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Analysis of Instrument Validity and Needs for Ethno-STEM Based Science E-Modules to Strengthen Pancasila Student Profiles

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Abstract: This study aims to analyze the results of the validation of the needs questionnaire and determine the needs of Ethno-STEM-based learning modules to strengthen the Pancasila student profile. This study uses the Research and Development (R&D) method with the Borg and Gall model which focuses on five stages. The results of the study showed that the validation of the needs questionnaire on content validation were 65.33% and the results of the language validation on the Pancasila student profile questionnaire instrument were 65.66% with a good category. The results of the Vindeks analysis on the content validation indicator were 0.91; 0.92; 0.91 and the Vindeks on the language validation indicator was 0.91; 0.92; 0.92 with a valid category on each indicator. The Vindeks results show that the instrument is valid in measuring the character of the Pancasila student profile. Furthermore, based on the results of the needs analysis, it was found that the understanding of junior high school students in Solo Raya regarding the sub-elements of the Pancasila Student Profile ranged from 34-67%, indicating that efforts were needed to strengthen student character. Further Ethno-STEM modules were needed to strengthen the character of the Pancasila Student Profile in all six dimensions.

Keywords: Ethno-STEM; Instrument; Pancasila student profile

Introduction

The independent curriculum is a new curriculum that has been implemented in Indonesia today. Learning in the independent curriculum provides students with the opportunity to learn in a fun, calm, and more flexible way (Jufrida et al., 2024; Rahayu et al., 2022). The main objective of the independent curriculum is to form an educational concept that includes the characters expected of every student in Indonesia through the Pancasila Student Profile (Harizon et al., 2024; Juita & Yusmaridi, 2021; Kurniawaty et al., 2022). The Pancasila Student Profile is an educational concept that includes the characters expected of every student in Indonesia. The Pancasila Student Profile emphasizes characters such as being critical, creative, independent, and having noble character, which can be developed through every learning activity (Ihsan, 2022; Jannah & Pangestu, 2024; Mery et al., 2022). One of the efforts made to achieve the Pancasila Student Profile and support students to understand local culture in Indonesia can be done by implementing Ethno, Science, Technology, Engineering, and Mathematics (Ethno-STEM) based education (Subali et al., 2023).

Ethno-STEM is an approach that allows students to learn science and technology while understanding local cultural values (Inayah et al., 2022; Safitri et al., 2024; Sotero et al., 2020; Subari & Mercuriani, 2024). Ethno-STEM can provide holistic understanding to students (Fauziah & Ihsan, 2024; Nazifah & Asrizal, 2022; Rini et

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al., 2025). The Ethno-STEM approach in learning can make a significant contribution because this approach is relevant to the goals of education in Indonesia which want to form students with global competence but still have the character of Pancasila. The Ethno-STEM approach allows teachers to integrate Science, Technology, Engineering, and Mathematics with local wisdom in the student's environment (Bramastia et al., 2023; Dini & Rini, 2024; Prabowo et al., 2024; Zan & Asrizal, 2024).

This study focuses on analyzing the need for an Ethno-STEM module to strengthen the Pancasila Student Profile, which emphasizes a love of culture, independence, and a critical understanding of technological advances (Juniawan et al., 2024; Nurhasnah et al., 2022; Primadianningsih et al., 2023; Yuliana et al., 2021). Ethno-STEM-based learning modules are expected to be able to create a generation of students who excel in science while upholding the nation's noble values (Altan et al., 2018; Anugrah, 2021; Chang & Chiou, 2017; Fahrudin et al., 2023).

Research on Ethno-STEM has been conducted by several previous researchers. Sudarmin et al., (2024) studied how to improve the character of global diversity using integrated Ethno-STEM projects. Sumarni et al. (2020) who studied project learning that has an impact on critical and creative thinking skills. Hiqmah et al. (2023) who tested the effectiveness of ethno-STEM-based chemistry learning to improve critical thinking skills. Sari et al. (2023) who developed an Ethno-STEM-based science learning tool. Reviewed from several studies that have been conducted by previous researchers that ethno-STEM research has been studied related to the dimensions of the Pancasila Student Profile but only focused on one dimension. The novelty of this study is that this study analyzes the validity and need for the development of learning modules in science learning with the main focus on strengthening the Pancasila Student Profile in six dimensions. This study aims to analyze the validation results and determine the need for an Ethno-STEM learning module to strengthen the Pancasila Student Profile in students.

