

Development of Pop Up Book Learning Media on *Pteridophyta* Materials as Source of Learning for Class X SMA Students

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ABSTRACT

Kingdom plantae learning materials, especially *Pteridophyta* material at SMA N 1 Trimurjo, experienced problems in the teaching and learning process due to the lack of available learning references in the school, so that it had an impact on students' interest in learning. Therefore, it is necessary to develop a pop up book learning media on *Pteridophyta* material as a learning resource for class X students of SMA N 1 Trimurjo. The aimed of this research on the development of the pteridophyte pop up book is to produce a learning media in the form of a pop up book on *Pteridophyta* material. This development research uses the type of ADDIE development which has 4 stages, *Analysis, Design, Development, Implementation and Evaluations*. The product developed in this research development is a *pop up book* that has passed the material expert validation stage with 97% results with "very good" criteria, and media expert validation with 94% results with "very good" criteria, and the results of the teacher's perception test response with the results of 88% with the criteria of "very good" and the small group trial with the results of 92.2% with the criteria of "very good". Pop up book products that have been validated and tested on small groups can be used without revision. Based on the results of research and development, it can be concluded that the pop up book learning media on *Pteridophyta* material is very feasible and very interesting to use in learning biology at SMA N 1 Trimurjo.

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INTRODUCTION

Indonesia has various types of ferns (*Pteridophyta*) which are abundant because the climate is suitable for the growth of *Pteridophyta* (Purnomo, *et al.*, 2015). *Pteridophyta* are mostly found in tropical forests that have abundant sunlight and high

humidity (Arini & Kinho 2012), and belong to a division whose members already have a *cornus*, meaning that the body can be divided into three main parts, namely roots, stems, and leaves. However, *Pteridophyta* have not yet produced seeds, their means of reproduction are by spores (Tjitrosoepomo, 2014).

Pteridophyta material is difficult to understand because it contains the scientific names of various types of *Pteridophyta*, so students feel bored in studying it (Betty & Julia 2015). Therefore, it is necessary to use appropriate and effective learning media (Arsyad, 2019). Appropriate learning media can include visuals, for example, such as pop up books (Meri & Afreni, 2016).

Media serves as a tool to attract students' attention, help accelerate understanding in the learning process, and overcome space limitations, so that learning is more communicative, productive, with time conditioning, and increases students' motivation to learn (Jalinus, 2016). The pop-up book learning media has its own uniqueness for students because it is presented in a folded form, moves and appears, causing more curiosity for students on each page (Safri, *et al.* 2017).

The selection of media must be appropriate and in accordance with the needs so that learning will be easily achieved. As revealed by Sinambela & Bashoirul (2018), the selection of learning media must be adjusted to the classification of learning materials, because each media has different advantages of its own.

Based on the results of the pre-survey at SMA N 1 Trimurjo, so far in general, teachers teach using conventional learning media such as blackboards, pictures and charts to help students master *Pteridophyta* material. One of the methods used by the teacher in delivering *Pteridophyta* material in class X is Discovery Learning, namely by bringing learning media in the form of *Pteridophyta* into the classroom to help the teaching and learning process, resulting in student learning outcomes being below expectations.

This is because in the learning process, learning tends to be more centered on the teacher. The teacher becomes a source of

learning in the learning process and students become passive - just sitting listening to the teacher's explanation while reading the handbook, making it difficult for students to remember. This is the basis for making and developing a pop-up book learning media for *Pteridophyta* material. In addition, researchers want to provide an overview to teachers in schools that the use of pop-up book learning media can improve student learning outcomes. The teaching and learning process using pop-up book learning media that is presented in a structured way will attract students to concentrate on the lesson.

The development of pop-up book learning media is expected to eliminate the boredom of students when studying *Pteridophyta* material. The benefits of pop-up book media themselves according to Dzuanda (2011) include: (1) Children will appreciate and take good care of their books, (2) Develop children's creativity, (3) Stimulate children's imagination, (4) Provide knowledge and provide an introduction to the shape of objects, (5) Can be used as a medium to foster reading motivation in children. Bluemel & Taylor (2012) mentions several uses of pop-up books, namely: (1) to develop young people's love for books and reading, (2) to think critically and develop creativity, (3) to capture meaning through attractive representations of images. and generates the desire and urge to read.

