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Development of Diagnostic, Formative and Summative Assessment Instruments in the PjBL Model to Strengthen the Profile of Pancasila Physics Students

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Abstract: This research has two purposes. The first is to develop a diagnostic, formative and summative assessment tool using the Project Based Learning (PjBL) model to strengthen the profile of Pancasila physics students. The second is to examine the validity and usability of the developed assessment tool. The first objective outcome is the product of assessment tools in the form of activity and assessment sheets. The outcome of the second objective is to obtain a valid and practical assessment tool that strengthens the student profile of Pancasila. The conclusion from the development of this tool is that the tool developed in the form of activity and assessment pages is practical and suitable for use in the classroom to strengthen the profile of Pancasila physics students.

Keywords: Diagnostic; Formative; Pancasila student profile; PjBL; Summative

Introduction

In 2022, the Government has inaugurated the Independent Curriculum as an alternative curriculum used in addition to the 2013 Curriculum. The features of the Merdeka Curriculum include development, social and character skills, focus on core material, and flexible learning. Character education in the Merdeka Curriculum is summarized in profile of Pancasila Student. Character education is very important in the world of education and must be implemented. Because creating a moral national character goals of the national education system. Assessment tools are needed to assess a student's character. By recognizing the characters of students through good and accurate evaluation, educators can create a national character that is in line with the educational goals of the country.

Various studies are conducted to build students' character. As the government did in the Merdeka curriculum, it offers a Pancasila Student Profile consisting of six main areas: faith, religiosity, collaboration, global diversity, independence, critical thinking and creativity. To assess students' progress in the Merdeka curriculum, two assessments are recommended: formative assessment and summative assessment. Research has also been conducted on assessment tools and Pancasila Student Profiles. An assessment study conducted by Budiono et al. (2023) shows that different types of assessment are used in the Merdeka curriculum: assessment diagnostic, formative assessment and summative assessment. A study on Pancasila student profiles was conducted by (Sabon et al. (2022) and Safitri et al. (2022). The results of the study show that Merdeka curriculum is the most suitable curriculum for student personality development by improving Pancasila student profile (Herman et al., 2024; Iskandar et al., 2024; Puspita et al., 2024).

However, character gaps are emerging in the world of education. Students' character now begins to fade and they rarely practice the values of Pancasila. Both problems are associated with the role of educators who do not implement character education in the teaching-

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learning process (Kahfi, 2022). In addition, educators also have difficulty in conducting assessments to evaluate student profiles during learning in class.

According observations in senior high schools, educators already know the profile of Pancasila students. However, based on the modules used by educators in learning, the assessment tool for each area of the Pancasila student profile is not explained in detail in the module. In other words, there is no assessment tool in the module that measures faith, religiosity and morality, cooperation and independence. The area of global diversity is not considered because it is not relevant or relevant to the physical material. This situation is also explained in Annisa (2023) by the fact that not all areas of Pancasila students can be included in the subject. According to the test for the area of critical and creative thinking, the results of the study show that students' critical and creative thinking skills are still low. The average score was 45.02 for critical thinking and 48.87 for creative thinking.

The assessment tool used by educators in learning, which is the module used by educators, is based on document analysis. Details of the diagnostic, formative and summative assessments used are not yet apparent. What parts of the diagnostic, formative and summative assessment are included is not explained in the module. In addition, it is not yet determined what type of assessment should be used to identify the profile of Pancasila students to be strengthened.

Based on these issues, the solution to be implemented is to develop a diagnostic, formative and summative assessment tool using the PjBL model to strengthen the Pancasila student profile of the students. The use of the PjBL model is based interviews with educators which show that the PjBL model is not used in learning. While the PjBL model is a learning model whose implementation in the Merdeka curriculum is highly recommended (Dewi et al., 2024; Putra et al., 2021; Swandana et al., 2023).

Previous researcher Wasimin (2022), who studied PjBL and Pancasila student profiles, found that project-based learning can be a tool to accelerate the success of Pancasila student profiles. Project-based learning can improve students' understanding of the material learned from different scientific perspectives and develop students' skills and character. In a study conducted by Azmi et al. (2023), it was found that the assessment tool of the project-based learning model was effective in developing students' 4C skills. The 4C skills are dimensions of the Pancasila student profile.

The development of an assessment tool using the PjBL model is intended to strengthen students' Pancasila student profile. In addition, this study can be a reference for educators in creating an assessment tool that fits the Pancasila student profile and the syntax of the PjBL model. So what the government hopes to do is to shape the character of students who fulfill the values of Pancasila.

