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Development of Dicot and Monocot Learning Media using Flannel and Cardboard to Improve Biology Learning Outcomes of Junior High School Stundets

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Abstract: Learning media innovation Flanchard, or flannel and cardboard, evolved from book-based image media into three-dimensional flannel flanchard media.The goal of this study is to create a flanchard-based learning medium that is reliable, useful, and efficient.The research methodology utilized is the research and development (R&D) ADDIE development model, which consists of the following five phases: analysis, design, development, implementation, and evaluation.The 24 students in class VIII at SMP Swasta Bina Siswa served as the study's subjects.Expert and media expert validation sheets for testing feasibility, practitioner validation sheets for testing practicality, pretest and posttest sheets, and student response sheets for testing effectiveness were the instruments used in the research.The study demonstrates that the developed Flanchard-based media is said to be very feasible with a percentage of 84%, very practical with a percentage of 86%, and very effective with an increase in learning in the high category, which was tested with n-gain with a score of 0.7 and participant responses.

Keywords: Flanchard, biology learning outcomes, development research.

Abstrak: *Flanchard (flannel and cardboard) adalah inovasi media pembelajaran yang dikembangkan dari media gambar berbasis buku menjadi media flanchard tiga dimensi berbahan flannel. Penelitian ini bertujuan mengembangkan media pembelajaran berbasis flanchard yang valid, praktis dan efektif. Jenis penelitian yang digunakan adalah penelitian dan pengembangan (R & D) model pengembangan ADDIE yang meliputi lima tahap, yaitu analysis, design, development, implementation, evaluation. Subjek penelitian adalah siswa kelas VIII SMP Swasta Bina Siswa yang terdiri dari 24 siswa.Instrumen penelitian yaitu lembar validasi ahli & ahli media pada pengujian kelayakan, lembar validasi praktisi untuk mengetahui kepraktisan, serta lembar pretest dan posttes, serta lembar respon peserta didik untuk pengujian keefektifan. Hasil dari penelitian membuktikan bahwa media berbasis Flanchard yang dikembangkan dinyatakan sangat layak dengan persentase 84%, sangat praktis dengan persentase 86%, serta sangat efektif dengan adanya peningkatan belajar kategori tinggi yang telah diuji dengan n-gain dengan skor 0,7 dan respon peserta didik sangat baik dengan persentase 81,67%.*

Kata kunci: *Flanchard, hasil belajar biologi, penelitian pengembangan.*

▪ INTRODUCTION

Quality education is education that is able to develop the potential and knowledge possessed by students (Novaliendry, 2021). Quality education is education that is able to develop latent positive potential in students (Amtu, 2020). According to the National Education System Law No. 20 of 2003, education is a conscious and planned effort of a person in creating a learning atmosphere and learning process so that students can actively develop their potential. Educational goals can be achieved by increasing teacher competence through training as well, educational institutions have an important role in shaping students' ideal self, intellectual and social prototypes (Mardiana, 2019).

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Humans certainly do not escape the quality of education, because education is a major factor in improving the quality of resources. human resources (Word, 2018). Sari (2018) and Siregar (2020) say that the success of educational development in educational institutions is strongly influenced by the availability of educational supporting components.

Several factors can affect critical thinking skills including the learning environment, learning experience, guidance and support for learning resources, as well as setting the desired learning achievement targets (Sutiani, 2021). Learning is a teaching and learning activity that occurs directly, where there is interaction between students and teachers (Tina, 2022). Learning activities carried out by students can encourage changes in students, both to increase students' knowledge, understanding, and skills that are constant (Haryani, 2021). The learning outcomes achieved by students can be influenced by two factors, namely internal and external factors (Nana Sudjana, 2006). Learning outcomes are not only tied to situations where understanding arises, but can also be used in other situations (Naibaho, 2019). Learning is not only oriented to mastery of knowledge but also oriented to the learning process (Winarni, 2020). The role of the teacher in the learning process is very important, especially in choosing learning media and designs to motivate students to learn (Saputra, 2018). The main causes of learning disabilities are internal factors, including interests, talents, motivation, intelligence level, while the main causes of learning problems are learning factors. External factors include wrong learning strategies, management of learning activities that do not arouse student learning motivation (Walubita, 2018).

