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Diskaprod: Dissemination and Creation of Basic Process Skills Assessment Instruments in Science Learning

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ABSTRACT

Purpose of the Study: This research aimed to identify and analyze the outcomes of the DISKAPROD program, specifically focusing on assessing the effectiveness and quality of instruments used to measure students' basic process skills in schools. The study also sought to determine teacher perceptions regarding the program's impact on improving student learning outcomes.

Methodology: A descriptive quantitative method was applied. The study population consisted of all teachers at the Al-Hidayah Foundation Kebon IX Muaro Jambi, with 21 teachers selected via purposive sampling. Data collection was conducted using questionnaires and interviews, while data analysis involved descriptive statistical tests to evaluate the teachers' perceptions and responses to the program.

Main Findings: The findings revealed strong teacher support for the DISKAPROD program. A significant 57.1% of the teachers expressed agreement with its implementation, and 76.1% provided a positive response to the program's impact. These results suggest widespread approval and recognition of the program's effectiveness in enhancing the measurement of student process skills, indicating the potential for broader adoption.

Novelty/Originality of this Study: This study introduces a fresh approach by highlighting the critical role of teacher-developed assessment tools in accurately measuring student learning outcomes. The integration of the DISKAPROD program into the curriculum is presented as a novel and effective method for improving science education, particularly at the Mts level. By emphasizing the practical application of assessment instruments, this research contributes to ongoing efforts to refine educational practices and foster student skill development in scientific inquiry.

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1. INTRODUCTION

In an effort to improve the quality of education in Indonesia, especially in the field of Natural Sciences, it is important for teachers to understand and develop basic process skills assessment instruments [1]. This instrument not only functions as an evaluation tool, but also as a guide for teachers in directing the learning process [2]. The activity entitled DISKAPROD: Dissemination and Creation of Basic Process Skills Assessment Instruments in Science Learning at Al-Hidayah Private MTS Kebon IX aims to strengthen this understanding. This activity was held with the hope of providing new insights to teachers regarding the importance of comprehensive assessment. In addition, this activity is expected to equip teachers with practical skills in

compiling effective assessment instruments. Assessment of basic process skills in science learning includes various important aspects that must be mastered by students. These skills include the ability to observe, classify, measure, conclude, and communicate observation results [3], [4]. A good assessment instrument must be able to measure all of these aspects comprehensively and objectively [5]. Therefore, teachers need to be equipped with adequate knowledge and skills in compiling valid and reliable assessment instruments. This activity is expected to answer these needs by providing relevant and practical materials and training.

Basic process skills are an important foundation in science learning, which helps students understand scientific concepts in depth [6]. The development of these skills is very important because it supports students in developing critical and analytical thinking skills [7]. In the context of learning at MTS Swasta Al-Hidayah Kebon IX, these basic process skills must be well integrated into the curriculum and daily learning processes. The DISKAPROD activity is designed to help teachers identify effective ways to achieve this goal. With a better understanding of the basic process skills assessment instruments, it is hoped that teachers will be better prepared in carrying out their duties.

In addition, this activity also aims to promote best practices in the creation and use of basic process skills assessment instruments. Teachers will be invited to share their experiences and discuss the various challenges faced and the solutions they have implemented in assessing these skills. Through interactive discussions and case study analysis, participants are expected to gain a deeper and broader understanding of how to implement effective assessments [8]. This activity is also designed to provide opportunities for teachers to expand their professional networks. By meeting and discussing with colleagues from various backgrounds, teachers can learn from the experiences of others and find new inspiration to apply in their classrooms [9].

The importance of good assessment instruments cannot be ignored, because the results of these assessments will be used as a basis for decision making in learning [10]. Accurate and objective assessments are essential because they provide a clear picture of students' abilities and areas that need improvement [11]. This activity will highlight the importance of accuracy and objectivity in assessing basic process skills. Teachers will be given practical guidance on how to develop assessment instruments that meet these criteria. In addition, this activity will also discuss techniques for analyzing assessment data to obtain meaningful information. With this knowledge and skills, teachers are expected to be more effective in conducting evaluations and providing constructive feedback to students.

In the context of MTS Swasta Al-Hidayah Kebon IX, basic process skills assessments serve as a tool to improve the overall quality of learning. Good assessment instruments allow teachers to more easily identify students' strengths and weaknesses [12]. This allows them to plan more effective and targeted learning strategies [13]. The DISKAPROD activity is expected to make a positive contribution to improving the quality of education in this school. Through comprehensive training, teachers are expected to become agents of change who are able to better implement basic process skills assessment. In addition, this training also aims to provide practical and theoretical knowledge that can be directly applied in the daily learning process.