Method

This type of research is research and development by developing diagnostic, formative and summative assessment tools using PjBL to strengthen the profile of Pancasila High School Physics students. The ADDIE model is a development model used in this research. The stages in the ADDIE model are: analysis, design, development, implementation and finally evaluation (Branch, 2009). Since this article only discusses the validity and practicality of the product under development, the implementation phase has been skipped.

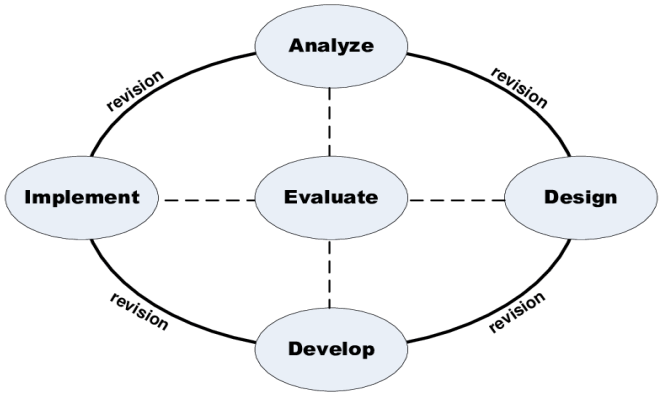

Figure 1. ADDIE stages

The subjects of this study were diagnostic, formative and summative assessment instruments in the form of activity and assessment sheets and the subjects of the research trial were students at SMAN 1 Padang Sago. The instruments used in the analysis stage were needs analysis questionnaire sheet, student analysis questionnaire sheet, tests and documentation. For practicality, the instrument used was a practicality questionnaire. Data analysis techniques in the analysis phase use formulas.

$$Final\ score: \frac{acquired\ score}{maximum\ score} x\ 100\ \% \quad (1)$$

Validity using Aiken's V equation data analysis technique, namely:

$$V = \frac{\sum s}{[n(c-1)]} \quad (2)$$

The criteria used to determine the validity of the developed product shown in Table 1.

Table 1. Product Validity Assessment Criteria (Aiken, 1985)

Value	Category
≥ 0.92	Valid
< 0.92	Invalid

Practicality analysis using formulas:

$$Final\ score: \frac{acquired\ score}{maximum\ score} x\ 100\ \% \quad (3)$$

The criteria for practical results shown in Table 2.

Table 2. Criteria for Product Practicality Assessment

Value range (%)	Category
≥81	Extremely practical
≥61-80	Practical
≥41-60	Less Practical
≥21-40	Not Practical
≥0	Not very practical

Result and Discussion

Analysis Stage

Needs analysis

The purpose of the needs analysis is to ensure that the product developed meets the user's needs. Activities in this phase include interviews with physics teachers in two schools in Padang Pariaman Regency on the teaching materials used, learning models and assessment tools used. In addition, the activity is to analyze documents or teaching modules used by educators for learning.

According to the results of the interviews with educators, several problems were identified. First, the teaching materials used by educators in the learning process are in the form of modules. Second, educators have used learning models that fit the material to be taught, such as discovery learning and problem-based learning models. However, the implementation of the PjBL model was not carried out properly. Third, the problems encountered in the assessment analysis; assessment focuses on the use of tests, assessment is only done at the end of learning, educators have difficulty in creating assessment tools, and the assessment used is not integrated according to the syntax of the learning model used. The results of the analysis of documents or teaching modules used by educators show that Pancasila Student Profiles can be found in the teaching modules. However, the assessment tool used to evaluate students' Pancasila Student Profiles is not explained. The assessments conducted before learning and the assessments conducted during learning only include the assessments conducted at the end of learning.

During the analysis phase, it was found that the teaching materials used by educators in the learning process is modules. This situation shows the lack of diversity in teaching materials used in learning. Lack of variety in the learning environment can cause students to become bored and lose interest in learning (Junia et al., 2023). According to Haryadi et al. (2021), lack of variety in teaching materials can cause students to remain passive and less motivated in learning physics. To increase students' motivation to learn, it is necessary to develop teaching materials that provide an enjoyable and effective learning experience and are appropriate to the student's environmental conditions and circumstances.

Analysis shows that the PBL model was not implemented well. Meanwhile, PjBL learning model is one of the learning models recommended in the Merdeka curriculum to strengthen the Pancasila student profile. Because project-based learning offers the advantage of being able to develop creative thinking, collaboration, problem-solving and communication skills, and these skills are in line with the competencies expected in the preparation of a Pancasila student profile (Dewi, 2022).