Media is one source of learning that affects student learning outcomes. The word "media" based on its terminology comes from the Latin "medium" which means "intermediary or means of connecting" (Sumiharsono, 2017). Dwi Cahyono (2021) and Widodo (2018) explain that Learning Media is a learning tool that is used by someone by using tools that are made to facilitate the delivery of material when teaching at school. learning media can also build dynamic learning in the classroom (Putra, 2019). At the beginning of education, the teacher was a source for information and explanations. However, in subsequent developments, books emerged as media in learning. Along with the passage of time and the development of the era of educators began to realize the importance of media or learning facilities that can provide learning experiences for students through all senses, especially the senses of sight and hearing (Susanto, 2019). The role of learning media in the learning and teaching process is an integral part that cannot be separated from the world of education (Tri mustika, 2017).

In accordance with the current situation in the field, teaching aids or learning media that are able to support the process of understanding students' concepts and material are still lacking. Teaching aids that can be used as experiments or practicums are still very minimal in schools (Alifteria, 2021). In this study, we will develop media made of flannel and used cardboard, which are assembled into a learning medium for dicot and monocot material. The media is called the flanchard media, where the word flanchard is a combination of the word flannel and the word cardboard. This plant structure teaching aid is a renewal of the dicotyledonous and monocot plant body structure props in the form of pictures (Rusmawati, 2017). This flanchard-based plant structure prop simplifies objects and enlarges the size of objects so that they are easier to observe. A clear update from this teaching aid is that initially, the teaching aids were

only in the form of printing from pictures of the preparations, while this flanchard-based teaching aid was a visualization of the structure of the root and stem tissue using rolled flannel pieces and cardboard which became the main foundation of the media so that it could represent the tissue. -tissue found in plants (Wahyuni. 2018).

In the learning process in junior high school about the structure of the plant body of dicots and monocots, students observe the structure of the plant body using a microscope. Students observe preparations made by themselves from plants around the school yard or observe preserved preparations. This observation shows students the true structure of the plant body. Students are expected to be able to achieve competency indicators, namely distinguishing the basic tissues that make up roots and stems, as well as comparing the tissues that make up stems and roots of dicotyledonous and monocot plants. Through the interview questionnaire that I gave to the teacher, the obstacle that occurred in the junior high school was that these indicators had not been achieved. The lack of achievement of these indicators was due to several obstacles, such as the lack of facilities at the school, microscopes not connected to LEDs, or an inadequate number of microscopes. This is a problem that must be solved so that students are able to achieve these indicators of competency achievement (Nur widhi, 2018).

To help achieve these indicators, teachers can make learning media or teaching aids. Learning media or teaching aids are able to become intermediaries or bridges to convey information to recipients and become one of the supports in the learning process in addition to explaining theory (Rahmani, 2022). Teaching aids are able to overcome the limitations of student learning experiences, clarify the presentation of teaching materials that are difficult for students to understand. Teaching aids in creative movement activities will have a positive impact on the teaching and learning process (Saearani, 2019). Objects that are too large can be displayed in class using props. Objects or objects that are too small can be observed directly, can be displayed on a larger scale (Rusmawati, 2018). Learning media is not always synonymous with expensive prices, even many learning media that almost do not cost money to make. One example is by creating simple learning media. Utilization of waste and cheap materials is a priority (Abullah, 2019). Some cheap materials are flannel. While the unused material that is easy to find is cardboard (cardboard). The use of these two materials is cheap, easy to obtain, and easy to use. Colorful flannel will attract students. With this teaching aid, students are expected to be able to distinguish the tissue structure of the roots, stems of dicots and monocots.

Some studies have actually explained about the use of teaching aids to achieve learning success, as has been researched by Nur Widhi (2018) that the use of teaching aids media in learning shows a better influence on student learning outcomes compared to student learning outcomes when learning does not use media. props. As well as the research that has been carried out by Munawir (2020), as well as Nur Subkhi's (2019) research entitled "Indramayu Local Waste Raw", said that the use of teaching aids media in the learning process can attract students' attention and make students motivated and actively involved in the learning process. learning, it is easier to remember, tell and understand the material in a concrete way and students can master the material so that they get better learning outcomes. The level of understanding of students after using teaching aids media obtained an average value of 86.89 which was

higher than without using teaching aids media obtained an average value of 83.73 and thus using teaching aids media could effectively improve students' understanding.

Based on the previous description, the author is interested in developing a media that helps in understanding biological concepts and increases students' creativity by utilizing simple materials. So the author took the initiative to do research with the title "Development of Flanchard-Based Learning Media (Flannel And Cardboard) to Improve Student Learning Outcomes in Junior High School" The learning media that will be used this time is media in the form of props made of flannel and cardboard. used (cardboard). Learning media derived from used goods such as cardboard are expected to realize creativity and innovation, students can provide alternative solutions to waste management. Biology learning media actually does not have to be expensive and sophisticated (Anjarwati, 2021). Things that must be considered are the ease of use, the effectiveness of the media in supporting the achievement of the objectives of the learning process, and the costs that must be incurred. Media made using materials that are simple and interesting to look at, if designed properly, even unused or used items can be used in the manufacture of biology learning media.

Based on this background, the purpose of this research is to develop a valid, practical and effective flanchard-based media. This research is expected to provide information about how learning media, namely flanchard-based media (flannel and card board) affect student success in obtaining biology learning outcomes. In addition, the findings obtained can be used as learning media in the subject structuresof Class VIII dicotyledonous and monoctile plant body and can be useful for teachers, students, and advanced researchers.

▪ METHOD

Research Design and Procedures

This study uses a research and development, or R&D, design, because research techniques are used to create certain items and evaluate their effectiveness. The development study was conducted using the ADDIE development design method (Analysis-Design-Develop-Implement-Evaluate).

Figure 1. ADDIE development design

Analysis

In the ADDIE development research model, the first stage is to analyze the need for new product development (models, methods, media, teaching materials) and analyze the feasibility and requirements of product development. The development of a product can be initiated by a problem in an existing/applied product. Problems can arise and occur because existing or available products are no longer relevant to the needs of the target, learning environment, technology, student characteristics and so on. After analyzing the problem of the need for new product development, we also need to analyze the feasibility and requirements of product development. The analysis process can be done by asking several questions, for example: (1) is the new product able to overcome the learning problems faced?, (2) does the new product have the support of facilities to be applied?, (3) is the lecturer or teacher able to apply the new product . New product analysis needs to be done to determine the feasibility if the product is applied.

Design

activities in the ADDIE development research model are a systematic process that starts with designing the concepts and content in the product. Designs are written for each product content. Instructions for implementing the design or manufacture of products are sought to be written in a clear and detailed manner. At this stage the product design is still conceptual and will underlie the development process in the next stage.

Development

Development in the ADDIE development research model contains activities for the realization of product designs that have previously been made. In the previous stage, a conceptual framework for implementing a new product has been developed. The conceptual framework is then realized into a product that is ready to be implemented. At this stage it is also necessary to create an instrument to measure product performance.

Implementation

The application of the product in the ADDIE development research model is intended to obtain feedback on the product being made/developed. Initial feedback (early evaluation) can be obtained by asking questions related to product development goals. The application refers to the product design that has been made.

Evaluation

The evaluation stage of the ADDIE model development research is carried out to provide feedback to product users, so that revisions are made according to the evaluation results or needs that have not been met by the product. The final objective of evaluation is to measure the achievement of development objectives.

Participants

One of the junior high schools in the Deli Serdang area was used as the research location. A total of 24 children from grade VII SMP consisting of 11 and 13 became research participants in this study which was conducted in August 2022.

Instruments

For instructors and students, validation sheets, response surveys, and learning outcomes tests were used to collect study data. Two expert validators received questionnaires for media validation, teacher responses, student learning outcomes, and questions to ascertain student learning outcomes. The information collected is verified, and educational materials are created.

Data analysis techniques

Data was obtained by assessing the quality of student worksheets by converting data in the form of scores into percentages. The results of the scoring analysis, that there are 5 scales namely: Very good with a score of 5, Good with a score of 4, Fairly good with a score of 3, Not good with a score of 2, Not good with a score of 1. Then, the percentage results obtained are interpreted in the criteria table feasibility, practicality, and effectiveness in table 2.

Table 1. Interpretation of Flanchard's media assessment

No.	Score (%)	Feasibility	Validity Interpretation	Effectiveness
1	0% - 20%	very inappropriate	Very invalid	Very ineffective
2	21% - 40%	Less feasible	Less valid	Less effective
3	41% - 60%	Fair	Enough	Enough
4	61% - 80%	Eligible	Valid	Effective
5	81% - 100%	Very feasible	Very valid	Very effective

The results of student learning scores are known based on the results of the pre-test and post-test, and processed using the N-Gain formula used to determine the effectiveness of the eye lesson. Based on table 3, the information from the results of the N-Gain calculation is translated into a normalized N-Gain level category. The N-Gain category is the category g > 0.7 that is included in the high criteria, then if 0.3 g 0.7 is included in the medium criteria, if the g category < 0.3 then the criteria is low.

▪ RESULT AND DISSCUSSION

The research results obtained were conducted to determine the feasibility, practicality and effectiveness of the development of Flanchard-based media for junior high school students to achieve better learning outcomes with the ADDIE model, the following results were obtained.

Feasibility

The results of the feasibility assessment by media experts and material experts are shown in table 4. Based on the results above, it is known that the average validator's assessment results regarding the flanchard media that have been developed are in the very feasible category with the percentage obtained is 86%. So that this flanchard-based media can already be used and is feasible to be tested and developed in the field.

Table 2. Validator assessment results

No	Assessor	Results	Category
1	Media expert	88%	Very Eligible
2	Content expert	84%	Eligible
	Average	**86%**	**Very Eligible**

The results of the practicality assessment by biology subject teachers are shown in Table 5. Data assessment results above that the results of the expert assessment of field practitioners related to the Flanchard media that were developed with an average of 87.5% were in the very practical category. sub-dicotyledonous and monocot plants.

Tabl 3. Expert practitioner assessment results

No	Aspects assessed	Results	Category
1	Material	90%	Very practical
2	Illustration	80%	Practical
3	Media quality and appearance	90%	Very practical
4	Attractiveness	90%	Very practical
	Average	**87.5%**	**Very Practical**

Effectiveness

The results of the effectiveness of Flanchard's media are known from the value of learning outcomes, pre-test and post-test scores and student response questionnaires. The results of the pre-test and post-test calculations are shown in Table 6. Based on the statistics above, the average pre-test score was 31.95, while the post-test average was 80.20. The increase in student learning scores is determined.

Table 4. Students' learning outcomes

	Pretest	Posttest
Number of students	24	24
Highest score	40	100
Lowest	14	60
Average score	**31.95%**	**80.20%**

Moreover, the results of student learning scores are processed using the N-Gain formula to determine the effectiveness Flanchard which is known in table 7. It is known from the results of the calculation above that the score is in the medium category, with an average N-Gain score of 0.71, $g > 0.7$, it is concluded that there is an increase in the "high" category in student learning outcomes. using Flanchard-based media.

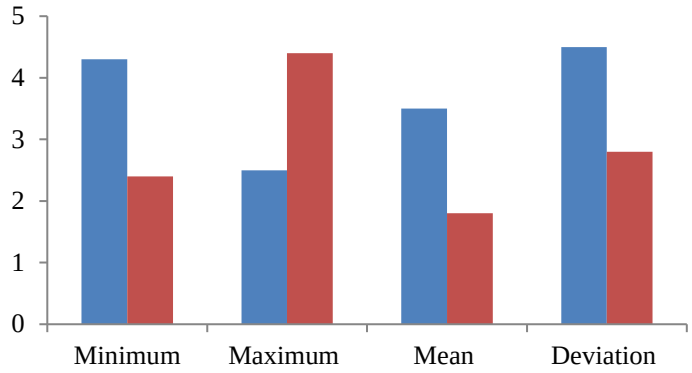

Figure 1. N-gain score (blue) and percentage (red)

Moreover, the effectiveness of Flanchard-based media is known from the results of calculating student responses based on Table 8. It is known from the results of the data above that the average student response value related to Flanchard has been shown in the very good category with a percentage gain of 81.67% . So from the results of the improvement and learning outcomes, this Flanchard-based media can be used and is very effective for students as an alternative learning media. The following are student responses, namely the number of students as many as 24 students, and the total value of student responses as many as 1,960 students and then the average value of 81.67%.