Overall, this activity is an important step in efforts to improve the quality of science education at Al-Hidayah Private MTS Kebon IX. By providing practical knowledge and skills to teachers, this activity is expected to bring positive changes in the way basic process skills assessment is carried out. The success of this activity will be measured by the teacher's ability to apply the knowledge they gain into daily practice. Thus, this activity not only aims to improve teacher competence, but also to provide a positive impact on students' academic development.

2. RESEARCH METHOD

This research uses a quantitative method with a research and development (R&D) or research and development design. Quantitative research methods are systematic approaches used to collect and analyze numerical data [14]. This research usually involves the use of structured instruments such as questionnaires or tests to measure the variables being studied. The data collected is then processed using statistical techniques to identify patterns, relationships, or trends. The advantage of this method is its ability to produce objective data that can be generalized to a larger population [15]. In addition, quantitative research results are often considered more reliable because they use consistent and replicable procedures. This method is very useful in research that requires large amounts of accurate data, such as population surveys [16]. Thus, quantitative research methods are an important tool in various fields of study to test hypotheses and gain a deeper understanding of the phenomena being studied.

Research subjects are objects that will be studied by researchers in a study. Research subjects can be individuals (such as participants, respondents, or interview participants) or certain groups (such as certain communities, organizations, or societies) [17]. Research subjects are closely related to population and sample. Population is all research objects that have the same characteristics and are relevant to research needs [18]. The population of the study was all teachers at the Al-Hidayah Foundation, Kebon IX, Muaro Jambi. The research

sample is part of the population. Sampling is done because it is often not possible to study the entire population, so the sample is used as a representation of a larger population [19].

Research subjects refer to entities that will be the focus of a scientific study. These objects can be individuals, such as participants, respondents, or interview participants, or certain groups, such as communities, organizations, or specific societies [20]. The selection of research subjects is closely related to the concept of population and sample. Population is all entities that have similar characteristics and are relevant to the research objectives [21]. For example, the population in a study can consist of all teachers at the Al-Hidayah Foundation. Objectivity in selecting subjects also helps in generalizing the findings, so that the results of the study are not only relevant to the sample studied but also to the larger population. So the sample in this study amounted to 21 teachers at MTs Swasta Al-Hidayah Kebon IX Muaro Jambi.

In data collection, the first thing to do is to determine the research subjects to be studied based on predetermined criteria, then distribute research instruments in the form of questionnaires and conduct interviews with teachers. For the questionnaire and interviews, this was given to teachers at the Al Hidayah Foundation, totaling 21 people. Where this data collection is to determine the dissemination and creation of basic process skills assessment instruments in science learning at MTS Swasta Al-Hidayah Kebon IX. The data that has been obtained will be analyzed using the SPSS application with descriptive statistical tests. From this test, a conclusion will be obtained.

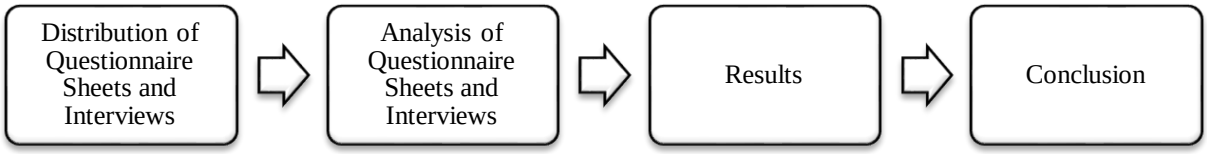

Figure 1. Research Procedure

The research instruments used in this study were questionnaires and interviews. A questionnaire is a series of written questions arranged in a specific format used to collect data from respondents on the topic or variable being studied [22]-[24]. This instrument contains questions that are relevant to the research objectives and are carefully designed to collect the desired information from research participants. For interviews, the subjects will be teachers. The data collection technique used in this study is a survey. The grid of the Teacher Perception and Response questionnaire can be seen in the table 2.

Table 2. Grid of Teacher Perception and Response Instruments

Variabel	Indicator	Question Number	Number of Items
Teacher Perception	Understanding the Material	1,9	2
	Utilization of Discussion	2,4	2
	Utilization of Mentoring	3	1
	Awareness Understanding	5,6	2
	Comprehension Ability	7,8,10	3
Teacher Response	Understanding the Material	1,9	2
	Utilization of Discussion	2,4	2
	Utilization of Mentoring	3	1
	Awareness Understanding	5,6	2
	Comprehension Ability	7,8,10	3
Amount			20

On the questionnaire sheet to measure students' attitudes using a Likert scale with 5 categories, namely strongly agree, agree, neutral, disagree, and strongly disagree. Because it uses a Likert scale, there will be intervals in each category. The description of the student attitude categories can be seen in the following table 3.

