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Feasibility Analysis of Inquiry-Based Physics Teaching Modules to Improve The Collaboration Skills of Class XI MAN 2 Lubuklinggau

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ABSTRACT
The aim of this research is to determine the feasibility of an inquiry-based teaching module to improve the collaboration skills of class XI students at MAN 2 Lubuklinggau. The research method used is the 4D development model consisting of 1) Define, 2) Design, 3) Develop and 4) Disseminate. The instrument used to answer the research objectives is the feasibility sheet consisting of a media expert validation sheet, a language expert validation sheet and a material expert validation sheet. The data in this study were analyzed using the Widoyoko formula. Based on the data obtained from the results of the feasibility of inquiry-based teaching modules, a score of 51 was obtained from media experts with a very good classification, a score of 73 from language experts with a very good classification, and a score of 47 from material experts with a very good classification. So the inquiry-based teaching module is declared very suitable for use and able to improve students' collaboration skills.

INTRODUCTION

Science learning has been taught from an early age in the world of education, but at each level science lessons have different stages and learning processes, one of which at the high school level is that science lessons include Physics, Biology and Chemistry (Agni et al., 2023; Day, 2019). Physics is a field of study that plays an important role in technological progress. It can be seen that in everyday life we always interact with the physical or natural environment around us. In accordance with what was written by Simatupang (2021) who explains that physics is a knowledge that can develop reasoning and analytical skills so that every problem related to nature can be understood.

In line with technological developments that occur in the world of education, there are many changes in learning. One of them is the government's change in implementing 21^{s}t century learning using an independent curriculum. Where the independent curriculum prioritizes a comfortable, happy learning atmosphere, focuses on basic material, increases skills, abilities, and is flexible (Muaziyah et al., 2023; Hasanudin, 2022). The independent curriculum was made an option by the Ministry of Education and Culture, Research and Technology so that students can carry out in-depth and exploratory learning activities using appropriate media according to the students' level of development (Hasanudin, 2022). The transformation of the 2013 curriculum into the MBKM (Free Learning Campus Teaching) curriculum is closely aligned with 21st century skills which implement learning using a scientific approach, where learning is student-centered so as to create students who are creative, innovative and productive. Current learning is faced with how to create students to have skills that will later be useful in society (Mu'aziyah & Isnawati, 2023; Wahid, 2021).

An independent curriculum is interpreted as a learning plan that gives students the freedom to study calmly, relaxed, fun, stress-free and pressure-free, to show their natural talents. Freedom to learn focuses on freedom of learning according to learning styles, skills and creative thinking (Sari et al., 2024; Rahayu et al., 2022). In addition, in implementing the independent curriculum, it is hoped that it will be able to improve collaboration skills which emphasize important work principles to be carried out and paid attention to in learning, namely: 1) Each member collaborates to achieve common goals and is interdependent, 2) Individuals are responsible for their own behavior -each and learn, 3) Classes or groups are encouraged to carry out activities together (Husain, 2020). Apart from collaboration skills, students must also have communication skills because communication skills have a big influence on the environment, one of which is to make it easier for students to obtain information. Through skills in collaboration and communication skills, it is hoped that high school students will be able to use logic that is believed to be true and make decisions based on data during learning (Apriani & Yulkifli, 2022). In this way, collaboration and communication skills can be taught through learning at school, especially in physics lessons.

A teacher should be able to have the ability to solve problems. According to Nava (2023), teachers must be able to create practical and effective teaching materials aimed at increasing students' understanding of physics concepts. So far, when studying physics, students tend to be less active in learning, they seem to just sit, be quiet, and just listen without responding to the lesson material because it is considered boring (Karuru et al., 2023; Fatoni et al., 2022). So it is necessary to develop appropriate teaching materials to increase understanding of physics concepts, namely teaching materials using the inquiry learning model. Previous research has proven that the inquiry learning model can improve students' understanding of physics concepts (Hidayat et al., 2022). This is in line with the demands of an independent curriculum, where teachers are expected to be able to design learning tools in the form of teaching modules so that learning becomes systematic and creates active and interesting learning (Maulinda, 2022). Based on the description of the problem above, researchers are interested in conducting research with the title "development of inquiry-based teaching modules to improve the collaboration skills of class XI students at MAN 2 Lubuklinggau"

Collaboration skills are a learning process where an educator must create a condition where all students are able to carry out learning together in solving a problem related to learning (Pramusinta, 2022; Supriyadi & Reski, 2020). Collaboration skills are a characteristic that is emphasized in 21st century learning, namely student-centered learning (Darmadi, 2021). Collaboration skills are the skills of working together effectively and showing respect for diverse groups, practicing fluency and willingness in making

decisions necessary to achieve common goals (Rawamangun, 2020).

