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The Use of Research-Based E-Flipbooks as Teaching Materials for Kingdom Monera

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ABSTRACT

Cellulolytic bacteria in termites are adaptive symbionts in the digestive tract of termites. The purpose of making an e-flipbook is to make it easier for teachers to provide monera material with visualization media and to make it easier for students to understand the characteristics of cellulolytic bacteria. This research is a combination of qualitative and descriptive research. The results of cellulolytic bacteria research can be documented digitally in the form of an e-flipbook. E-flipbook is an alternative learning media that can help students to get a visualized picture of the material presented in a digital portable device. In the e-flipbook, it is outlined that cellulolytic bacteria have a significant physiological level. The test indicators use physiological tests, MR-VP tests and TSIA tests that produce the conclusion that cellulolytic bacteria in the termite GI tract are very suitable for the atmosphere of the GI tract. The feasibility test of the e-flipbook to be used as a learning resource has been validated by learning media experts and material experts. Validation results show an average of 91% resulting in 'valid' criteria. The validation-based validator statement states 'e-flipbooks can be used as learning resources'.

Introduction

Termites are pests that require high silliness to survive. Indonesia's tropical climate conditions are the cause of termites and their populations grow evenly in each region. In this study, the termite sample used was worker termites. The worker termite caste has the highest number within a termite colony. Based on the results of the study, information was obtained that cellulolytic bacteria in the termite GI tract are highly productive and can be isolated in large quantities, so it is hoped that the opportunity for cellulolytic bacteria extraction can be done well. Documentation of the results of research on the isolation of cellulolytic bacteria in the gastrointestinal tract Curvignathus sp. To make it easy to understand digitally, it will be accessible in the form of an e-flipbook.

e-Flipbook is an e-book developed using special software so that it is more interactive, in the form of a page that can be flipped through by loading material, image content, audio or video by being on the same page (Chandra, 2016). Quality image and video content can help learners to observe an event that is difficult to obtain directly (Surasmi, 2016).

Interactive learning media is considered capable of increasing student interest and learning outcomes because it makes learning activities more meaningful and makes students less easily saturated. Interactive learning media can also help overcome the limitations of delivering abstract material concepts or material concepts that are limited in space and time to be delivered (B. F. Putra et al., 2017).

The final result of the e-Flipbook can be saved in the form of a link online or in PDF format offline. E-Flipbook is designed by paying attention to visual aspects so that readers are helped by the visualization of material so that it facilitates the delivery of information and learning to be more effective (Sugianto, 2012). The use of e-Flipbooks is considered effective because of its practical use that is easy to use, communicative, and makes learning time more efficient (B. F. Putra et al., 2017). Another opinion was conveyed by (Hendrayanto, 2016), the benefit of e-Flipbook-based learning media is that it can make it easier for students to capture an overview of the material being taught. This media can also help stimulate the thoughts, feelings, attention and interests of students so that the material presented in the learning process can be absorbed more optimally. The advantage of e-flipbooks is strengthened by the opinion of (Pixyoriza, 2018), the advantage of e-Flipbook-based learning media is that it is easy to carry everywhere and saves paper because it is in the form of a file that can be stored in a portable digital device. In addition, this media is also easy to propagate for free, saving costs to support learning. The selection of learning media is a type of e-flipbook because e-flipbooks can contain information in digital visualization which contains components such as: text elements, images, photos and colors, if presented properly can attract students' interest and attention. In general, schools only use textbooks that are dominated by a lot of writing and not too many pictures.

The purpose of making an e-flipbook is to make it easier for teachers to provide monera material with visualization media and to make it easier for students to understand the characteristics of cellulolytic bacteria. The e-flipbook that has been created has gone through the validation of learning media experts and grammar experts. Based on the description above, an e-flipbook needs to be held to facilitate the understanding of material about monera, especially bacteria that are microscopic in size.

Method

This research is a combination of qualitative and descriptive research. According to Sugiyono (2011) stated that qualitative research is a type of research conducted to examine the condition of natural object conditions where researchers act as keys. While descriptive research is a problem-solving procedure that is investigated by telling and interpreting data related to facts, circumstances, variables, and phenomena that occur during the research and presenting it as it is. The research method used is descriptive analytics. The sampling technique uses purposive sampling. Samples for the research trial were carried out on students at MTS Yasiba with a total of 30 students with a Minimum Standard Score of 71. The research sample was conducted on students at MTS Yasiba with a total of 32 students with a KKM score of 74. The instrument used is a questionnaire to measure the feasibility of a pocketbook for students to use. Meanwhile, the instrument to measure student learning outcomes to achieve KKM uses a multiple-choice test of 40 questions.

The procedure for using a data pocket book is explained through the following steps, including: pocket book design, observation of students' KKM scores before using pocket books, conducting a learning process using e-flipbooks, conducting learning outcome tests after using e-flipbooks, science subject teachers filling out a questionnaire on the feasibility

of using e-flipbooks as a learning medium, conclusions about the feasibility of using e-flipbooks.