Table 3. Teacher Perception and Response Categories

Category	Intervals
Strongly agree	44-52
Agree	35-43
Neutral	26-34
Don't agree	17-25
Strongly disagree	8-16

The data obtained from the teacher response and perception instruments will be processed using the SPSS application. The test that will be used is a descriptive statistical test. Descriptive statistical tests are methods used to summarize and describe data concisely and informatively [25]. With this test, researchers can obtain information about the average, median, and minimum and maximum values of the data collected. In addition, descriptive statistical tests also provide an overview of data distribution through percentages [26]. This method helps in understanding the patterns and trends in the dataset, without making further inferences or generalizations. This test is very useful in facilitating data interpretation and presenting research results in a clear and systematic manner.

3. RESULTS AND DISCUSSION

The results of descriptive statistics for teacher perceptions. This research was conducted at the Al-Hidayah Foundation in Muaro Jambi with data collection using a questionnaire sheet. The description of teacher perceptions can be seen as table 4-5.

Table 4. Description of Teacher Perceptions at the Al-Hidayah Muaro Jambi Foundation

Score Intervals	Category	F	Mean	Median	Min	Max	%
44-52	Strongly agree	4					19.0
35-43	Agree	12					57.1
26-34	Neutral	5	40.8	41.5	30.0	47.0	23.8
17-25	Don't agree	0					0
8-16	Strongly disagree	0					0

Based on the results of the distribution of teacher perception questionnaires at the Al-Hidayah Foundation, Muaro Jambi, in the strongly agree category there are 4 teachers with a percentage of 19.0%, in the agree category there are 12 teachers with a percentage of 57.1%, in the neutral category there are 5 teachers with a percentage of 23.8%, while in the disagree and strongly disagree categories there are 0 teachers with a percentage of 0%.

Table 5. Description of Teacher Responses at the Al-Hidayah Muaro Jambi Foundation

Score Intervals	Category	F	Mean	Median	Min	Max	%
44-52	Strongly agree	3					14.2
35-43	Agree	16					76.1
26-34	Neutral	2	43.3	49.0	30.0	50.0	9.5
17-25	Don't agree	0					0
8-16	Strongly disagree	0					0

Based on the results of the distribution of teacher response questionnaires at the Al-Hidayah Foundation, Muaro Jambi, in the strongly agree category there are 3 teachers with a percentage of 14.2%, in the agree category there are 16 teachers with a percentage of 76.1%, in the neutral category there are 2 teachers with a percentage of 9.5%, while in the disagree and strongly disagree categories there are 0 teachers with a percentage of 0%.

The DISKAPROD initiative Dissemination and Creation of Basic Process Skills Assessment Instruments in Science Learning at MTS Swasta Al-Hidayah Kebon IX represents a significant step forward in improving the quality of science education by equipping teachers with tools for more accurate and objective student assessment. This program focuses on enhancing teachers' understanding of how to assess basic science process skills, aligning with the educational needs of today's curriculum. The training provided aims to bridge gaps in current assessment practices and ensure that teachers can develop instruments that reflect essential science competencies.

Basic science process skills indicators include observation, classification, measurement, communication, and inference, while integrated science process skills include problem formulation, hypothesis formulation, experimental planning, data interpretation, and concept application [27], [28]. Observation is the ability to collect information through the five senses, classification is the ability to group objects based on certain characteristics, measurement involves the use of measuring instruments to obtain quantitative data, communication includes conveying the results of observations or experiments, and inference is the ability to draw conclusions based on analyzed data [29]. On the other hand, problem formulation is the ability to identify research questions, hypothesis formulation involves predicting experimental results, experimental planning

includes systematic experimental steps, data interpretation is the analysis of experimental results for valid conclusions, and concept application is the use of knowledge to solve new problems or in different contexts [30].

The novelty of this initiative lies in its comprehensive focus on both dissemination and creation of process skills assessment tools. Unlike previous studies that either emphasized skill development in students or theoretical frameworks for teaching, DISKAPROD directly addresses the often-overlooked aspect of teacher assessment practices. By focusing on equipping teachers with the ability to create and utilize assessment instruments, this program bridges theory and practice, enabling teachers to more effectively measure key scientific competencies. The inclusion of integrated science process skills such as hypothesis formulation and data interpretation sets this initiative apart from earlier efforts that primarily focused on basic skills like observation and classification. Additionally, this study highlights the significance of teachers as active creators of assessment tools, empowering them to shape the learning environment in ways that are contextually relevant and aligned with curriculum goals. It positions teachers not just as instructors but as evaluators capable of enhancing student engagement through more tailored assessments.

The success of DISKAPROD has several important implications. The positive teacher response to the training (as evidenced by the 57.1% of participants who agreed and 19% who strongly agreed) indicates that educators see immediate value in being able to assess student process skills more objectively. This has a direct impact on teaching efficacy, as teachers now have more reliable tools to gauge student understanding and skill development. Teachers also gain confidence in facilitating more inquiry-based learning environments, where students can be assessed on their ability to conduct experiments, analyze data, and apply scientific concepts. DISKAPROD supports improved student learning outcomes. Assessments based on science process skills such as observation and measurement can increase student engagement and develop critical thinking. By empowering teachers to implement more nuanced assessments, the initiative contributes to deeper student engagement, leading to better retention of scientific concepts and more active participation in the learning process. Moreover, the long-term implication of this approach is a systemic shift in how science education is evaluated. By moving away from traditional rote learning assessments to more process-oriented evaluations, students are better prepared for real-world scientific inquiry and problem-solving. This paradigm shift aligns with the educational demand for fostering critical thinking, problem-solving, and evidence-based reasoning in students.

While the results of the DISKAPROD initiative are promising, there are notable limitations. The study was conducted in a single educational setting MTS Swasta Al-Hidayah Kebon IX limiting the generalizability of the findings. Different schools with varying resource levels, student demographics, and teacher competencies may experience different outcomes when implementing similar assessment instruments. The study focuses primarily on teacher perceptions and does not directly measure student performance outcomes resulting from the use of these instruments. Without longitudinal data on how these assessments affect student learning and retention, the long-term efficacy of the program remains uncertain. The lack of technological integration in the assessment tools. While traditional methods of assessment were covered, there was little exploration of how digital tools or real-time data collection methods could further streamline the evaluation process, especially in classrooms with a high student-to-teacher ratio.

Several key recommendations arise from this study to ensure the continued success and wider applicability of the DISKAPROD initiative: Expand Testing Across Educational Levels and Contexts, To ensure the validity and reliability of the assessment instruments, future research should implement these tools in various educational settings, including urban and rural schools, as well as across different age groups and science disciplines. This would provide more comprehensive insights into how adaptable the tools are in different learning environments. Incorporate Technology into Assessment, Future iterations of the DISKAPROD program should explore integrating digital assessment platforms to facilitate real-time data collection and feedback. Digital tools would allow teachers to track student progress more efficiently and provide personalized feedback. For example, mobile apps or online assessment platforms could be used to record students' observations and inferences during experiments, offering more dynamic and engaging ways to assess their skills. Conduct Longitudinal Studies, It is essential to conduct long-term evaluations to determine the impact of these assessment tools on students' critical thinking and scientific reasoning skills. Tracking student progress over several academic years would provide valuable data on how these assessments influence learning outcomes in the long run. Develop Comprehensive Instruments for Integrated Skills, While the current focus is on basic science process skills, there is a need to develop more holistic assessment tools that also evaluate integrated science process skills, such as problem formulation, hypothesis testing, and experimental design. These competencies are crucial for fostering higher-order thinking and should be assessed alongside basic skills. Teacher Professional Development, Ongoing professional development should be provided to ensure that teachers remain equipped to use these instruments effectively. Workshops and training programs could focus on helping teachers refine their assessment practices, integrate new technologies, and develop more advanced assessment instruments as their familiarity with the DISKAPROD framework grows.This revision adds depth, highlights the novelty of the DISKAPROD initiative, and provides comprehensive implications, limitations, and actionable recommendations for future work.

4. CONCLUSION

The development of the Electronic Pocket Book media for teaching plant-like protists (Phytoplankton) was successfully completed in three stages: pre-production, production, and post-production. The validity assessment of the electronic pocketbook media, based on Content Validity Ratio (CVR) and Content Validity Index (CVI) values of 1.00, indicates that the media is valid and feasible for use in Class X Senior High School as a learning tool. However, further research is required to assess its effectiveness in enhancing the learning process for students in this context.

While the development and validation of the Electronic Pocket Book show promising results, the next logical step is to evaluate its actual impact on students' learning outcomes. Implementing this media in real classroom settings and conducting studies on its effectiveness could provide valuable insights into its ability to improve comprehension, engagement, and retention of complex topics like plant-like protists. If proven effective, this electronic media could serve as a valuable resource for modernizing biology education, especially in promoting interactive and digital learning environments. In the broader context, this research opens opportunities for educators to integrate more technology-based learning tools that cater to diverse learning styles, fostering a more dynamic and student-centered approach. Further development of such tools could be expanded to other subjects, creating a more comprehensive and innovative educational framework in Senior High Schools.

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