology lessons at the high school level, educators should start using new innovations in addition to ordinary or conventional learning in the classroom so that students are not easily bored with the learning media so that they get more optimal learning results. Biology is also a subject that is directly related to real life ((Nomsoor dkk., 2021) so biology need technique for help students make learning easier. One of them is to use flipbook innovation. The students will have a new experience and it will make it easier to learn because it can be accompanied by more interesting visuals, such as inserted video or audio. According to Nurmaningsih, et al. (2013) the Biology learning process is abstract and complex material, so it requires help visualizing learning material through learning media.

The basic competencies 3.10 and 4.10 require students to analyze and formulate problem solving skills to build concepts related to ecosystem interactions in

fostering science literacy. Therefore, ecosystem material is important for students to be able to solve an ecosystem problem that occurs in the surrounding environment, so this material is relevant if using the Problem Based Learning model.

Problem-based learning is a type of model whose activities refer to an authentic problem to train students' mastery of thinking and problem-solving skills (Hamruni, 2011). This learning model creates solutions to problems based on local, national, global issues related to understanding ecosystem components and interactions between components. Problem Based Learning is a learning model by providing more dynamic learning activities to students, so that it can make students more effective (Aman, 2016). The main objective of PBL is to increase students' learning motivation so that achievement also increases (Moningka, 2015). This innovative learning model is expected to motivate learners to actively participate in learning. Because this can allow learners to work together with their peers to solve and find solutions to real-life problems (Yamin, 2011).

Science literacy is the ability to implement knowledge in identifying a question to develop a mindset so that it can participate in addressing science-related issues and ideas (OECD, 2019). Science literacy is the skill of using science knowledge to identify questions, conclude things based on evidence, understand and make decisions related to nature and natural changes caused by human activities (Fitariya, 2018). Science literacy skills in Indonesia have not been maximized if based on PISA. Based on PISA 2018 data participated by 78 countries, Indonesia has below-average science literacy skills with an average score of 396, while ASEAN has an average score of 433. This shows that the science literacy skills of Indonesian's students are still relatively low (OECD, 2019).

The success of this research through the development of flipbooks also supports the SDGs program with point number 4, namely quality education and point number 13, namely handling climate change. From the background of the problems described above, researchers will examine "Development of Problem Based Learning- based Flipbooks on Ecosystem Material to Train Students' Science Literacy". With the hope that students can better understand and understand the concept of ecosystem material in the Biology subject of Senior High School.

METHODS

The methods of this research study is R&D (Research and development). R&D is a research method to produce a products which are then tested for validity

and effectiveness (Sugiyono, 2018).

This research was conducted in even semesters in 2024. At the analysis, design, and development stages were carried out at the Department of Biology FMIPA Unesa. At the implementation stage, the research was conducted at Hang Tuah 4 Surabaya High School with a limited trial.

The target of this research is a flipbook based on problem-based learning on ecosystem material which will be tested in one class containing at least 30 X grade high school students.

The design used in this research is to use the Four-D Model method without the disseminate stage. This study using a sample from two different classes, where the first class used Problem Based Learning-based flipbooks, while the second class used a books that usually given by the teacher.

The flipbook feasibility parameters are in the form of validity, applicability, and effectiveness tests. The flipbook validity test starts from the aspect of the content component and the flipbook presentation. The content aspect is related to the suitability of the topic, the suitability of the learning outcomes, the suitability of the learning stages, and the suitability of the indicators. Presentation related to the sequence, linkage, suitability of topics and materials, accuracy of size and font selection, suitability of language, and ease of explanation of sentences in the flipbook. The validity of the flipbook is assessed by experts. It can be valid if get a minimum score of 2.8. The applicability of the flipbook is the ease of students in learning using flipbook media. This implementation is observed and assessed by several observers in the class. It will be said that learning using this flipbook is successful if it reaches a minimum score of 40. The effectiveness of the flipbook is the skills that students have after using the flipbook as a learning medium. The skills tested are science literacy skills which are said to be effective if they reach a minimum score of 75. The data collection technique used is absed on calculations that have been modified bt (Ridwan, 2013) ans (Karim, 2015).

RESULTS AND DISCUSSION

Research on flipbooks based on Problem Based Learning on Ecosystem material was carried out in the range of March-June 2024 with class X students of Hang Tuah 4 Surabaya High School as many as 60 students. The data generated in this study are validation results, observation results, science literacy test results, and questionnaire results.

Based on a review of the validation of the flipbook instrument implemented to identify students' science literacy in Ecosystem material, the average result of

instrument validation is 3.9 with very valid criteria.

Table 1. Validation Results.

No.	Assessment Aspect	Average	Category
A.	Content Component		
1.	Appropriateness of the topic on the flipbook.	4,0	Highly Valid
2.	Appropriateness of learning outcomes in flipbook.	4,0	Highly Valid
3.	The suitability of the Problem Based Learning, learning stages in the flipbook.	4,0	Highly Valid
4.	Compliance with science literacy indicators.	4,0	Highly Valid
B.	Presentation		
1.	Coherent flipbook presentation.	3,5	Highly Valid
2.	The components of a flipbook are interrelated.	4,0	Highly Valid
3.	The topic in the flipbook is in accordance with the ecosystem material.	4,0	Highly Valid
4.	Attractive flipbook design.	4,0	Highly Valid
5.	Choosing the right font size and type.	3,5	Highly Valid
6.	The language used in the flipbook is Indonesian in accordance with EYD.	3,5	Highly Valid
7.	The sentences in the flipbook are clear and easy to understand.	4,0	Highly Valid
	Average	3,9	Highly Valid

This table shows that the flipbook instrument is very valid to be implemented to identify students' science literacy that occurs in Ecosystem material. According to Ridwan (2013), it is said to be valid if the score is in the range of 2.8-3.3 and is said to be very valid if the score is in the range of 3.4-4.0. This is proven by the contents of the flipbook itself which is accordance with these validity; content component and the presentation has been proven valid. The existence of a valid instrument is a requirement that must be met so that the research instrument used has a trust value and can measure what should be measured (Muntazhimah et al, 2020).