In accordance with the results of observations made on students in learning, there are students with good abilities (High, Low & Medium) who still experience difficulties in learning physics, this is because there was no initial diagnosis at the start of school. The only learning resources for students are textbooks and independent assignments sourced from the internet. Students also feel bored with monotonous learning media so they easily get bored in learning. Teacher assessment still focuses on knowledge only so that students' skills are not yet fully visible. Even in active learning, only students are considered to have high ability, while those with low and medium ability tend to rely on it. Students with high abilities consider students with medium and low abilities as a burden in group learning, this is what makes students with high abilities prefer to study independently.

Efforts will be made to overcome problems in learning by using the selection of appropriate learning models and media. One of them is the inquiry learning model which is in accordance with independent curriculum learning, where learning is student-centered. The inquiry learning model is a learning activity that facilitates students to ask questions, carry out investigations or searches, experiments or research independently to gain the knowledge they need (Gunawan et al., 2023; Kaif, 2022). So that students are able to collaborate with friends in carrying out learning.

METHOD

In this study, researchers used a 4D development model. Development research is a research method used to validate products and develop products (Sugiyono, 2019). The 4D development model consists of 4 main stages, namely: 1) Define, 2) Design, 3) Develop and 4) Disseminate (Mulyatiningsih, 2011).

Development procedures

Define stage (definition)

At this define stage the researcher determines the goals and limitations for product development through analysis. According to Thiagarajan, there are 5 activities carried out in the stages. The define stages are as follows:

a. Final preliminary analysis

Preliminary to final analysis was carried out to identify the basic problems faced in learning. This stage is carried out by direct observation during learning. Based on the results of observations in learning, there are several problems faced during the learning process. Problems obtained based on observations include 1) The implementation of the independent curriculum used is not mastered by teachers so that teachers still find it difficult to apply it effectively during learning, 2) Teachers only use textbooks in learning, 3) Teachers stick to the learning model provided by schools, 4) Teachers still use lecture and assignment methods without any direct practice, 5) The media used only utilizes existing facilities in the class without adding innovation, and 6) Teachers also use modules provided by the Ministry of Education and Culture without modifying them accordingly. with the needs of students and appropriate learning models.

b. Learner analysis

Student analysis is a study of student characteristics which include attitudes, interests, motivation, learning styles, skills and knowledge of students in accordance with learning topics, media, format and language. In this case, researchers identified that students prefer learning through experiments or trials.

c. Task analysis

At this stage, researchers analyze the main tasks that must be mastered by students in achieving the specified learning skills. The main task that must be mastered by students in this research is improving students' collaboration skills when carrying out learning using inquiry-based teaching modules. From the results of observations made, there are still many students who do not like studying in groups because they consider students only as a burden to do the assignments given.

d. Concept analysis

In concept analysis, the main concepts to be taught are identified, arranged in a hierarchical form (sequence) and dividing the concepts into relevant and irrelevant forms.

e. Determine learning objectives

In the process of determining the learning objectives carried out, in previous observations the teacher only measured students' knowledge, not skills. Although basically learning activities involve a lot of skills used. There are some students who have high abilities, but have not been able to collaborate to develop the skills they have in learning. This means that determining learning objectives must be precise and correct, in order to achieve learning objectives that are in accordance with the ATP that has been created.

Design Stage (Planning)

The planning stage aims to design the learning tools being developed. Development of inquiry-based teaching modules assisted by Microsoft Office Word 2019 and Canva applications. There are 3 stages in planning, including:

a. Media selection

The choice of media is adjusted to the objectives that have been set to convey the learning material to be developed, namely in the form of inquiry-based teaching modules.

b. Format selection

The format used in this research is in accordance with the inquiry-based teaching module format and is adapted to the independent curriculum

c. Initial design

The initial design stage aims to provide a form of presentation of the media that will be used.

Development Stage (Development)

The development stage is carried out by product validation by experts. These experts consist of media experts, language experts and material experts. After being validated by experts and declared suitable for use, the product developed will be tested on a limited group and a large group. The limited group only provides suggestions or input to improve the product being developed.

Disseminate Stage (Spreading)

At this stage the product that has been developed is limited in scope.

Data collection instrument

The data collection instrument used in this research used a validation sheet. This validation sheet will be used by experts to validate the product being developed. The experts in question are media experts, language experts and material experts.