The first step in making this Flanchard-based media is analysis (in the analysis phase, the tasks are: including needs assessment). Needs analysis uses observation and interviews to examine the needs needed to address a problem. Results Most teachers at Bina Siswa Private Junior High School use textbooks from the library to present material, which causes students to become bored and has a negative impact on learning outcomes. However, the results of an interview with one of the biology teachers showed that this practice actually benefits student learning outcomes. At school it was found that the learning outcomes on the content of dicots and monocots were not very comprehensive.

In the Flanchard-based media, the selection of design stage learning media (flanel and cardboard). The first step in the design process before making Flanchard media is to find underutilized and affordable materials that can be used to make media in the form of props. Following are the results of the revised flanchard-based media in Figures 1 and 2. At the development stage (Development, validation carried out by media experts obtained 88% results, with the category very suitable for use in the field with there is a revision, namely changing the color of the media so that the difference in the color of the media can be seen. Meanwhile, the assessment by material experts obtained 84% results, in the appropriate category with the revision. At the implementation stage, there were 24 students in class VIII SMP Swasta Bina Siswa. Two the session was held to complete the implementation phase. Students were given a total of 22 pre-test questions at the first meeting, with an average acquisition rate of 31.95%. After learning was completed, students were asked to fill out a questionnaire and respond to 20 questions in the post-test. The second meeting include flanchard media (flanel and cardboard) in class and explain the material previously already in the RPP. The post-test average was 80.20%, compared to the student response average of 81.67%.

Figure 1. Dicot roots and monocot roots before revision

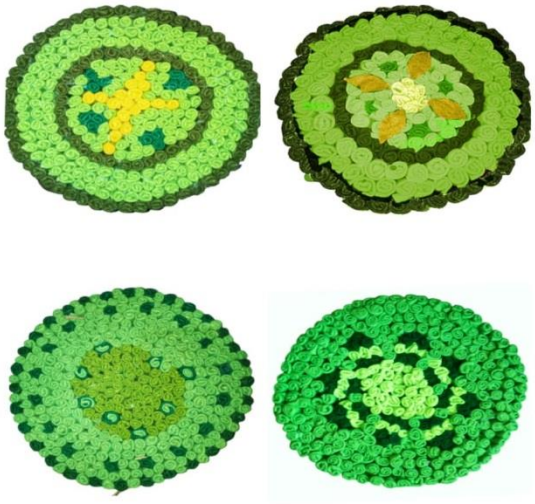

Figure 2. Dicot roots, monocot roots, dicot stems, and monocot stems After revision

The final evaluation step in the ADDIE development methodology is when it is assessed whether the flanchard-based media development is successful in improving student learning outcomes. The results of making Flanchard-based media (flanel and cardboard) are reported to have met the very feasible requirements with an average percentage of 86% based on data analysis carried out. In addition, testing the results of the practicality test resulted in an average percentage of 87.5% which was included in the "very practical" category. As for testing the effectiveness of the developed flanchard media, it was obtained an increase in student learning scores from the test pretest and posttest results of students before and after learning using flanchard media, as well as student responses related to flanchard development which was developed to determine the increase in the value of learning outcomes calculated by the N-test. The gain obtained is 0.71. This means that the gain score has a high increase, namely $g > 0.7$ so that there is a change in the value of student learning outcomes after doing learning activities with flanchard media. Therefore, the development of flanchard media (flannel and cardboard) enhances learning with concept discovery. Furthermore, the results of the student response questionnaire values submitted to 24 students obtained a percentage of 81.67% with a very good category. So this is flanchard-based media (flannel and cardboard) can provide a positive attitude from students after carrying out the process of learning activities with flanchard media

▪ CONCLUSION

Based on the results, it can be concluded that Flanchard-based media is very feasible to be used and tested in the field with a percentage gain of 86%. The Flanchard-based media that has been developed is considered very practical to be used by subject teachers with a percentage gain of 87.5%. And the Flanchard-based media is considered to be very effective in its use by students which is known from the increase in the value

of student learning outcomes in the N-Gain test with a value of 0.7 which means there is an increase (high category) on the results of student learning scores and the percentage of student responses that obtained by 81.67% with a very good category.

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