The analysis of the assessment tool shows that the assessment tool used to assess the student's Pancasila profile is not disclosed, the assessment conducted before learning (diagnostic assessment) and the assessment conducted during learning (formative assessment) are not disclosed, only the assessment conducted from written at the end of the class (summative assessment). A well-rounded curriculum requires three forms of assessment, namely diagnostic, formative and summative assessment (Sanjaya et al., 2023). In the Merdeka curriculum, there are three types of assessment: diagnostic, formative and summative assessment (Festiyed et al., 2022). The last and most important part of the implementation of Pancasila's Student Profile Strengthening Project is assessment. The aspects that need to be considered in assessment include: Diagnostic, formative and summative assessments are interrelated. This is important to consider because the assessment results can be used as reference material to map students' strengths and weaknesses. The purpose of assessment is to determine students' abilities. It is hoped that when this goal is achieved, the learning material can be adapted to students' needs (Nahdiyah et al., 2022). According to Falaq (2022), diagnostic, formative and summative assessments should be interconnected. Students' strengths and weaknesses can be inferred from the results of diagnostic assessments, which can serve as a reference in determining student indicators when designing formative and summative assessments.

Student analysis

This analysis aims to investigate the use of assessment tools during learning and students'

knowledge of Pancasila Student Profiles. According to the results of the survey conducted by the students, they said that the most commonly used assessment tool by educators is the written test and students are eager to answer the questions asked on paper. The results of the survey also show that students are aware of the Pancasila Student Profile, but they are not yet aware of the assessment of the Pancasila Student Profile when learning in class.

Curriculum analysis

Curriculum analysis by examining the current curriculum in the school, especially the Grade XI physics subjects. According to the interview results, it was learned that both schools are currently using the Merdeka curriculum. Teachers have difficulty understanding the profile of Pancasila students in the Merdeka curriculum because this curriculum is new.

Curriculum analysis is carried out to ensure that the creation of assessment tools can meet the current curriculum requirements. The results of the curriculum analysis showed that SMAN 1 Padang Sago has been using the Merdeka curriculum for two years. This is in line with the purpose of making the assessment tool, namely to strengthen the students' Pancasila student profiles. Pancasila Student Profile is one of the Merdeka Curriculum programs that aims to shape the character and abilities of students in accordance with the daily life and life needs of each student (Alhayat et al., 2023).

Analysis of Pancasila student profiles

The analyzed Pancasila student profile is 5-dimensional. Analysis of the dimensions of faith and noble character, the dimension of mutual cooperation, the dimension of independence seen from the teaching modules used by the educators. Analysis of the dimensions of critical reasoning and creative dimensions seen from the results of the given essay questions.

The analysis of the Pancasila student profile based on document analysis revealed that no assessment tools were used to assess three dimensions. Therefore, an assessment tool is required to assess these three dimensions.

Analyze the profile of Pancasila students with the dimensions of critical thinking and creative dimensions by giving mock tests to the students. The results obtained were 42.05% for critical thinking and 48.87% for creative thinking, while the minimum score for graduation was 66% according to the 2022 Learning Guide of the Ministry of National Education and Culture. This shows that the Pancasila Student Profile of students with critical thinking and creative dimensions still low.

When analyzing the Pancasila Student Profile for the dimensions of noble character, mutual cooperation and independence, the results showed that there were no assessments that educators used to consider these dimensions. Meanwhile, assessment is an activity that looks for evidence that learning objectives have been achieved during the learning process (Learning and Assessment Guide, 2022). According to the essay test at hand, the results for the critical and creative thinking dimensions showed that students' knowledge scores were still low. One way to improve students' critical and creative thinking dimensions is to use assessment tests in the form of diagnostic, formative and summative tests following the PjBL model. Implementing the PjBL learning model can help students express their thoughts and ideas, as well as increase students' active participation in problem solving through project presentation, thus increasing students' creativity in critical thinking (Barak et al., 2021; Chang et al., 2022; Maor et al., 2023; Wicaksana et al., 2022).

