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DEVELOPMENT OF TEACHING MATERIALS BASED ON STRENGTHENING THE PANCASILA PROFILE OF SCIENCE AND SCIENCE SUBJECTS TO IMPROVE CRITICAL-CREATIVE

Sri Suryaningsih[1*], Arwan[2], Nur'aini Rahma[3]
[1*]STKIP Harapan Bima, [2]STKIP Harapan Bima, [3]STKIP Harapan Bima
[1]srisurianingsih@habi.ac.id

Abstract
The "Merdeka Belajar" curriculum presents its challenges for teachers. The selection of models supporting this curriculum has not been optimal, and teaching materials for fostering critical and creative skills have not yet been fully developed. Therefore, it is necessary to develop teaching materials using the Project-Based Learning (PjBL) model to enhance students' critical and creative skills. This research aims to: (1) determine the feasibility of the teaching materials, (2) assess the practicality of the teaching materials, and (3) evaluate the effectiveness of the teaching materials. The research method follows Research and Development (R&D) adopting the Borg & Gall model with ten stages. Instruments used include teacher response questionnaires, student response questionnaires, critical thinking skill tests, and creative thinking skill tests. The research subjects comprised 103 students from SDN 1 Kaleo, SDN 2 Kaleo, and SD Inpres Kaleo. Feasibility testing involved four expert validators; practicality testing was based on teacher and student response questionnaires; and effectiveness testing used average mastery tests, classical mastery tests, average difference tests, and N-gain tests. The teaching materials were deemed appropriate for use, as indicated by expert validators' ratings of "very valid" and "valid." The practicality of the materials was rated as excellent based on teacher and student responses. The materials were found effective in enhancing students' critical and creative skills. Developing PjBL teaching materials based on strengthening the Pancasila profile in the IPAS subject to improve elementary school students' critical and creative skills is feasible. It can enhance critical thinking skills by 94% and creative thinking skills by 95% among 5th-grade students.
Keywords: *Teaching Materials; PjBL; Critical-Creative Skills*

Abstract
Kurikulum merdeka belajar memiliki tantangan tersendiri bagi setiap guru. Pemilihan model yang mendukung kurikulum merdeka belum tepat dan bahan ajar untuk melatih keterampilan kritis-kreatif belum maksimal, maka perlu dikembangkan bahan ajar dengan model PjBL untuk meningkatkan kritis-kreatif siswa. Penelitian bertujuan (1) untuk mengetahui kelayakan bahan ajar, (2) kepraktisan bahan ajar, dan (3) keefektifan bahan ajar. Metode penelitian menggunakan R & D (*Research and Development*) adopsi *Borg & Gall* dengan 10 tahapan. Instrumen yang digunakan yaitu angket respon guru, angket respon siswa, tes keterampilan kritis, dan tes keterampilan kreatif. Subjek penelitian sebanyak 103 siswa pada SDN 1 Kaleo, SDN 2 Kaleo, dan SD Inpres Kaleo. Uji kelayakan menggunakan 4 validator ahli, uji kepraktisan bersadarkan hasil angket respon guru dan respon siswa, dan uji keefektifan menggunakan uji ketuntasan rata-rata, uji ketuntasan klasikal, uji perbedaan rata-rata, dan uji N-gain. Bahan ajar layak digunakan sesuai dengan katagori penilaian validator ahli yaitu sangat valid dan valid. Kepraktisan bahan ajar sangat baik berdasarkan hasil angket respon guru dan siswa. Bahan ajar efekif untuk meningkatkan keterampilan kritis-kreatif siswa. Pengembangan bahan ajar PjBL berbasis penguatan profil pancasila pada mata pelajaran IPAS untuk meningkatkan keterampilan kritis-kreatif siswa sekolah dasar layak digunakan dan dapat meningkatkan keterampilan berpikir kritis sebanyak 94% dan berpikir kreatif sebanyak 95% pada siswa kelas V Sekolah dasar.
Kata Kunci: Bahan Ajar; PjBL; Keterampilan Kritis-Kreatif

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Introduction

The implementation of the independent learning curriculum has its challenges for every teacher. The independent curriculum requires teachers to be able to explore students' potential, design personalized learning, develop active learning, encourage students' creativity and innovation, strengthen character and ethics, connect learning with local contexts, and build student independence (Ardianti & Amalia, 2022; C. Z. Fitriyah & Wardani, 2022; Heryahya et al., 2022; Inayati, 2022; Solikhah & Wahyuni, 2023; Zahir et al., 2022). Students can achieve the profile of Pancasila students, namely by having an attitude and character of believing in God Almighty and having noble morals, global diversity, working together, being creative, thinking critically, and being independent. (Anita et al., 2022; Faslia et al., 2023; Khairiyah et al., 2023; Suardi, 2024).

The Pancasila student profile is several characters and competencies that have the noble values of Pancasila that are expected to be achieved by students (Fadhilah et al., 2023; Sari, 2023; Setiawan et al., 2023). Students with a Pancasila student profile will be able to maintain a balance between technological growth and human development in the era of globalization and technological innovation by prioritizing the values and character of Pancasila (Aries, 2022; Nurhijatina & Larasati, 2024).

Critical and creative skills are part of the profile dimension of Pancasila. So that these two skills are important for students to have to face the development of the times in the era of the onslaught of technology and human development (Imamah & Muqowim, 2020; Nurnaningsih et al., 2023; Park et al., 2023). Critical thinking skills are the ability to process, analyze, and reflect information to make decisions (Huang et al., 2017; Ma, 2023; Petchtone & Sumalee, 2014; Suryaningsih et al., 2021). Creative Thinking is the ability to create, manipulate, and differentiate something useful in life (Berestova et al., 2021; Zhou, 2021). Having critical-creative thinking skills is very important to support the development of science and technology.

Critical creative thinking skills are needed to solve problems in all learning. Science and Technology in the independent curriculum is a subject that combines natural sciences and social sciences. Through IPAS, students can discover the importance of the relationship between the natural and social environments; the two cannot be separated. Students who have creative critical skills will be able to analyze and create an idea so that it can be a solution to problems that exist in the natural and social environment (Rahmawati et al., 2023; Wijayanti & Ekantini, 2023; Zakaria, 2020).

Based on the results of interviews with teachers, the problems obtained in elementary schools are that teachers still find it difficult to implement the independent curriculum, it is difficult to associate learning with the achievement of the Pancasila student profile, lack of creating games in learning even though one of the characteristics of elementary school students is learning while playing, lack of understanding related to science and technology learning, lack of understanding of learning models that can support critical-creative skills so that the forum to develop both skills is not Maximum, the support for independent learning students has not been developed so that if the teacher cannot enter the class, the assigned assignment is only to take notes or do practice questions. Practice questions to improve critical-creative thinking skills are still difficult for teachers to develop (Suryaningsih et al., 2021, 2023).

The solution to the above problem is to be able to develop science and technology teaching materials that students with or without teachers can use and be able to provide stimuli for students to improve critical-creative skills as a result of the implementation of the independent curriculum and prepare students to face technological changes and human

development. The PjBL model is one of the learning models that supports the implementation of the independent curriculum (Triastuti et al., 2023; Widayanto & Farida, 2022). PjBL directs students to work through a project in designing and solving problems independently (Lestari & Ilhami, 2022; Nisa, 2023; Suryaningsih et al., 2024; Suryaningsih & Ramdani, 2023). The application of the PjBL model can improve students' critical-creative skills (Ananda et al., 2021; A. Fitriyah & Ramadani, 2021).

Based on previous research, it was also found that students critical thinking skills and confidence increased after the application of the Talking Stick-assisted PBL model in science subjects (Suryaningsih, 2023; Suryaningsih et al., 2021). Then another research was conducted in the following year with the results stating that the creative thinking skills of grade V students can improve after the application of the Talking stick-assisted PjBL model in science subjects (Suryaningsih et al., 2023, 2024).

It is necessary to develop a differentiated teaching module with a flow of learning objectives using the PjBL approach to realize critical-creative skills, and collaborative problem-solving through tasks that challenge reason, and realize a Pancasila student profile that is in line with the demands of 21st-century education (Ndiung et al., 2023).

The novelty in this study is: (1) Teaching materials with PjBL syntax, (2) there is a link to access the material, (3) strengthening the Pancasila student profile, (4) LKK, (5) LKPD strengthening critical-creative, and (6) games in answering questions. This study aims to develop PjBL teaching materials based on strengthening the profile of Pancasila students and improving the critical-creative skills of elementary school students through the application of teaching materials.

Research Methods

This research is a research and development (R&D) research. The research procedure used adopts the procedure, *Borg & Gall*. The following is a picture of the research procedure *Borg & Gall* (Fahmi Mannassai et al., 2023).

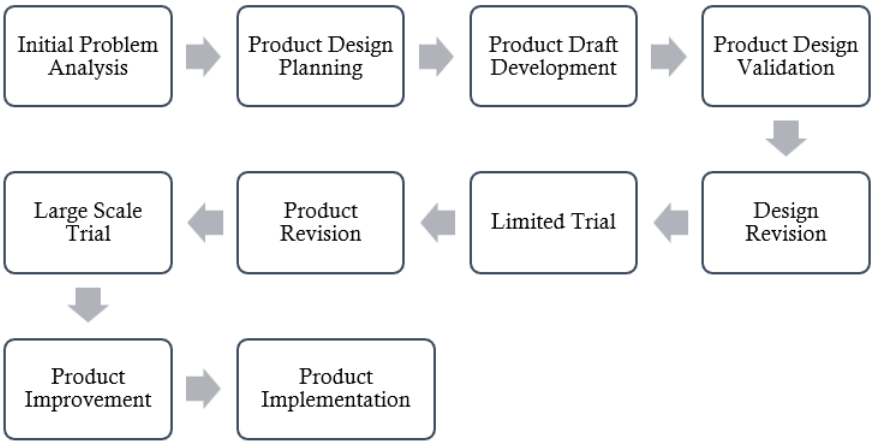

Figure 1. Borg & Gall *Research Development Stages*

Borg & Gall research development stages, (1) initial problem analysis, namely by conducting interviews with teachers, students, and school principals to find out the needs in the field, (2) product design planning, namely designing products according to needs in the field, (3) developing product drafts, namely compiling teaching materials based on previous product designs, (4) product design validation, namely validating teaching materials with 4 expert validators, (5) Design revisions are made based on the revision results from the four expert validators, (6) limited trial, namely implementing teaching materials at SDN 1 Kaleo, (7)

Jurnal Cakrawala Pendas Vol. 10, No. 4, October 2024, pp. 928-940

Product revisions are made based on the results of teacher and student response questionnaires, (8) large-scale trials were conducted at SDN 1 Kaleo, SDN 2 Kaleo, and SD Inpres Kaleo, (9) product improvement, namely compiling product improvements according to the results of the teacher and student response questionnaires in the three schools, and (10) product implementation, namely implementing teaching materials at SDN I Kaleo, SDN 2 Kaleo, SD Inpres Kaleo as a final activity before conducting a post-test.

The research subjects used the Nonprobability Sampling Technique, samples were taken based on criteria, namely, elementary schools with the same curriculum; accreditation of the same school; qualifications of teaching teachers; almost the same infrastructure; the material taught is the same; and as a follow-up to previous research. A limited trial will be carried out in class V of SDN 01 Kaleo and a wide-scale trial will be carried out in class V of SDN 01 Kaleo, SDN 02 Kaleo, and SD Inpres Kaleo with a total of 103 students.

The data collection techniques and instruments used are; (1) the validation sheet of the developed teaching materials; (2) the critical-therapeutic thinking skills test (tested in advance of validity, reliability, discriminating power, and level of difficulty); and (3) questionnaire on teacher and student responses in the development of teaching materials.

The feasibility test is carried out by testing the validation of teaching materials which will be carried out by 4 expert validators, 1 language expert, 1 media expert, and 2 material experts. The practicality test is carried out by looking at the average questionnaire results of teacher and student responses to the learning process using PjBL teaching materials based on strengthening the Pancasila student profile. The effectiveness test was conducted after the learning treatment with PjBL teaching materials based on strengthening the Pancasila student profile was then tested using an average completeness test with the One Sample t-Test at a significance level of 5%, classical completeness test with proportion test using the Z formula, test the difference in means with the Paired Sample t-Test (Paired) at a significance level of 5%, and N-gain test.

Results and Discussion

The product developed in this study is a teaching material with PjBL syntax based on strengthening the profile of Pancasila students in science and science subjects. This teaching material is developed to improve students' critical-creative skills. The stages of developing Teaching Materials are as follows:

The first stage is *the initial problem analysis,* at this stage, it is found that the problems in the field are that teachers find it difficult to relate learning to the achievement of the Pancasila student profile, lack of understanding of social science learning and models that support critical-creative skills, teaching materials that do not attract students' attention. It is necessary to develop teaching materials with the PjBL model that supports the independent curriculum and the implementation of the Pancasila student profile.

The second stage is *product design planning,* after the results of the needs analysis are prepared, then determine the learning objectives to produce a product, the content in the teaching materials (there are PjBL steps, material access links, P5, LKK, and LKPD), determination of covers, color compatibility, and appropriate images.

The third stage is the development of the product draft after the product development has been designed, enters the fourth stage, namely product design validation, at this stage product validation is carried out by 1 language expert, 1 media expert, and 2 material experts with the following results:

Table 1. Validation Results of PjBL Teaching Materials Based on Strengthening Pancasila Profile in Science Subjects.

No	Validators	Percentage	Information
1	Media Expert	89%	Highly Valid (used without revision)
2	Language Expert	73%	Valid (used with revision)
3	Subject Matter Expert 1	71%	Valid (used with revision)
4	Subject Matter Expert 2	94%	Highly Valid (used without revision)

In Table 1 you can see the results of the expert validator's assessment of the teaching materials that have been developed. Revisions made based on comments from validators can be seen in the next stage.

The fifth stage is design revision, the results of the validator's assessment provide suggestions and comments, namely language and material experts. Linguists provide comments, namely to change English into Indonesian (found at the PjBL stage). This is because the abilities of students at the school are used as a research sample. Development must be carried out according to conditions and circumstances in the field (Pratiwi et al., 2024). The results of the revision can be seen in Figures 2 and 3 as follows:

Figure 2. Before Revised

Figure 3. After Revised

Further comments to add activity objectives to make it easier for students to design and compile projects to be worked on. The development of PjBL teaching materials can help create student projects (Nita & Irwandi, 2021). The results of the revision can be seen in Figures 4 and 5 as follows:

Jurnal Cakrawala Pendas Vol. 10, No. 4, October 2024, pp. 928-940

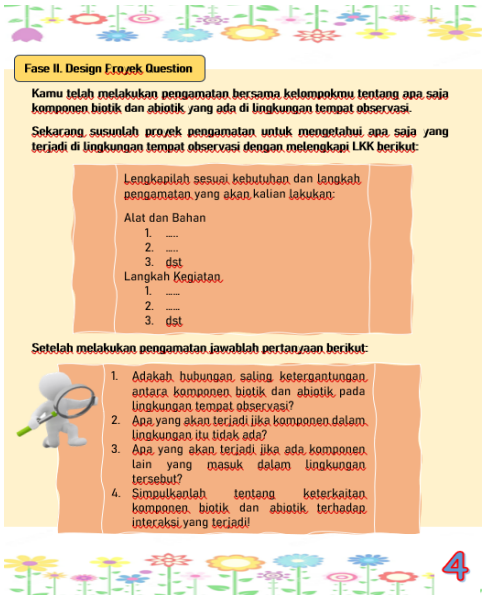

Figure 4. Before Revised

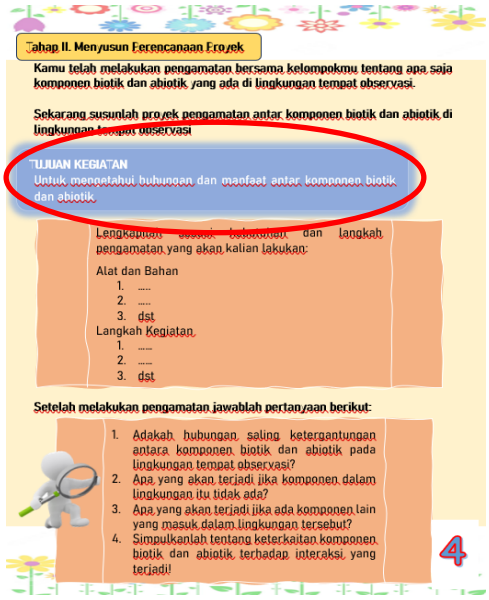

Figure 5. After Revised

Next, the comment from material expert 1 is on the summary of the material that exceeds the limits of elementary school material. There are only 3 biotic components in elementary schools. The results of the revision are shown in Figures 6 and 7 below:

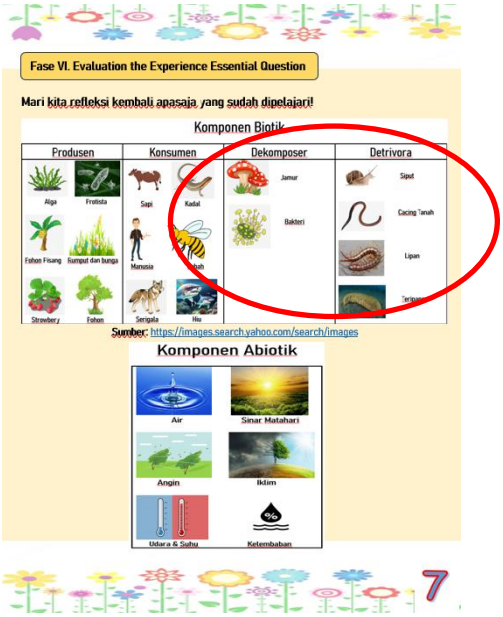

Figure 6. Before Revised

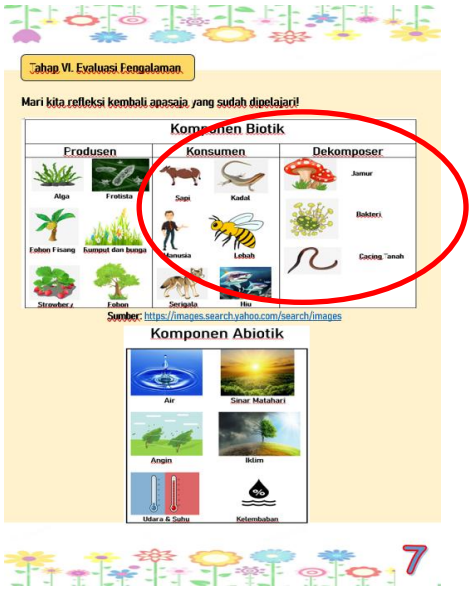

Figure 7. After Revised

The next comment by Language Expert 1 is to complete the answers to the quiz according to the ecosystem and grouping of animals based on their type of food, this is to train students' identification skills. The results of the revision in Figures 8 and 9 are as follows:

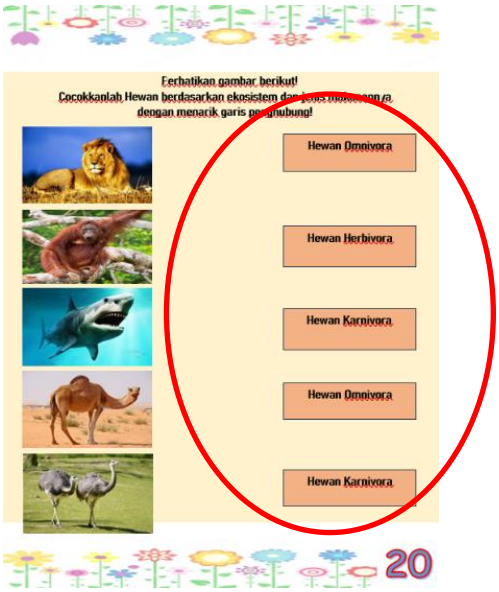

Figure 8. Before Revised

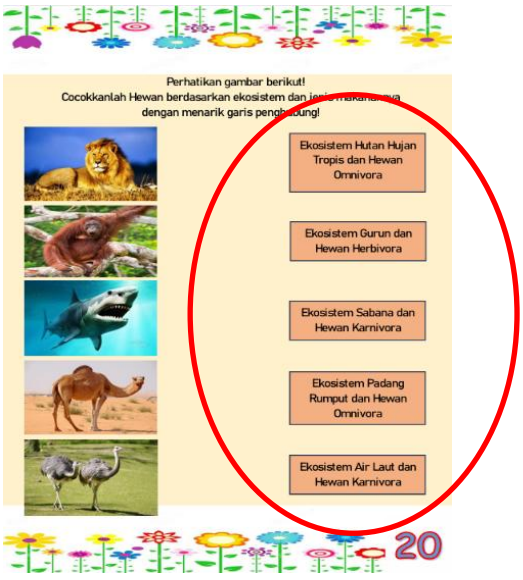

Figure 9. After Revised

There is a difference between Figure 8 and Figure 9 where in Figure 9 the answer is completely based on the ecosystem and type of animal food, while in Figure 8 it is only based on the type of food.

The next stage is *Limited Trial* which was carried out at SDN 1 Kaleo with a total of 48 students. After the trial was carried out, a student response questionnaire and a teacher response questionnaire to the teaching materials were given, 3 teachers responded to this limited trial, the results can be seen in the following table:

Table 2. Results of the Limited Trial Teacher and Student Response Questionnaire

Respondents	Average Percentage	Information
Teacher	88%	Excellent
Student	93%	Excellent

Next is done *wide-scale test,* namely at SDN 1 Kaleo, SDN 2 Kaleo, and SD Inpres Kaleo with a total of 103 students and teachers who will respond as many as 10 teachers. The following can be seen the results of the responses of teachers and students on the wide-scale test:

Table 3. