



DEVELOPMENT OF A GUIDED INQUIRY-BASED BIOLOGY MODULE FOR TEACHING THE HUMAN REPRODUCTIVE SYSTEM FOR GRADE XI STUDENTS AT SMA NEGERI 1 NA IX X

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ABSTRACT

This study aims to develop a guided inquiry-based biology learning module on the reproductive system material for grade XI SMA/MA. This research is a type of research and development (Research and Development or can also be called R&D). Research and Development (R&D) is one of the research models used to produce a specific product from a problem and test the effectiveness of the product. The results of product validation and trials indicate that the guided inquiry-based biology learning module on the reproductive system material for grade XI SMA/MA obtained qualifications with a validation level of "very suitable" to use and received positive responses from biology teachers and students. This was obtained based on the percentage of product validation and trials results. The percentage results obtained for each were material experts at 91%, media experts at 81%, teacher responses at 96%, and student responses at 86.2%.

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1. INTRODUCTION

Learning is an educational endeavor aimed at imparting knowledge. Learning is accomplished by organizing students and creating an effective learning system using engaging methods to optimize the learning process and ensure students effectively absorb the material [1]. Teaching materials are tools or tools teachers use in learning to achieve learning outcomes, encompassing material, limitations, and evaluation methods, all the way down to their complexity. Teaching materials play a crucial role because they can make learning more engaging, provide students with more opportunities for independent learning with teacher guidance, and facilitate the learning of each competency they must master [2]. Biology is a very broad science. Contextual learning can encourage students to be more active, making the lesson more receptive [3]. Developing students' knowledge can also be done through inquiry, a method useful for discovering ideas about existing problems. The importance of guided inquiry is the process of obtaining existing information by conducting experiments to solve problems based on the problem formulation using critical and logical thinking skills.

Based on the results of the needs analysis at SMA Negeri 1 NA IX X on January 5, 2025, it was found that classroom learning had used the independent curriculum, while the teaching materials used were still limited. The independent curriculum only used textbooks. At SMA Negeri 1 NA IX X there was no guided inquiry-based biology learning module, especially the reproductive system material for grade XI students because the teacher had not completed the teaching module created and had not developed a guided inquiry-based learning module. Based on the results of interviews with biology teachers at SMA Negeri 1 NA IX X, information was obtained that the learning process teachers often used PowerPoint to deliver learning. This was because, at SMA Negeri 1 NA IX X learning resources were less varied. This resulted in teachers not having complete teaching modules. Biology learning was

only based on PowerPoint explained by teachers and students during presentations, while the material entered by students did not come from credible sources.

Knowledge of the human reproductive system is important to learn because it can help prevent early pregnancy, avoid disease, and prevent infertility. Knowledge of the human reproductive system is very important to learn in high school to anticipate early pregnancy, avoid sexually transmitted infections as a consideration for their future. XI grade students at SMA Negeri 1 NA IX X studied the human reproductive system to strengthen the writer's understanding of the material used in this journal. However, the eleventh-grade students at SMA Negeri 1 NA IX X have not yet understood the material on the human reproductive system. Therefore, the author developed an inquiry-based explanation of the material so that both students and teachers would respond positively to the material development. The reproductive system is a biological material that requires a deeper understanding of the material. In the learning process, students must be given the broadest possible opportunity to seek their own knowledge [4]. The human reproductive system material is very suitable if the learning is carried out using guided inquiry with several student activities that will be included in the learning module. This is because the reproductive system material will provide an understanding of reproductive health for eleventh-grade students who are already teenagers [5].

According to Burton, "a person is suspected of having learning problems or difficulties if the person concerned does not succeed in achieving a certain level of learning outcome qualification within a certain time limit"[6]. Many students are unable to develop their understanding of biology concepts, especially the human reproductive system, because the acquisition of knowledge and the process are not well integrated and do not allow students to grasp the meaning flexibly [7].

Mastery of the concepts of the human reproductive system will be able to form a positive attitude towards the Biology subject in grade XI at SMA Negeri 1 NA IX X. This positive attitude towards the human reproductive system material is a prerequisite for successful Biology learning and increasing student interest in Biology in grade XI. In other words, if mastery of the human reproductive system in Biology in grade XI is accompanied by a negative attitude towards Biology lessons, it is difficult to expect students to succeed well in subsequent Biology lessons [8]. To achieve the goal of students having a good interest and ability in the human reproductive system material in Biology subjects has implications for very strategic tasks and responsibilities for Biology teachers in grade XI of SMA Negeri 1 NA IX X. They are required to help students gain a good understanding of the human reproductive system material in Biology subjects to facilitate their subsequent Biology studies [9]. This means that the Biology learning process carried out by teachers should enable the development of conceptual understanding, attitudes, and increase student interest in Biology lessons, especially the human reproductive system.

Based on the background description above, the researcher will develop a product by conducting development research with the title "Development of an Independent Curriculum-Based Learning Implementation Plan on the Human Reproductive System Material for Grade XI at SMA Negeri 1 NA IX X". The purpose of this study is to determine the development of a biology learning module with an independent curriculum teaching module based on guided inquiry on the human reproductive system material, to determine the feasibility of the independent curriculum learning module in biology lessons based on guided inquiry developed on the human reproductive system material, and also to determine the response of teachers and students to the independent curriculum learning module in biology subjects based on guided inquiry on the human reproductive system material for grade XI at SMA Negeri 1 NA IX X.

2. RESEARCH METHOD

Definition of Module

The modules are systematically arranged as teaching materials using language that is easy to understand, adjusted to the level of knowledge of students so that they can learn effectively and efficiently and then students can measure their own ability to understand the material [10].

Understanding Guided Inquiry Learning

Guided inquiry is a teaching and learning activity where the problem is determined by the teacher and the teacher guides students by asking questions to develop hypotheses so that students discover concepts from the material that the teacher has provided [11].

Biology Learning Materials for Grade XI High School/Vocational High School

The biology material covered in this research is the reproductive system. The primary focus of the reproductive system includes the organs that make up the external and internal reproductive tissues, the reproductive tract, hormones, spermatogenesis, oogenesis, menstruation, fertilization, pregnancy, and childbirth [1].

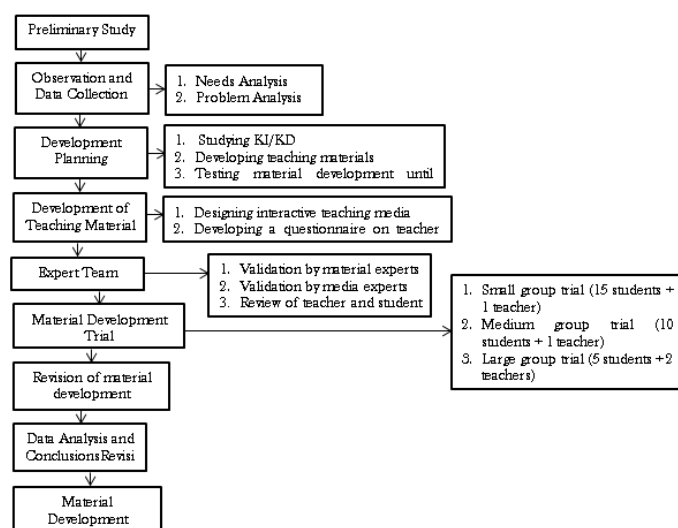
Definition of Teaching Materials

Teaching materials are all forms of materials used in teaching and learning activities. Teaching materials can be defined as materials that students must learn as a means of learning. Teaching materials can include material on the knowledge, skills, and attitudes that students must attain related to certain basic competencies [12].

This research was conducted at SMA Negeri 1 NA IX X, if the trial subjects are 30 grade XI students, then it is better to take all of them, whereas if the trial subjects are more than 100, 10-15% or 20-25% more can be taken. So the sample used is Quota Sampling by selecting 10 students from 30 students [13]. This research uses a product-oriented model through a qualitative approach. Research and Development (R&D) is a research model used to generate a specific product from a problem and test its effectiveness [14]. R&D aims to develop and produce valid research through cyclical and repetitive processes or steps such as field testing, product revisions until finally producing a product that meets the stated objectives [15]. The development model used in this research is ADDIE (Analysis-Design-Development-Implementation-Evaluate). The ADDIE model is a colloquial term used to describe a systematic approach useful for developing learning. The ADDIE model is a systematic approach. The ADDIE model can be used for various forms of development, such as learning models, learning strategies, learning methods, media, and teaching materials [16]. The research subjects for validating the use of learning module media consisted of lecturers who were material experts and lecturers who were media experts. After product development was carried out and revised [17], a trial was conducted at the research location of SMA Negeri 1 NA IX X class XI to determine the responses of teachers and students to the material that had been developed.