In research by Meri & Afreni (2016), the type used is R&D, the type of data used is qualitative and quantitative data with data collection instruments in the form of questionnaires. The results of the study show the results of product revisions by media experts, material experts and respondent trials. The media expert revision was carried out three times with a product feasibility percentage of 71% (categorized as good). Revisions by material experts were carried out twice with a percentage of product feasibility

of 84% (categorized as very good). The percentages of teacher and student trials were 88% and 91.6% (very good). It can be concluded that the developed pop-up book learning media is suitable for use in the learning process.

The results of research by Marhamah (2015) state that the design of pop-up book media using the ADDIE model has a validity level of 88%, student responses are 82%, with an effectiveness of 97%, which means that pop-up book media is very effectively used as a learning medium. . The goal to be achieved in this research is to develop a valid, practical and effective pop-up book learning media for Pteridophyta material. This research is expected to be an important source of information in the application of developing an effective pop-up book media for Pteridophyta material in high school. This study aims to develop a pop-up book learning media that is valid, practical and effective, and is expected to be an important source of information in the effectiveness of biology lessons in senior high schools.

METHOD

Types of research

The type of research is research and development (Research and Development). The research and development model chosen is the ADDIE research and development model (Analyze, Design, Development, Implementation, Evaluation). According to Tegeh & Made (2010) this model was developed systematically and based on the theoretical foundation of learning design. This model is structured programmatically with a systematic sequence of activities in an effort to solve learning problems related to learning resources that are in accordance with the needs and characteristics of the learner.

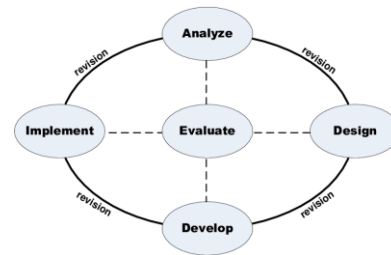


Figure 1. Stages of the ADDIE Model

This model consists of five steps, namely: analysis consisting of needs analysis and material analysis, at this stage it is done by collecting data from direct interviews with biology subject teachers, observations in class and observations of facilities and infrastructure at SMA N 1 Trimurjo . Design (design), to prepare the equipment and materials needed in making media. Development (development) is the initial product form, the design phase of the product form which includes learning materials. Implementation (implementation), the stage of testing the responses of biology teachers as many as 1 person and testing the responses of students as many as 10 people in class X SMA N 1 Trimurjo. Evaluation, this stage evaluates the product regarding the feasibility by revising the product based on comments and suggestions from the validator through the validation sheet.

This research contains qualitative data and quantitative data. Qualitative data obtained from the assessment of the expert team, the responses of students and subject teachers in the form of input and suggestions were analyzed descriptively. While quantitative data from the expert team, the responses of students and biology subject teachers regarding the assessment of the media were made in the form of scores from questionnaires. The data obtained from the expert team in the form of an analytical questionnaire and processed descriptively into interval data using a Likert scale.

Material and media validation questionnaire

Analysis of the calculation of the number of criteria scores, namely:

$$\text{Maximum score} = \text{Highest criteria} \times \text{Number of question items}$$

$$\text{Minimum scale} = \text{Lowest criteria} \times \text{Number of question items}$$

$$\text{Value scale} = 5$$

$$\text{Value range} = \frac{\text{max score} - \text{minimum score}}{\text{value scale}}$$

The results obtained in the analysis of the calculation of the number of criteria scores, the maximum score and the minimum score of the material and media validation questionnaire were used to determine the interval distance (Riduwan, 2020).

Teacher and student perception questionnaire

The test questionnaire was given to 1 teacher and a small group of 10 students. The test instrument by the teacher has 15 questions and the small group test instrument has 10 questions. Based on the results of the perceptions of teachers and students get a significant gain with the perception of teachers who obtained a score of 66 with a percentage of 88% included in the very good category. The small group trial with a total of 10 students using google forms got a total score of 46.1 with a percentage of 92.2% belonging to the very good category as well. The data obtained using a Likert scale by calculating the average score of answers from the product trial questionnaire can be seen with the following formula:

