

Development of Pop-up Book as Biology Learning Media on Class XI Human Reproductive System Material

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Abstract

This study aims to develop pop-up book as a biology learning media and describe the validity of pop-up book as a biology learning media. This type of research conducted is Research and Development research using the ADDIE model (Analysis, Design, Development, Implementation and evaluation). The stage in this research is up to the development stage. The instrument used in the study was a questionnaire which was analyzed descriptively quantitatively. Pop-up book development up to the product validity test involving five validators including two material expert validators, two media expert validators and one biology teacher Based on the results of pop-up book validation by material experts obtained results of 92.66%, by media expert validation 90.62%, teacher validation 93.33%, thus it can be concluded that pop-up book learning media is very valid as a biology learning media for students.

Key words: ADDIE, learning media, pop-up book, reproductive system

INTRODUCTION

Learning is a process of behavior change that occurs due to encouragement by the needs and goals to be achieved to gain a learner experience with the environment (Mulianti, 2017). One of the most important factors in learning is learning media because the presence of a medium in the teaching and learning process will greatly help learning activities to be easier (Yasinta, 2019). Biology learning is not only limited to reading material where learning biology is learning to remember, understand a concept and also apply it in everyday life so that students will easily remember a concept, facts and also biological principles. Understanding the concepts that students need is a meaningful

interconnected understanding, not just memorization.

Reproductive system material is material in which there are various images and the process of forming reproductive cells, where the material of the reproductive system in humans requires a detailed explanation, according to biology teachers and also MAN 1 Mojokerto students reproductive material in humans is quite difficult material to learn if only using student worksheets and teacher notebooks that are too much writing, especially in the chapter on the process of sperm and ovum cell formation and also on the anatomy of female and male reproductive organs. The teaching materials used in this school are said to be less effective due to the limited learning media used and the availability

of biology reference books in the library is very limited.

One of the media that can help students is visual media equipped with more effective images. 3-dimensional learning media is learning media in the form of real objects or it can also be in the form of 3-dimensional images that can help students in understanding and imagining the shape of existing images. Pop-up book media is in the form of printed books that have 3-dimensional and motion elements, in pop-up books the material is conveyed in the form of interesting images because there are parts that if opened can move to change or give the impression of arising (Halisa, 2018). Pop-up book can be said to be an animated book that is designed in such a way as to form a structure that looks alive when the book is opened, the visualization of a unique and interesting pop-up book can stimulate students to learn to make it easier for them to remember the material and be able to develop children's abilities, with this book can connect between real situations and symbols that represent them (Rizkika and Sandy, 2018).

Pop-ups add a new dimension to cards and pop-up books using clever paper folding to create an ingenious mechanism when the reader opens the pop-up page anything can happen when opening the pop-up book then the reader will find a 3-dimensional scene complete with explanations. (Ives, 2009).

This pop-up book has the ability to strengthen the impression that will be conveyed in a material so as to make the material easier to remember and learn (Lismayanti, et al. 2016). Pop-up media has advantages and disadvantages

according to the results of research conducted by Firmansyah (2017) there are several advantages of pop-up books, namely easy to under and easy to use, being an alternative if class conditions do not allow using electronic media such as power point, video and others, pop-up books are concrete which means that they are more realistic having a dimensional space in this book can be in the form of a 3-dimensional structure so as to attract the attention of students.

This is in line with the opinion of Ardika (2018), which states that pop-up books have a practical form, include many objects in one book, have full color or attractive colors, facilitate understanding of the material. In addition to having the advantages of pop-up books, it also has disadvantages according to Firmansyah (2017) says that pop-up book learning media has less durability because the material used is paper. Fitri (2017) also argues that the weaknesses possessed by pop-up books are in the manufacturing process which takes a long time.

Based on the results of the questionnaire analysis of the needs of students by distributing questionnaires to 35 students of class XI MIPA 4 at MAN 1 Mojokerto said that 90.90% of students need learning media to study biology subjects on the material of the human reproductive system, students find it difficult if they understand the material of the human reproductive system without learning media this is indicated by a needs analysis of 60%. In addition, 95% of students like learning materials that are colorful and illustrated so that students are interested in learning them, this was also said by the MAN 1

Mojokerto biology teacher during the learning process, students seemed unenthusiastic and from the students, they were not interested in learning.

METODE

This type of research conducted is Research and Development (R&D) with the ADDIE model (Analysis, Design, Development, Implementation and evaluation) but this research reaches the development stage due to conditions that are still in the covid-19 pandemic and limited time and costs. The stages that can be done are the Analysis, Design, and Development stages. The following are the three stages carried out while carrying out the research; a) Analysis, carried out two activities consisting of performance analysis and needs analysis. In the performance analysis, researchers conducted observations and interviews with biology teachers to find out the problems faced at school related to the learning media used during the learning process in the performance analysis was also used to find out the methods used in the school. then found a solution by developing a pop-up book learning media. Needs analysis is done by distributing questionnaires to students related to learning media to determine the type of learning media needed by students, namely learning media that can make students more interested and happy during the learning process and can easily understand the concepts to be learned. B). Design, carried out, namely determining the KD to be used, structuring the layout of material and images on the media to be developed,

selecting font writing on the media, selecting the paper to be used on pop-up book learning media. Making background design on pop-up book learning media. C). Development, consists of 1) making pop-up book learning media in accordance with the initial design that has been made before, 2) conducting media expert validation, material expert validation, teacher (learner) validation, 3) revising the media based on input and suggestions from validators, 4) conducting limited trials using 10 students, 5) making revisions according to the results of student responses.

The implementation and evaluation stages cannot be carried out because there is no face-to-face learning during the covid-19 pandemic so this research is limited to the development stage. Based on the development stage carried out, qualitative data is obtained from criticism and suggestions while quantitative data is obtained from data processed from the formulation of numbers.

Quantitative data obtained from the validation questionnaire was analyzed using the calculation of the average score obtained from the validator with the formula:

$$V\text{-ah} = \frac{TS_e}{TS_h} \times 100\%$$

Note :

V-ah : Validation score

Tse : Total empirical score

Tsh : Total expected score

(Akbar, 2016)

Meanwhile the data of students response is calculated using the formula below :

$$V\text{-au} = \frac{TS_e}{TS_h} \times 100\%$$

Note :

V-ah : Validation of audience

Tse : Total empirical score

Tsh : Total expected score

(Akbar, 2016)

Then, the total percentage of students response is calculated using the formula :

$$\chi = \frac{\sum fx}{n}$$

Note :

Mean (X) : Average

n : All students

$\sum fx$: Students' score

(Mulianti, 2017)

Furthermore, the validation score is categorized using the criteria below.

Table 1. Criteria of Validation

Average	Criteria
0%-20%	Very low
21%-40%	Low
41%-60%	Moderate
61%-80%	Valid
81%- 100%	Very valid

(Nurmalina, 2020)

RESULT AND DISCUSSION

Development research (R&D) is a method used to validate and develop a product, using the ADDIE model, the resulting product is in the form of pop-up book learning media on human reproductive system material, at the analysis stage there are 2 activities, the first is performance analysis on performance analysis, it is known that learning is carried out using the lecture method, and using several learning media that are less effective during the learning process, one of which is powerpoint media in delivering material that is not coherent, then in terms of

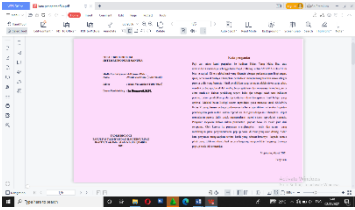
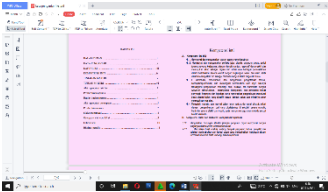
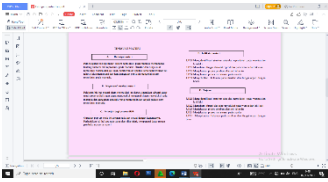
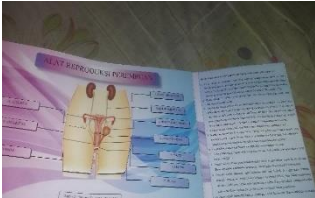

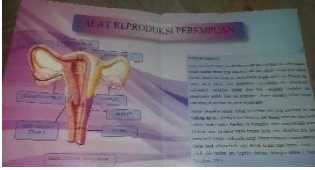

coloring that is less interesting so that it makes students feel bored.

As for the needs analysis, it is known that 90.90% of students need learning media to study biology subjects on human reproductive system material, students find it difficult to understand human reproductive system material without learning media, this is indicated by a needs analysis of 60%. In addition, 95% of students like learning materials that are colorful and illustrated.

The next stage is the design stage at this stage the pop-up book media is designed to explain the material of the human reproductive system so that it is easy to understand and understand for students starting from: improve the format of completing the front cover back, preface, table of contents, KI, KD, Indicators of exercise questions biodata development. Furthermore, improve the content format and add images, improve the design using the same full color on each page. Making this pop-up book media involves the Corell Draw x7 application in the design process. The design is made in accordance with the material that will be presented in the media. This media is made in printed form with art paper 260 with A4 size, with landscape format, and writing format: times new roman size 12 pt.

Furthermore, the development stage as for the steps taken in the development stage include the printing process of pop-up book design, the process of making pop-up book learning media into a whole book, and validating the five expert validators in their fields. The results of making pop-up book learning media are described in the table 2.

Table 2. Pop-up book learning media

No	Visualization	Note
1.		Page after cover
2.		Page related to competencies
3.		Page related to the concepts
4.		Concepts of male reproductive organs
5.		Concepts of sperm formation process
6.		Concepts of female reproductive organs
7.		Concepts of ovum formation process

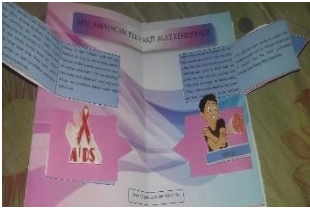

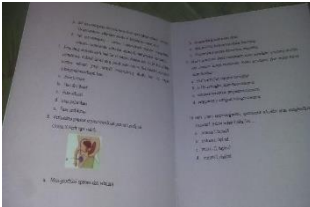
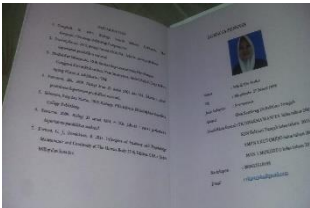
No	Visualization	Note
8.		Concepts of reproductive system disease
9.		Concepts of menstruation process
10.		Page about doing task
11.		Page about references and profile

Table Based on the results of validation by experts, it is known that the average percentage of validation scores by two media validators is 90.62% with very valid criteria, two material validators are 92.66% with very valid criteria, and one teacher (learner) response is 93.33% with very valid criteria. The limited trial using 10 students obtained an average percentage of 93.06% with very valid criteria.

Pop-up media has advantages and disadvantages according to the results of research conducted by Firmansyah (2017) there are several advantages of pop-up books, namely easy to understand and easy to use, being an alternative if class

conditions do not allow using electronic media such as power point, video and others, pop-up books are concrete which means that they are more realistic having a dimensional space in this book can be in the form of a 3-dimensional structure so as to attract the attention of students.

CONCLUSION

Based on the results of the research and discussion above, the data obtained conclusions that: (1) Pop-up book learning media consists of: analysis, design and development (design printing process, media manufacturing techniques and product validation), (2) The development of pop-up book

learning media on human reproductive system material is included in very valid criteria based on material expert validation of 92.66%, media experts with an average of 90.62%, teacher responses obtained an average of 93.33% and limited trials obtained an average of 93.33% with very valid criteria.

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BRIEF PROFILE

The author named Windi Vio Ariska was born in Mojokerto on March 27, 1998, is a student of Biology Education Department of UIN KHAS Jember and graduated in 2021. The second author is Ira Nurmawati, S.Pd., M.Pd., a lecturer in basic biology who is currently still actively teaching in the Biology Education Department of UIN KHAS Jember.