Results and Discussion

Kingdom Monera is a matter that is closely related to microbial sizes that are microscopic. In concept, this material is very difficult to imagine. Students who are interested in microbial life will be more interested in learning about it and understanding the concept if they get representative data and documents. In understanding concepts, innovative media is needed so that learning becomes meaningful (Sukaesih & Alimah, 2012). This is in accordance with the opinion of Murniasih and Ferdiani (2018) which states that the use of media can increase students' understanding of concepts related to certain materials. A similar opinion is that the use of media in learning can increase the interest of students (Ferdiani, Murniasih and Suwanti, 2017). The use of pocket books can arouse the interest of students and make it easier to understand certain materials (Asyhari and Silvia, 2016).

The contents of the e-flipbook contain physiological results through physiological metabolism tests, MR-VP tests and TSIA tests. Physiological tests of cellulolytic bacteria are described in table 1. Physiological tests aim to determine the physiological abilities of cellulolytic bacteria obtained. The MR-VP test aims to determine the ability of a bacterium to oxidize glucose by producing acid as the final product and concentrating high. The Voges Proskauer test is aimed at evaluating the ability of organisms to produce non-acidic substances or neutral end products such as acetylmethyl carbonyl from organic acids as a result of glucose metabolism. The next test is TSIA which aims to distinguish various genera of Enterobacteriaceae, all of which are Gram-negative bacteria that are able to ferment glucose by producing acid and can also distinguish Enterobacteriaceae from other intestinal bacilli that are Gram-negative. The presentation of the research results that have been described can motivate students to develop the ability to research other types of bacteria for disease diagnosis or cosmetics and even to increase food production.

Table 1. Results of physiological tests of cellulolytic bacteria

No	Test	Result	Information
1	MR (Crushed)	Negative	Does not change color
	MR (Stab)	Negative	Does not change color
2	VP (Crushed)	Negative	Does not change color
	VP (Stab)	Negative	Does not change color
3	TSIA (Crushed)	Positive	Dark brown
	TSIA (Stab)	Positive	Dark brown
4	Indol production (Crushed)	Negative	Does not change color and does not form
	Indol production (Stab)	Negative	Does not change color and does not form
5	Glucose fermentation (Crushed)	Negative	Does not change color
	Glucose fermentation (Stab)	Positive	Perfect yellow color
6	Simmone Citrate(Crushed)	Positive	Dark blue color
	Simmone Citrate (Stab)	Negative	Does not change color
7	Urease (Crushed)	Positive	Light Purple color
	Urease (Stab)	Positive	Light Purple color
8	Oxidase (Crushed)	Positive	Dark blue color
	Oxidase (Stab)	Positive	Dark blue color
9	Catalase (Crushed)	Positive	Bubbly white color
	Catalase (Stab)	Positive	Bubbly white color

The research results obtained are designed in such a way that students get an overview of the concept relevant to the learning indicators to be achieved. The designed e-flipbook

will be used as a learning medium in monera kingdoms that have previously gone through the validation stage.

To determine the feasibility of using a pocketbook as teaching material, it must go through validation tests by learning media experts and fungus material experts. The validation test results can be detailed as follows:

Table 2. Validation results of learning media experts

Number	Assessed aspects	Score
1	Cover page	84
2	Foreword	86
3	Instructions for use pocket book	82
4	Stages of studying a pocketbook	83
5	How to learn a pocketbook	83
6	Table of contents	85
7	Description of plant morphology	84
8	Anatomical Description of endophytic fungi	89
9	Picture	84
10	Completeness of the contents of the pocketbook	82
Total/average		851/85.11

Table 3. Validation results of fungus material experts

Number	Assessed aspects	Score
1	Cover page	85
2	Foreword	84
3	Instructions for use pocket book	86
4	Stages of studying a pocketbook	86
5	How to learn a pocketbook	83
6	Table of contents	84
7	Description of plant morphology	86
8	Anatomical Description of endophytic fungi	84
9	Picture	83
10	Completeness of the contents of the pocketbook	82
Total/average		910/91.0

E-flipbook validation results based on content quality, language quality, presentation quality, and graphic quality are in the valid category. The variety of endophytic fungi presented can motivate students to dig deeper into the benefits and advanced physiology tests. Similar research results can be seen in other relevant studies, namely the research of B. F. Putra et al. (2017) with the title Development of Interactive Learning Media Using the Flash Flip Book Application on Animalia Material for Class X Students of SMAN 1 Pariaman, which states that this Flash Flip Book application-based learning media is valid and practical for students to use with an average validity score of 82.89% and practicality of 82.64%. The results of another relevant research are the research of (Mulyadi & Wahyuni, 2016) with the title Development of Flash Flipbook Media to Improve Students' Creative Thinking Skills in Science Learning in Junior High Schools, which states that the learning media is suitable for use, can improve students' understanding and creative thinking ability.

Based on this description, it is strongly suspected that an e-flipbook that contains information about cellulolytic bacteria can add insight and knowledge about microbes, improve digital visualization, increase student learning motivation to continue to increase their curiosity and other benefits, namely being able to develop the ability to research other microbes simply.

Conclusion

E-flipbook is a medium that has advantages in digital visualization that is practical. Based on the results of the research, physiological results, MR-VP test results and TSIA tests of cellulolytic bacteria in the termite GI tract were obtained. The results of the feasibility test by learning media experts and material experts obtained the results of the "valid" criteria and produced suggestions and comments "can be used as a learning resource".

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