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DEVELOPMENT OF FLIPBOOK TEACHING MATERIALS DESKTOP-BASED EXCRETION SYSTEM TO IMPROVE STUDENTS' CRITICAL THINKING SKILLS (RESEARCH STUDY AT SMA TERPADU WIRA BHAKTI)

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Abstract:

Critical thinking skills are able to prepare students to think in various disciplines, and can be used to fulfill intellectual needs and develop the potential of students. This research is a research and development research, with the procedure of this research adapting the ADDIE development model with 5 stages of development, namely, 1). Analysis, 2). Design, 3). Development, 4). Implementation, and 5). Evaluation, The results of research on the development of teaching materials based on the results of expert assessments of teaching materials obtained an average percentage of eligibility of 86.25% with a very feasible category. Based on user responses in small group trials, the average percentage of eligibility is 85.23% and is included in the "Very Eligible" category, while the feasibility of teaching materials based on user responses in large group trials obtained a feasibility percentage of 93.54% and is also included in the very decent category. In addition, the results of the calculation of the effectiveness of teaching materials on increasing students' critical thinking skills obtained a price of t_{count} = 9.1756 which is greater than t_{table} = 2.0129 with a significance level of 5% and the value of degrees of freedom (dk) = 46, so it can be concluded that the material The desktop-based excretory system flipbook teaching that has been developed is proven to be effective in improving the critical thinking skills of class XI students at SMA Terpadu Wira Bhakti Gorontalo.

Keywords ADDIE, Flipbook, Desktop.

INTRODUCTION

Education is a conscious effort to prepare students through guidance, teaching, and training activities for their roles in the future (Law No. 2, 1989). And according to (Law No. 20, 2003) education is a conscious, planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and the necessary skills. of him, society, nation and state.

A good education must begin with a good learning process as well as the Indonesian national education as outlined in Law no. 20/2003 concerning the national education system "National.

Education functions to develop capabilities and shape the character and civilization of a dignified nation in the context of educating the nation's life, aiming at developing the potential of students to become human beings who believe and fear God Almighty, have noble character, are healthy , knowledgeable, capable, creative, independent, and become citizens of a democratic, and responsible. , changes in behavior and attitudes that characterize the success of a learning process.

The teacher's role is very decisive in improving the quality of education. As a teacher, it is necessary to pay attention to the abilities and skills of the teacher in managing the classroom in order to create an active, creative and innovative learning process for the material being taught. To achieve a goal in an effective learning process, students are not only expected to be able to master concepts, but can also improve their critical thinking skills so that they can develop the potential that exists within themselves. This is in line with Sadia (2008) who argues that education in schools is directed not only at mastering and understanding scientific concepts, but also at increasing students' thinking abilities and skills, especially high-level thinking skills, namely critical thinking skills. skills), teachers need to teach their students to learn to think (teaching of thinking).

Liliasari (2003) states that critical thinking skills are able to prepare students to think in various disciplines, and can be used to fulfill intellectual needs and develop students' potential, to live careers and real life. But in reality, efforts to train students' critical thinking skills often escape the attention of teachers, this can be seen from the learning activities carried out by teachers who provide more information, followed by discussions and exercises with a very limited frequency. Paradigms like this should have changed as an embodiment of improving the quality of education, especially during the current covid-19 pandemic. Changes can be made by changing the learning system that has been implemented so far from a teacher-centered learning system to a more meaningful learning, namely student-centered learning. Learning systems that direct student centeredness (students centered) will be able to grow and develop creativity and train students' critical thinking skills in learning and in solving problems faced in everyday life. This is in line with the opinion of Muhfahroyin (2009) which states that the student-centered paradigm is more appropriate to use to develop self-regulated learners who are able to empower critical thinking skills.