Data analysis technique

The validity test is used to determine the feasibility of the open module being developed. Validation sheets for media experts, language experts and material experts are filled in with the following provisions.

a. Calculate each average score for each instrument item.
b. Calculate the average total score for each component.

$$\chi = \frac{\Sigma x}{n}$$

(Widoyoko, 2022)

Information:
x = Average score
Σx = Total score of each assessor for a particular component
n = Number of Assessors

c. Comparing the average score of each component with the following criteria:

Table 1. Average Value of Component Scores with Criteria

Formula	Classification
$X < \bar{X}_i + 1{,}8 \times sbi$	Very Good
$\bar{X}_i + 0{,}6 \times sbi < X \leq \bar{X}_i + 1{,}8 \times sbi$	Good
$\bar{X}_i - 0{,}6 \times sbi < X \leq \bar{X}_i - 0{,}6 \times sbi$	Enough
$\bar{X}_i - 1{,}8 \times sbi < X \leq \bar{X}_i - 0{,}6 \times sbi$	Not Enough
$X < \bar{X}_i - 1{,}8 \times sbi$	Very Less

RESULTS AND DISCUSSIONS

The teaching module development stage consists of validating and revising the inquiry-based teaching module so that the teaching module conforms to expert advice and limited group testing to perfect the inquiry-based teaching module being developed. The limited group test consists of 9 students with different abilities. The abilities taken are 3 high abilities, 3 medium abilities and 3 low abilities. The limited group filled in the suggestion sheet provided on the teaching module sheet that was distributed.

Development of inquiry-based teaching modules assisted by Microsoft Office Word 2019 and Canva applications. Modules that have been validated and refined based on limited group suggestions can be tested in large group trials later during the research.

Validation is obtained from the media expert validation sheet by filling in a checklist on a sheet containing 12 statements. Statements are made in accordance with the scientific principles used for each media suitability indicator. The results of research from media expert validators to determine the feasibility of inquiry-based teaching modules can be seen in the table 2.

Table 2. Results of Feasibility Analysis of the Media Expert Teaching Module

No	Indicator	Many items	Score	Classification
1	Size of teaching module	2	51	Very good
2	Cover design	5	51	Very good
3	Design of teaching module content	5	51	Very good

Based on the Table 2, the results of the analysis obtained a score of 51 with a very good classification, so it can be said that the inquiry-based teaching module is suitable for use. Linguist validation validates the product by filling in a checklist sheet on the validation sheet with a total of 16 statements. The use of language in the teaching modules developed has been adapted to good and correct language rules. The results of research conducted by language validators to determine the feasibility of inquiry-based teaching modules so that they can be used. It can be seen in the following table 3.

Table 3. Results of Feasibility Analysis of the Language Expert Teaching Module

No	Indicator	Many items	Score	Classification
1	Straightforward	3	73	Very good
2	Communicative	1	73	Very good
3	Dialogical and interactive	1	73	Very good
4	Suitability to student development	2	73	Very good
5	Conformity with language rules	9	73	Very good

Based on the table above, a score of 73 was obtained from linguists with a very good classification and can be said to be suitable for use in studying physics on work and energy.

Material expert validation validates inquiry-based teaching modules by providing a checklist on the validation sheet based on 10 statements that have been adjusted to the correct rules according to their knowledge. The research results from the validator were analyzed to determine the feasibility of the inquiry-based teaching module being developed, which can be seen in the table 4.

Table 4. Feasibility Analysis Results for Material Expert Teaching Module

No	Indicator	Many items	Score	Classification
1	Listen and appreciate	2	47	Very good
2	Confident attitude	2	47	Very good
3	Convey ideas effectively	2	47	Very good
4	Responsible for ideas	2	47	Very good
5	Communicate effectively	2	47	Very good

Based on the table above, a score of 47 was obtained from material experts with a very good classification and can be said to be suitable for use in learning physics regarding work and energy. It can be concluded that based on the overall assessment of the experts, an assessment has been obtained and has been adjusted to the feasibility classification and declared suitable for use.

CONCLUSION AND SUGGESTION

The development of this inquiry-based teaching module uses a 4D development model including define, design, develop and disseminate. The inquiry-based teaching module was declared very suitable for use in the learning process according to the validation results of several experts using the Widoyoko formula. The data obtained is based on media expert validation of 51 (very good classification); Linguist 80 (excellent classification); and material expert 47 (very good classification).

Inquiry-based teaching modules can be collaborated with other learning media and this inquiry-based teaching module can be used in the learning process because it has gone through a validator assessment and has received a very good assessment and is suitable for use.

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