This research develops a learning module that can be used by students to understand the material [15]. Next comes the design stage, where the guided inquiry-based learning module will be developed based on the analysis used previously. The design stages are as follows :

Figure 1 Research Stage



Module Creation

This stage begins with the creation of learning modules using Microsoft Word. Visual aspects are also addressed during this stage.

Publishing

After the module creation stage is complete, the next step is printing the module. The module is printed in book form.

Subject Matter Expert Validation

After the publication stage is complete, the next stage is subject matter expert validation, where the material written in the module is assessed by a validator to determine the suitability of the material presented in the learning module.

Media Expert Validation

This stage is conducted concurrently with the material expert validation stage. During the media expert validation stage, the module is assessed in terms of the appearance of the developed module design.

Product Revision

This stage is carried out after receiving assessments from validators, media experts, and material experts. Following the assessment, the module is revised based on the suggestions and input, and feasibility is measured using assessment instruments. Validation is carried out until the product is truly suitable for testing with students.

The data analysis techniques used in this development research included qualitative descriptive analysis and quantitative descriptive analysis, using a Likert scale ranging from 1 to 5, [18] with 1 being the lowest and 5 being the highest. The Likert scale is used to measure opinions, attitudes, and perceptions about social phenomena. The data obtained in this study comprised both qualitative and quantitative descriptive analysis.

1. Qualitative Descriptive Analysis

Qualitative data were obtained from interviews with biology teachers and students at SMA Negeri 1 NA IX X regarding issues related to learning media, as well as input and suggestions from media expert validators and material experts from Labuhanbatu University lecturers, teachers, and students. Qualitative descriptive analysis was conducted to provide explanations for the processed data.

2. Quantitative Descriptive Analysis

Data obtained through questionnaire distribution were then measured using a Likert scale. This Likert scale was used to determine the length of the intervals within the measuring instrument, ensuring that the instrument could produce quantitative data for analysis. The following assessment categories for the Likert scale are shown in Table 1 below :

Table 1 Assessment Categories for Likert Scale

No	Category	Score Value
1	Strongly Agree	5
2	Agree	4
3	Somewhat Agree	3
4	Somewhat Agree	2
5	Disagree	1

Source: modified from data Aprilia, A., 2023

Table 2 Validator Assessment Categories

No	Persentase	Tingkat Validasi
1	84%-100%	Very Eligible
2	68%-83,9%	Eligible
3	52%-67,9%	Quite Eligible
4	36%-51,9%	Less Eligible
5	20%-35,9%	Not Eligible

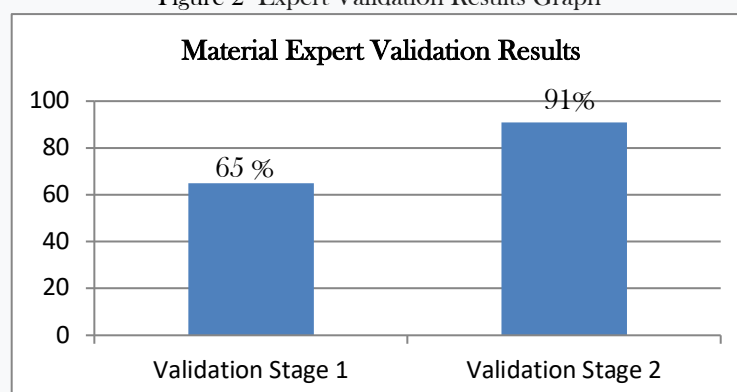
Source: modified from data Aprilia, A., 2023

3. RESULT AND ANALYSIS

Material Expert Validation Results

Validation by subject matter experts was conducted to determine the feasibility of the product and identify any deficiencies in the developed content. In this study, subject matter experts validated a guided inquiry-based biology learning module on the reproductive system.