Biology learning in high school in general emphasizes learning on aspects of knowledge and understanding of concepts only, as a result students' critical thinking skills cannot grow and develop as expected, as happened at Wira Bhakti Integrated High School Gorontalo City, where based on observations made by researchers when the online biology learning process is carried out, students seem not to pay much attention to the explanation of the material presented by the supporting teacher. Even the learning process is more centered on the teacher so that the process of assessing the achievement of student learning outcomes is only assessed based on the results of the assignments given. As a result, student learning achievement, especially in biology subjects is very low. This can be proven by the results of student learning outcomes in class XIIPA3, where 18 of 22 students or 81.82% have not reached the Minimum Completeness Standard (SKM), while the achievement of learning outcomes of 29 students in class XIIPA4 is none or 100% yet. achieve the SKM that has been determined by the school of 70

Based on the learning phenomenon that occurred at the Wira Bhakti Integrated Senior High School, Gorontalo City, it can be seen that the low achievement of student learning outcomes is caused by the learning process that is currently taking place mostly online (online) so that learning seems to emphasize more on mastering the concept of material only by participants. students are less motivated and cannot develop the potential that exists within themselves so that it affects the achievement of student learning outcomes. A learning can be said to be good and effective if the learning itself involves all students and teachers as facilitators, which can facilitate students in learning so that students can develop their potential.

In addition, the cause of the decline in student learning outcomes in biology subjects is the availability of an unsupportive internet network where most students who do online learning at home do not have sufficient internet access to take part in learning. Besides that, during the learning process students tend to just ask and answer questions, and even then only a few people do while others tend to be passive, so that the critical thinking skills of students at SMA Terpadu Wira Bhakti Gorontalo City are still not maximally empowered by rakes, because the learning method used is still using conventional learning methods and is only centered on the supporting teacher.

From the description of the problems above, it can be concluded that the main cause of the lack of critical thinking skills of students in learning biology is that learning seems to be still teacher-centered and the absence of interactive learning media that can be used offline as a companion in the online learning process itself. With the existence of learning media that can be used independently by students without depending on the availability of the internet network. In addition, the learning carried out is still using pdf-based electronic modules so that students feel bored in participating in learning, because the media used as online learning companions are still presented in the form of text and images. Basically, learning biology, especially on the excretory system of humans and animals, is not just material presented in text form, but teachers are required to be able to show the parts of the excretory system of humans and animals themselves and be able to explain each of their functions.

Departing from the problems that occurred above, the researchers then developed a desktop-based excretory system flipbook teaching material that can be run without using the internet network (offline) and supports independent learning outside the classroom which is presented in the form of a flipbook and contains material on the human and excretory system. animals equipped with video content, animations, educational games and learning evaluations. The development of these teaching materials is expected to be able to overcome every problem faced in the biology learning process at the Wira Bhakti Integrated High School Gorontalo City, especially on the material of the human and animal excretory system. This is based on the presentation of material delivered through teaching materials that carry interesting contemporary concepts so that they can trigger students' learning desires. The teaching materials that will be developed are also equipped with educational and evaluation games that can train students' critical thinking skills and can be used independently as an online learning companion without using the internet network (offline) so that they become the right solution in online learning amid the current COVID-19 pandemic. this. The research objective is to determine the process of developing desktop-based excretory system flipbook teaching materials to improve students' critical thinking skills at SMA Terpadu Wira Bhakti.

RESEARCH METHODS

The type of research used in this research is research and development, with this research procedure adapting the ADDIE development model with 5 stages of development, namely, 1). Analysis (analysis), 2). Design (design), 3). Development (development), 4). Implementation (implementation), and 5). Evaluation (evaluation). Stages of developing desktop-based excretory system flipbook teaching materials.

The method or technique of data collection is the method taken to obtain the data that is needed in an accurate and accountable manner. The method of data collection is done through 3 techniques. 1). documentation study, 2). Questionnaire 3). Test

Data analysis in this research is using qualitative and quantitative analysis techniques. Qualitative data in this study was obtained from entering the validator at the validation stage of teaching materials, while quantitative data is data that describes the results of the feasibility of teaching materials obtained through the results of the feasibility assessment of teaching materials both by teaching materials experts and user responses which are then processed and presented in the form of percentage by using a Likert scale as the measurement scale. To measure the feasibility category, it is obtained by dividing the range of percentage numbers based on the Likert scale used where, if it is expected that the condition of the research results is 100%, then the value of the range will be divided into 4 categories, so that the grouping of the category ranges is media eligibility can be seen in the following table.