Design Stage

The design stage in this study aims to design activity sheets and assessments with the PjBL model to strengthen the Pancasila student profile. The design stage was obtained according to the results of the analysis that had been carried out. This activity and assessment sheet is designed based on the student activity sheet structure. The student activity sheet design is as follows:

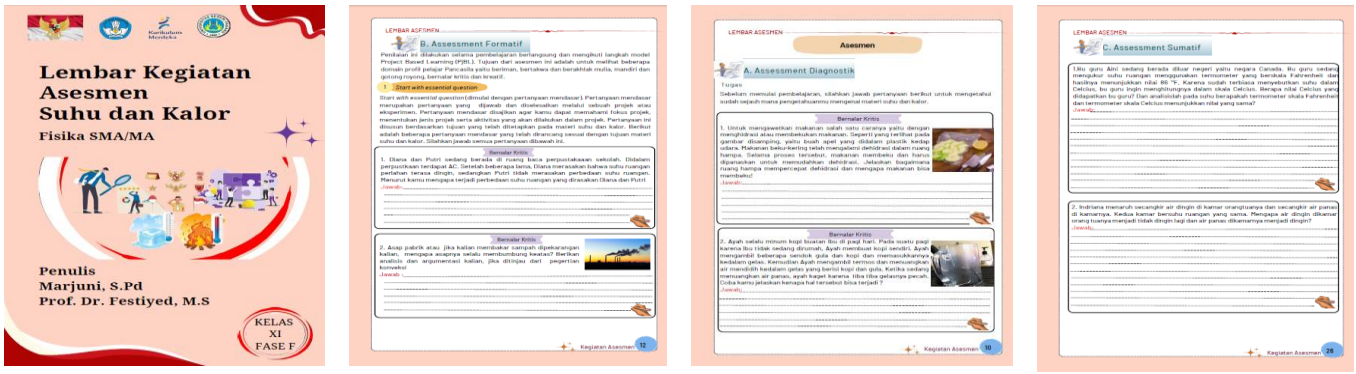

Figure 2. Initial design

Development Stage

At the development stage, the thing that is done is validation of the product design by experts. The purpose is to find out whether the product being developed is feasible or not feasible to use. The activity and assessment sheets are validated by three validators using a validation instrument in the form of a product validity questionnaire.

The validity questionnaire consists of four assessment components: adequacy of content, use of language, adequacy of presentation, and assessment graphics. Each component consists of various notification indicators. The product verification results of activity forms and assessments are shown in Table 3.

Table 3. Verification Results

Components	Aiken's value	Category
Adequacy of content	0.92	Valid
Use of language	0.92	Valid
Adequacy of presentation	0.92	Valid
Assessment graphics	0.93	Valid
Average	0.92	Valid

Table 3 show that the activity and assessment sheets developed have an average Aiken V value of 0.92 which is within the valid criteria. The assessment activity sheet developed must first be validated. The components of validation assessment according to the Ministry of National Education (2008) include aspects of adequacy of content, aspects of adequacy of presentation, aspects of adequacy of language and aspects of adequacy of graphics. The results of the expert validation are within valid criteria.

The practicality test of the activity sheets and assessments was given to physics subject teachers and 33 students. The practicality of the activity sheets and assessments was assessed using a practicality instrument in the form of a questionnaire.

There are three evaluation components in the practicalit test instrument. The evaluation components used are usability, attractiveness and efficiency. The practicability is shown in Table 4.

Table 4. Practicality Results According to Teacher

Components assessed	Value	Category
Used are usability	80	Practical
Attractiveness	85	Very Practical
Efficiency	93	Very Practical
Average	86	Very Practical

It is known that the activity and assessment forms developed according to Table 4 have an average score of 86, which is a very practical criterion. Based on these data, the use of activity and assessment forms in learning is quite practical.

The practicability is shown in Table 5. From Table 5, it is observed that the developed activity and assessment sheet has an average score of 87 which is very practical criteria. Based on this data, activity and assessment sheets are very practical for learning. The results obtained show that assessment activity sheet is one of the very practical criteria because it is easy to use, interesting and effective in the learning process. First, the practical aspect of convenience is that educators and students feel that the activity sheets and assessments are easy to use. Second, it is practical and appealing because the assessment sheet is visually appealing and students are motivated and eager to learn. Third, in terms of time efficiency, activity sheets and assessments are designed to speed up learning. Thus, learning time passes effectively.

Table 5. Practicality Results According to Students

Components assessed	Value	Category
Used are usability	86.7	Practical
Attractiveness	86.9	Very Practical
Efficiency	87.5	Very Practical
Average	87	Very Practical

Conclusion

The diagnostic, formative and summative assessment tools in the PjBL model for strengthen profile of Pancasila students are valid with an average score of 0.92 in the components of content adequacy, presentation adequacy, language adequacy and graphics adequacy. The diagnostic, formative and summative assessment tools in the PjBL model for strengthening the Pancasila student profile are practical with 86.1% and 86% scores in the components of usability, attractiveness and efficiency, respectively, according to educators and students.

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Conflicts of Interest

No conflict interest.

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