Figure 2 Expert Validation Results Graph



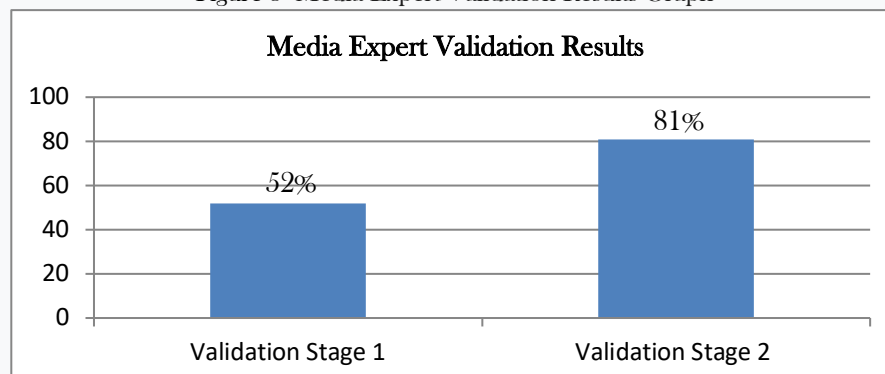
Source: Ms. Excel 2010 data processing

Based on figure 2 Input provided by the media expert validator. After the revisions are completed, the product is returned to the media expert validator for revalidation. The results of the second validation by the media expert are obtained.

Media Expert Validation Results

Media expert validation was conducted to determine the feasibility and shortcomings of the product's appearance. In conjunction with material expert validation, media expert validation was also conducted.

Figure 3 Media Expert Validation Results Graph



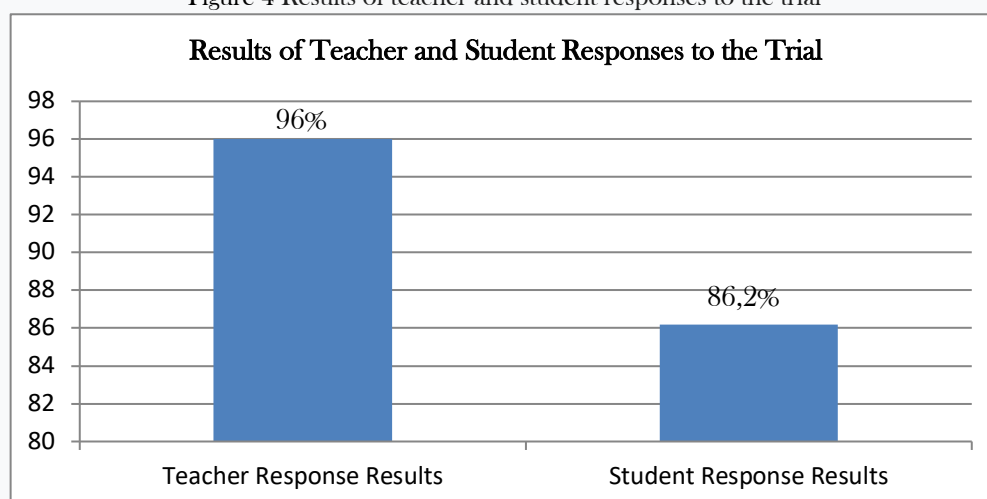
Source: Ms. Excel 2010 data processing

Based on the final validation results from the two validators, namely material experts and media experts, as seen in Figures 2 and 3, it is known that the product feasibility obtained was 91% and 81%, respectively. Therefore, the average product feasibility obtained from the two validators is as follows:

$$\begin{aligned}
 \text{Average Eligibility} &= \frac{\text{Percentage of Material Experts} + \text{Percentage of Media Experts}}{2} \\
 &= \frac{91\% + 81\%}{2} \\
 &= 86\%
 \end{aligned}$$

Based on the calculations above, the average product feasibility rating from both the material expert and media expert validators was 86%. This concludes that the learning module developed by the researchers falls into the "very feasible" category, with a validation level that is highly suitable for field testing without revision. Therefore, the next research phase was conducted, namely a trial of biology teacher and student responses.