Teacher perception validation results

$$\begin{aligned} \text{Response} &= \frac{\text{Average Score}}{\text{Maximum total score}} \times 100\% \\ &= \frac{66}{75} \times 100\% = 88\% \end{aligned}$$

The results of the validation of the perception of small groups (students)

$$\begin{aligned} \text{Response} &= \frac{\text{Average total Score}}{\text{Maximum total score}} \times 100\% \\ &= \frac{46,1}{50} \times 100\% = 92,2\% \end{aligned}$$

Analysis of the percentage calculation of each variable is calculated using the following formula (Riduwan, 2020) :

$$p = \frac{f}{n} \times 100\%$$

Information :

- p = percentage of sub variable
- f = total value of each sub variable
- n = number of maximum scores

RESULTS AND DISCUSSION

The final result of developing a pop up book learning media for Pteridophyta material that has been validated by expert validators and tested in schools is an operational design that is ready to use. The results of research and development of *Pteridophyta* pop-up book media are listed in the following discussion.

Validation Results of Developed Pteridophyta Pop-up Book by Material Experts

The results of the analysis in Figure 2 show that the validation of the material was carried out 2 times. The assessment indicator for this aspect shows that the material in the Pteridophyta pop-up book is able to describe the minimum substance (in terms of the feasibility of the material, language and theory), has a match between the material and the development of students' cognitive domains, the suitability of images and animations in supporting the explanation of the material, and the suitability of material questions with the learning objectives.

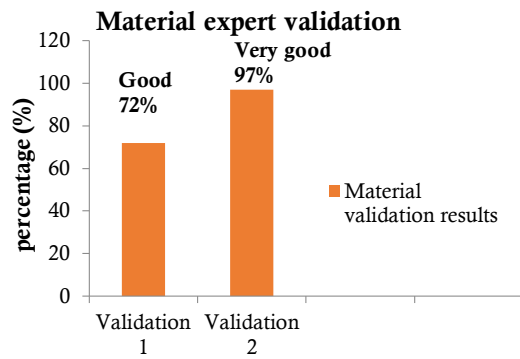


Figure 2. Graph of material expert validation results

Phase I resulted in an average score of 72 with a percentage of 72% (good category). Although classified as good, there are still many suggestions for improvement given by the validator regarding the material to be developed from various aspects, so it needs to be revised. In the second stage, an average score of 97 was obtained with a percentage of 97% (very good category) and deserved to be tested in the field without any revision.

Yulisna & Agus (2014), regarding the development of the Pop up Module for biology learning on environmental pollution material for Class X High School Students, concluded that dimensional visualization-based media can make the display more attractive, so that the message conveyed will be easily understood by readers. Afifah (2018) in her journal entitled Media Pop-Up Books for Learning German Literary Works revealed that apart from being an educational medium for high school students, Pop-Up Books can also be used as a source of interesting, creative and innovative lessons. Thus, students can understand and learn the material easily without feeling bored.

Validation Results by Media Experts on the developed Pteridophyta Pop-up Book

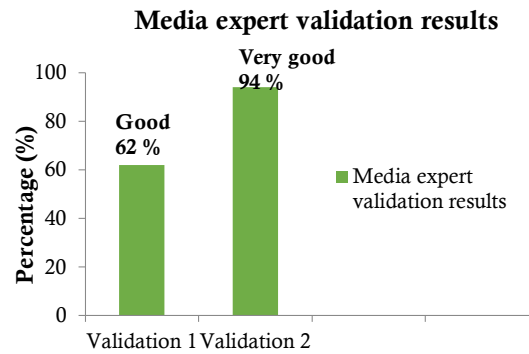


Figure 3. Graph of media expert validation results

The results of the analysis of Figure 3 show that the media was used 2 times. In stage I the average score was 62 with a percentage of 62% (good category). Because there is still a score of 2, the media needs to be revised accordingly. In stage II, the average score was 94 with a percentage of 94% (very good category) and deserved to be tested in the field without revision. According to Marhamah (2015), the design of pop-up book media using the ADDIE model has a validity rate of 88% and an average student response of 82% with an effectiveness of 97%, which means that the pop-up book media is effective for learning.