Thus the flipbook was declared valid because it obtained an average validation result of 3.9 with a very valid category. This shows that the flipbook has conformity with the learning outcomes billed..

Based on the analysis of the implementation it can be stated that it runs well. This is because the average

percentage of observations of the implementation of problem-based learning flipbooks on ecosystem material that has been implemented reaches 96% with very good or very high criteria. This is in accordance with Karim (2015), which is said to be high if it reaches a percentage of 60%-80%, and is said to be very high if it reaches a percentage of 80%-100%.

The average value of class X-5 or the class that uses the flipbook is 86.5. While the average value of class X-2 or a class that does not use a flipbook is 83.2. From this value it can be seen that there is a difference in value between the two classes even though all students are classified as passing the predetermined minimum completeness criteria of 75.
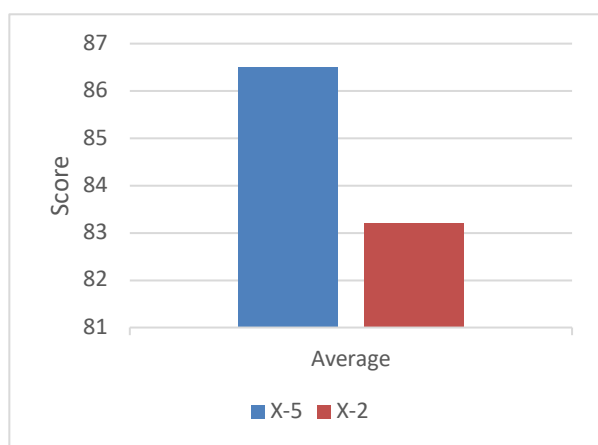

Figure 1. Class Average Graph Results.

The difference between classes X-5 and X-2 is due to the treatment carried out in class X-5, namely by using flipbooks in their learning, while class X-2 uses biology books in general. The advantage of this flipbook is that there are features that train students in accordance with the learning outcomes. This flipbook also trains problem-based learning such as formulating problems, writing hypotheses, identifying variables, writing tools and materials, writing steps, making analysis, analyzing solutions, and making conclusions from data results. Each component has their own question and accordance to either problem based learning or science literacy skills.

Based on the results that can be seen in the graph, it can show that there is an influence on students who do learning using problem-based learning flipbooks due to differences where the flipbook makes learning in the classroom more interesting and can train students' science literacy skills so that the existence of problem-based learning-based flipbooks on ecosystem material to train science literacy can be said to be effective.

Based on the results of the student response questionnaire related to problem-based learning-based flipbooks on ecosystem material, it can be rated very high.

These results can provide additional evidence of the effectiveness of this flipbooks. This questionnaire include the use of flipbook and the benefit of the flipbook.

Table 2. Responds Results.

No.	Aspect	Score	Category
Use of flipbook			
1.	Flipbook are easy to download on each learner's Smartphone or Laptop.	91%	Very High
2.	Flipbook are easy to use	86%	High
3.	The text in the flipbook is clear and easy to read and understand.	100%	Very High
4.	The illustrations and animations in the flipbook helped my understanding.	100%	Very High
5.	The design in the flipbook is interesting	100%	Very High
Benefits			
1.	I understand the material more easily after using flipbook	94%	Very High
2.	I don't feel bored by using flipbook	100%	Very High
3.	Learning activities using flipbook have an influence in improving my science literacy.	93%	Very High
4.	I feel more excited to participate in learning activities if I use flipbook	100%	Very High
5.	I find it helpful in understanding the material after using flipbook	95%	Very High
	Average	96%	Very High

This table shows that the flipbook instrument is very high to be used for the students' science literacy in Ecosystem material. This is due to the implementation of good learning and interactive media that makes students focus on learning. This makes students able to solve problems and train science literacy well.

Flipbook based on Problem Based Learning on ecosystem material to train students' science literacy is said to be valid. This is because the flipbook has contained all components of content and presentation. Where the validity of this flipbook can make learning more conducive and effective. This is evidenced in the implementation of learning by using problem-based learning-based flipbooks going well. Learners do the activities contained in the flipbook. With the implementation that goes well, it also affects the tasks given to students. Where if students carry out a series of learning activities well and conducive, the resulting output value will also be optimal. In class X-5 which was treated using a flipbook achieved higher scores

than class X-2 which did not receive treatment. This is due to the advantages of flipbooks that are not found in books in general. It is also proven by the response questionnaire that given to students which shows the use of the flipbook is proven to facilitate students in learning and be able to train students' science literacy in ecosystem material.

CONCLUSION

The validation of the Problem Based Learning based flipbook instrument on Ecosystem Material to Train Science Literacy was declared very valid with a value of 3.9. The implementation of learning with this flipbook which is done by observation during learning in the class had a value of 90% and in a very high category. The effectiveness of learning using flipbooks based on Problem Based Learning on Ecosystem Material to Train Science Literacy shows a difference between classes X-5 and X-2 because t count 2.025> t table 2.003. The tested class also has a score > 75 or above the minimum completeness criteria and has an average score of 86.5.

SUGGESTION

Teachers can apply Problem Based Learning-based flipbooks on Ecosystem Material to Train Science Literacy. Application with this media can be used so that students are not easily bored when learning takes place which only uses physical book teaching materials.

Teachers recognize the learning challenges faced by students so that teachers can apply media or learning methods that support students' abilities so that learning takes place effectively.

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