Method

The research method used was Research and Development (R&D) one. Research and Development is a process of developing and validating educational product (Gogahu & Prasetyo, 2020; Pertiwi & Jailani, 2023). The development model used in this study is the Borg and Gall model which includes 10 stages, but this study only focuses on 5 stages shown in Figure 1.

The research and information gathering stage is carried out by collecting information related to the problem. At the planning stage, the objectives to be achieved in the research are developed. At the initial product form development stage, the product validation instrument development is carried out which will be used in the next stage. At the initial field trial stage, product validation was carried out on 14 science teacher validators at SMP Solo Raya with senior criteria or with a master's degree in education. Finally, at the main product revision stage, the product revision was carried out based on the validation results.

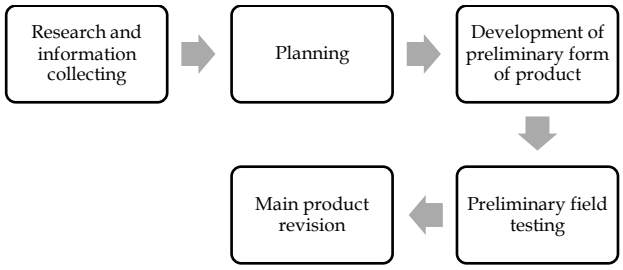

Figure 1. Procedure research

This research involved teachers to assess the validation of Pancasila student profile instrument. Data collected using a questionnaire and analyzed using the equation formula 1:

$$\text{Validity } (\%) = \frac{\Sigma x}{n} x100\% \quad (1)$$

Percentage of category by validation result is presented in Table 1.

Table 1. Percentage of Category by Validation Result (Riduwan, 2015)

Description	Percentage (%)
Very bad	0-20
Bad	21-40
Poor	41-60
Good	61-80
Very Good	81-100

Result and Discussion

The research and information collection stage is carried out by collecting information related to problems regarding the character profile of Pancasila students. Jannah et al. (2024) have conducted an analysis which found that the formation of student character needs to be carried out in learning. To strengthen the argument for the need for empowerment of the character profile of Pancasila students, the researcher conducted preliminary research by distributing questionnaires regarding the profile of Pancasila students.

At the planning stage, the formulation of the instrument to be used in the study was carried out. The formulation of this instrument contains 6 aspects that

will be assessed, namely faithful and pious, global diversity, working together, independent, critical thinking, and creative.

At the initial product development stage, validation instruments were developed which were used in the next stage. The validation instruments used were content validation and language validation. The content validation instrument contained aspects of question instructions that were written clearly, questions according to the indicators studied, and questions were formulated briefly and clearly. The language validation instrument related to the language used was standard according to KBBI, the language used was communicative and easy to understand, and the use of effective sentences in the questions.

In the initial field trial stage, validation was conducted on 14 validators of science teachers of SMP Solo Raya with senior criteria or having a master's degree in education. The questionnaire instrument of needs related to the profile of Pancasila students was validated in content and language.The developed questionnaire has 5 scales with scale 1 stating very lacking; 2 stating lacking; 3 stating sufficient; 4 stating good and 5 stating very good. The percentage of each content validation indicator can be seen in Figure 2.

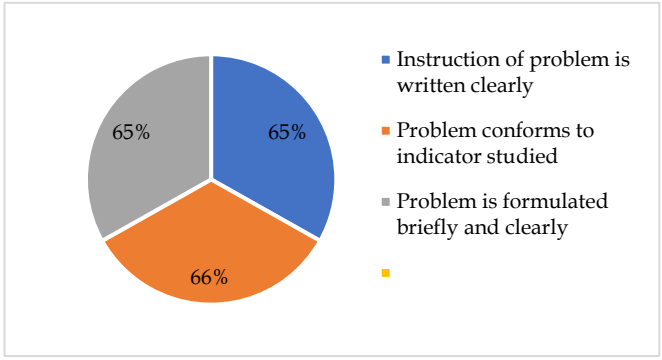

Figure 2. Result of content validation

Based on Figure 2, the result of content validation was 65.33% with the good category (Riduwan, 2015). The percentage of each content validation indicator are 65% for instruction of problem is written clearly, 66% problem conforms to indicator studied, and 65% problem is formulated briefly and clearly.

The percentage of each language validation indicator can be seen in Figure 3. Based on Figure 3, the result of language validation in the instrument of questionnaire on pancasila student profile reaches 65.66% belonging to good category (Riduwan, 2015). The percentage of each content validation indicator are 65% problems use standardizes Indonesian language according to KBBI, 66% problems use communicative and understandable language, 66% problems use effective sentences.

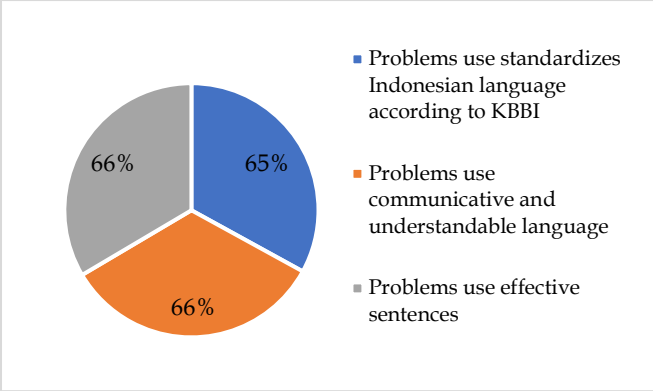

Figure 3. Result of language validation

The results of Vindex analysis in the indicator of content validation are 0.91; 0.92; and 0.91 belonging to valid category in each of indicators. The results of Vindex analysis on the indicator of language validation are 0.91; 0.92; and 0.92 belonging to valid category in each of indicators. The result of Vindex shows that the valid validation instrument is used in measuring the character of Pancasila student profile.

Finally, at the main product revision stage, the Pancasila student profile questionnaire instrument has been revised based on the validation results and is suitable for use. The result of preliminary study on 116 students of junior high school in Solo Raya shows in Figure 4.

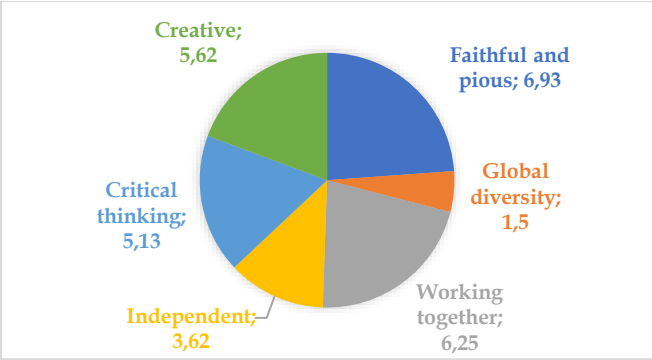

Figure 4. Result of preliminary study per indicator of pancasila student profile

Based on Figure 4, it shows that the results of a preliminary study of 116 students of SMPN Solo Raya on the sub-elements of new student profiles reached a percentage of 34-67% where the character of faith and piety was 5.67, global diversity was 1.5, working together was 6.25, independent was 3.65, critical thinking was 5.13 and creative was 5.62. Figure 4 shows that the results of the preliminary study that had been carried out per indicator were still relatively low. Thus, it is necessary to strengthen the character of the Pancasila student profile.

Based on the research of Saputro et al. (2023), to strengthen the profile of Pancasila students can be done by utilizing the Science module. Iswatiningsih (2019) and Jufrida et al. (2019) also explains that strengthening character education in schools can be done through local wisdom cultural education. A module is a concept of teaching materials that is packaged in a complete and systematic way, containing a set of planned learning experiences and designed to help students master specific learning objectives (Chantarasombat & Rooyuenyong, 2020; Nursamsu et al., 2020).

Ethno-STEM based modules by adopting Project Based Learning syntax can empower Pancasila learner profiles. Learner learning activities include determining the main questions, designing project planning, compiling schedules, monitoring project progress, testing the learning process and achievements, and evaluating learning experiences (Syafrijal & Desyandri, 2019). In the learning activity of determining the main questions, learners carry out scientific methods in the form of observing and asking questions. In the learning activity of designing project planning, the scientific methods carried out by learners include collecting data from various sources and associating information. In the learning activity of testing the learning process and achievements, the scientific method carried out by learners is communicating the products of learning activities.

The students' learning activity in Ethno-STEM modules empowers each dimension of Pancasila student profile. The character dimensions of having faith, being devoted to god the Almighty, and having noble character in the element of personal character with sub element of integrity are developed when the students deliver the truth and fact while expressing opinion. The element of behavior toward human beings with the sub element of being empathetic to others is developed when the students are invited to accept their friends' opinion during discussion. The element of behavior to nature with the sub element of maintaining surrounding natural environment is developed when the students contribute to solving the problem existing in surrounding environment by giving alternative solution.

The character dimension of global diversity in the element of knowing and appreciating culture with the sub element of growing the sense of respect to cultural diversity is developed through a learning activity by which the students are invited to give alternative solution to preserve culture in daily life. The character dimension of *gotong royong* (mutual cooperation) in the element of collaboration with the sub element of cooperation and coordination is grown through learning activity in the form of working together and sharing the task in the group. The element of care with the sub element of responsiveness to social environment and social perception is grown through the learning activity by which the students contribute to solving the problems be responding to their friends' input.

The character dimension of being independent in the element of self-understanding and situation faced and self-regulation with the sub element of developing self-reflection and showing initiative and working independently is developed through a learning activity involving active learning and implementing self-reflection after the learning. The character dimension of critical reasoning in the element of obtaining and processing information and idea with the sub element of posing question is developed through a learning activity in which the students pose question on information, identifies, clarify, and analyzing relevant information. The element of analyzing and evaluating with the sub element of analyzing and evaluating reasoning and its procedure is developed through a learning activity in which the students learn to reason various arguments to make decision. The character dimension of being creative in the element of resulting in original idea with the sub element of resulting in original idea is developed through a learning activity in which the students associating the idea they have with information obtained. The sub element of producing work is developed when the students express their thought into work or action. The sub element of having flexible thinking ability in finding alternative solution to the problem is developed when the students are in the process of producing alternative solution to a problem presented in Ethno-STEM module.

Conclusion

Based on the results of the study, it can be concluded that the validity of the needs questionnaire in content validation is 65.33% and the results of language validation on the Pancasila student profile questionnaire instrument are 65.66% with a good category. The results of the Vindex analysis on the content validation indicator are 0.91; 0.92; 0.91 and Vindex on the language validation indicator is 0.91; 0.92; 0.92 with a valid category for each indicator. The Vindex results indicate that the instrument is valid in measuring the character of the Pancasila student profile. Furthermore, based on the results of the needs questionnaire, it was found that in early learning at SMP Solo Raya, students' understanding of the sub-elements of the Pancasila Student Profile ranged from 34-67%, indicating the need for character strengthening. In strengthening the character of the Pancasila student profile, an Ethno-STEM module with Project Based Learning syntax is

needed to provide a contextual learning experience that strengthens the values of integrity, empathy, collaboration, and self-reflection. This Ethno-STEM module has the potential to improve students' understanding of science and strengthen students' character in accordance with Pancasila Student Learning. Suggestions for future research are to provide innovation in teaching materials related to strengthening Pancasila student profile learning.

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Conflicts of Interest
The authors declare no conflict of interest.

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