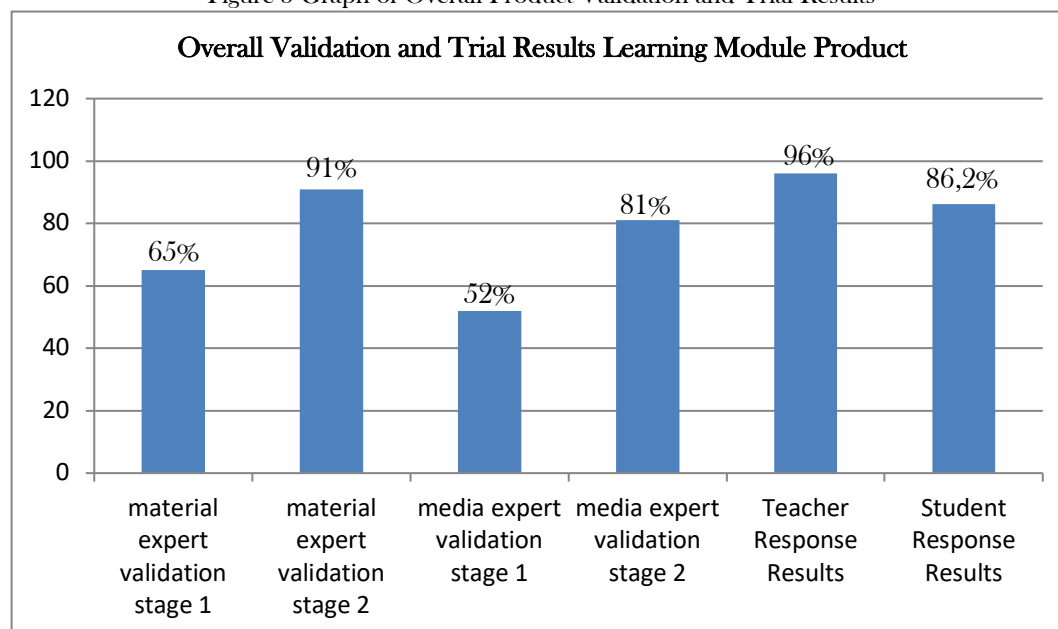
Figure 4 Results of teacher and student responses to the trial



Source: Ms. Excel 2010 data processing

Based on the response results, as seen in Figure 4, it is clear that both biology teachers and small groups of grade XI students at SMA Negeri 1 NA IX X received a positive response. Therefore, the product was declared usable without further trials and can be used as teaching material for biology teachers and grade XI students at SMA Negeri 1 NA IX X. The overall results of the validation and trial of the guided inquiry-based learning module on the reproductive system as teaching material for grade XI SMA/MA students are shown in Figure 5 below:

Figure 5 Graph of Overall Product Validation and Trial Results



Source: Ms. Excel 2010 data processing

The overall results of validation conducted by expert lecturers and product trials by teachers and students obtained scores as follows. In stage 1, the validation by material experts obtained a percentage of 65% with a validation level of "quite adequate", while in stage 2, the validation by material experts obtained a percentage of 91% with a validation level of "very adequate". In stage 1, the validation by media experts obtained a percentage of 52% with a validation level of "quite adequate", while in stage 2, the validation by media experts obtained a percentage of 81% with a validation level of "very adequate". Furthermore, the results of the trial for biology teachers obtained a percentage of 96% with the category of "very good" and the results of the trial for small groups of students obtained a percentage of 86.2% with the category of "very good".

4. CONCLUSION

- 1) The developed product was validated by material experts and media experts. Material validation was conducted twice, while media expert validation was conducted twice. The product's feasibility was assessed by both validators with an average percentage of 86%. Based on these validation results, the guided inquiry-based learning module on the reproductive system was declared "very suitable" and its validation level was "very suitable."
- 2) The biology teacher response trial resulted in a score of 48, with a percentage of 96%, falling within the "very good" qualification category. Meanwhile, the 11th-grade student response trial at SMA Negeri 1 NA IX X resulted in an average score of 43.1, with a percentage of 86.2%, falling within the "very good" qualification category. This demonstrates the positive response from both biology teachers and students to the guided inquiry-based learning module on the reproductive system, with a very good validation level, suitable for use in biology learning in 11th-grade biology at SMA Negeri 1 NA IX X.
- 3) Developing reproductive system material using a guided inquiry approach has several benefits. This approach can improve students' conceptual understanding, scientific thinking skills, and problem-solving skills. Furthermore, the guided inquiry model also encourages students to be active in learning and develops critical and creative thinking skills in grade 11 students of SMA Negeri 1 NA IX X.

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