The results of research on teacher and student perceptions of the developed Pteridophyta Pop-up book

The pop-up book learning media on *Pteridophyta* material for class X SMA students has been printed and deemed appropriate by media experts and material experts, then tested on teachers and students. The subjects of the research trials were biology teachers at SMA N 1 Trimurjo and class X SMA students in even semesters, including 10 students in class X Mia 3 at SMA N 1 Trimurjo who were sampled through a google form questionnaire who had studied *Pteridophyta* material. The sampling technique in this study is random sampling, which is a sampling technique from

the population that is carried out randomly without regard to the existing strata in the population (Sugiyono, 2015). The results of the assessment of teacher and student perceptions can be seen in Figure 4.

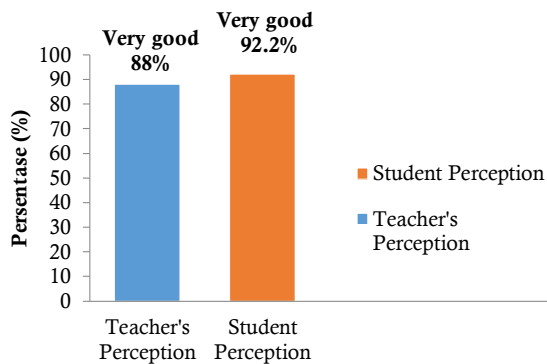


Figure 4. Graph of teacher and student perceptions

Based on Figure 4, the graph of the results of teacher and student perceptions shows a significant score, where the teacher's perception score is 66 with a percentage of 88% (included in the very good category). The small group trial with a total of 10 people using google forms resulted in a score of 46.1 with a percentage of 92.2%, which belongs to the very good category. Based on the perception responses of teachers and students, the developed pop-up book media is very suitable for use in learning at SMA N 1 Trimurjo.

The results of this study are in accordance with Meri & Afreni (2016), where the type of research used is R&D. The data used are qualitative and quantitative data with data collection instruments in the form of a questionnaire. The results showed that the product revision of media experts, material experts and respondent trials. Revision by media experts was carried out with a percentage of product eligibility 71% (categorized as good). Revisions by material experts were carried out twice with a percentage of product feasibility of 84% (categorized as very good). The percentages of

teacher and student trials were 88% and 91.6%, respectively (categorized as very good). It can be concluded that the product developed, namely the pop-up book learning media, is suitable for use in the learning process.

According to Isa (2016), the value and use of media enhances the learning process and learning outcomes in the learning process. The use of teaching aids, educational aids, and learning media in schools began to be adapted to technological developments. The thing to note is that all school equipment must be adjusted to the demands and materials, methods and levels of students' abilities to achieve learning objectives. The development of information has influenced the use of various types of media as a tool in the learning process. Therefore, teachers are expected to be able to use these tools or equipment effectively and efficiently in learning. In order to increase the effectiveness and efficiency of learning, it is necessary to develop various creative and innovative learning models. This is necessary for the learning process to be less interesting, monotonous and boring, so that it will inhibit the transfer of knowledge. Therefore, the role of media in the learning process is important because it will make the learning process more varied and not boring (Muhson, 2010).

According to the results of the analysis, the difference between the development research carried out by the researcher through the relevant previous research is the development of a pop-up book as an alternative learning media, but it does not contain learning materials, especially *Pteridophyta* material. The advantage of this pop-up book media for *Pteridophyta* material as an alternative or other visual-based teaching material is the increased interest in *Pteridophyta* material thanks to the combination of text, images and colors on printed pages that are arranged as attractively as possible.

Development research has limitations, namely biology class X SMA specifically for *Pteridophyta* material only. Because the product material must be able to be used in the long term and not easily damaged or faded when exposed to water, the *Pteridophyta* pop-up book learning media is made manually through a cutting and pasting process, so the resulting product is still not neat. Research on the development of *Pteridophyta* pop-up book learning media is limited by labor and cost.

CONCLUSION

The product developed in this development is a pop up book that has passed the material expert validation stage with 97% results with very good criteria and media expert validation with 94% results with very good criteria, and the results of the teacher's perception test response with 88% results with very good criteria and small group trial with 92.2% results with very good criteria. Pop up book products that have been validated and tested on small groups can be used without revision. Based on the results of research and development, it can be concluded that the pop up book learning media on *Pteridophyta* material is very feasible and very interesting to use in biology learning at SMA N 1 Trimurjo.

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