Table 1. Media Eligibility Level

No	Category	Percentage
1.	Very Worthy	76 % - 100 %
2.	Worthy	51 % - 75 %
3.	less worthy	26 % - 50 %
4.	Not feasible	0 % - 25 %

Source: Arikunto (2010)

RESULTS AND DISCUSSION

RESULTS

The validation of the experts focused on 4 aspects of the assessment, namely the assessment of the design of teaching materials, the assessment of the instructions for use and interaction of teaching materials, the assessment of the presentation of the material in the teaching materials, and the assessment of the quality of the instructional materials in the teaching materials. the average achievement of the percentage of the feasibility of teaching materials from the aspect of the assessment of the design of teaching materials obtained a feasibility level of 92.01%. In addition, the average result of the feasibility of teaching materials is assessed from the aspect of evaluating the use and interaction of teaching materials by 86.11% and based on the aspect of assessing the content and presentation of material in teaching materials reaches an average of 88.89% feasibility, while for the assessment of Instructional aspects of the quality of the questions in teaching materials obtained an average feasibility of 81.94%. And for the average percentage of feasibility from all aspects of the assessment of teaching materials it reaches 87.24%, and the overall results of achieving the feasibility of teaching materials are in the very feasible category, so that it can be tested on small group students to find out the user's response to the level of attractiveness. developed teaching materials.

The results of the validation of the feasibility of teaching materials by teaching materials experts based on all aspects of the assessment of the desktop-based excretory system flipbook teaching materials can be seen in the following table and histogram.

The average percentage of achievement of the feasibility of teaching materials from the aspect of the assessment of the assessment of the function of teaching materials obtained a feasibility level of 84.85%, while the average results of the feasibility of teaching materials were assessed from the aspect of the assessment of the presentation of teaching materials of 86.11%, and the average the percentage of feasibility of all aspects of the assessment of student responses as users of teaching materials reached 85.48%. The overall results of achieving the feasibility of teaching materials are in the very feasible category, so it can be concluded that flipbook teaching materials for human and animal excretion systems can be continued at the stage of large group trials.

The results of the trial of the feasibility of teaching materials by small group students based on all aspects of the assessment of the desktop-based excretory system flipbook teaching materials can be seen in the following table and histogram.

Testing of teaching materials on large group students also focused on 2 aspects of assessment, namely aspects of assessing the function of teaching materials and aspects of assessing the presentation of teaching materials. that the average percentage achievement of the feasibility of teaching materials from the aspect of the assessment of the assessment of the function of teaching materials obtained a feasibility level of 92.36%, while the average results of the feasibility of teaching materials were assessed from the aspect of the assessment of the presentation of teaching materials of 96.64%, and the average the average percentage of eligibility for all aspects of student response assessment as users of teaching materials reached 94.50%. The overall results of achieving the feasibility of teaching materials are in the very feasible category of feasibility.

DISCUSSION

The development of teaching materials carried out has gone through a series of phases of developing the ADDIE model with 5 stages of development starting from the analysis, design, development, implementation, and ending with the evaluation stage so as to produce a desktop-based excretory system flipbook teaching material that can be used both in classroom learning and as a medium for student self-learning outside the classroom.

In its implementation, the first stage in this development is to conduct an analysis consisting of two stages, namely material analysis and needs analysis. From the analysis of the material, it is known that the material needs needed in the development of teaching materials include the material presented in the teaching materials containing material on the human and animal excretory system based on competency standards and basic competencies, competency achievement indicators and learning objectives that apply at SMA Terpadu Wira Bhakti. Gorontalo.

The next step in the analysis stage is to conduct a needs analysis both in terms of development needs and user needs. In the analysis of user needs, it is known that the results of developing teaching materials are adapted to current trends by paying attention to the display design and ease of use can eliminate student boredom when studying the material being studied, because the developed teaching materials are believed to provide variations in the learning process because it integrates sound, text and audio shows. , pictures, animations, videos, music, and educational games so that the information conveyed is richer than conventional books.

Furthermore, the second stage in the ADDIE development model that is carried out is designing teaching material products which consist of the stages of designing teaching material data and designing the display of teaching materials. The developed teaching materials are made in the form of digital flipbooks wrapped in one complete application with the .exe extension that can be run on desktop devices (computers/laptops) with the Windows operating system. In addition, the page format used is Landscape with Times New Roman font format.

The third stage in the ADDIE development model that is carried out is the development stage where the process of realizing the design becomes a reality, meaning that at this stage all the needs that have been collected in the previous stage are made into a unified whole to become an application of teaching materials that can be used in learning. The steps taken in the development stage include making interactive flash-based simulations, making interfaces for teaching materials, and validating the feasibility of teaching materials.

The final step taken at the development stage is to validate the feasibility of teaching materials by teaching materials experts. Validation was carried out during the FGD seminar with the aim of knowing the feasibility of the product developed according to several teaching materials experts. This is similar to the research conducted by Wulandari (2018) where in his research he used three experts to validate the feasibility of the learning media he developed. Based on the results of the validation of the feasibility of teaching materials by teaching materials experts, the overall feasibility percentage was 86.25% and was declared very feasible. The data obtained in the form of quantitative data and qualitative data. Quantitative data are in the form of assessment questionnaires and qualitative data which include general criticism and suggestions that will be considered for improving the teaching materials developed. This is similar to the research conducted by Puspitasari and Rakhmawati (2013) which also used qualitative and quantitative data in the questionnaires validating the feasibility of the developed e-book. Then the quantitative data obtained were analyzed using a Likert scale with a scoring range of 1 to 4. The results of the 3 validators' assessments were averaged for each aspect and the indicators were then averaged again to obtain the final validity value. This value is then calculated using a percentage calculation by dividing the score obtained by the validator with the ideal score for each question item as outlined in the questionnaire. Furthermore, the results of the feasibility percentage obtained are juxtaposed with a table of eligibility categories to determine the feasibility category of the teaching materials developed. This is in line with the research conducted by Noviani (2013) where the development research used Arikunto's feasibility category table in determining the feasibility category of the learning media he developed.

The fourth stage in the development of the ADDIE model carried out by researchers is the implementation stage where teaching materials have been developed. The implementation phase is carried out through a small group and large group trial phase. The results of small group trials conducted on 11 students who were not test subjects obtained an average percentage of the feasibility of all aspects of assessing student responses as users of teaching materials reaching 85.48% with the overall results of achieving the feasibility of teaching materials in the very feasibility category. feasible, so it can be concluded that material testing can be continued at the stage in large group trials. Large group trials were conducted on 24 students of class XI IPA-1 who were the subject of the trial with the aim of knowing the user's response to the level of attractiveness of the teaching materials developed while at the same time knowing the effectiveness of teaching materials to improve students' critical thinking skills. The results of the trial of teaching materials on large groups of students obtained the average percentage of eligibility for all aspects of the assessment reached 94.50% with a very feasible feasibility category. Thus, it can be concluded that the teaching material which is a desktop-based excretory system flipbook that was developed is suitable for use in learning.

CONCLUSION

Based on the results of research and discussion, the following conclusions can be drawn:

1. This research on the development of teaching materials has produced a product in the form of a desktop-based flipbook teaching material application which contains excretory system material in humans and animals that can be used as an effort to improve students' critical thinking skills, especially in class XI IPA-1 SMA Terpadu Wira Bhakti Gorontalo , because it has fulfilled the components of good teaching materials and can be used in the learning process.
2. The results of the development of desktop-based flipbook teaching materials resulted in a feasibility assessment based on the results of the expert's assessment of teaching materials with an average feasibility percentage of 86.25% and based on user responses of 93.54% and included in the "Very Eligible" category based on the category table appropriateness.

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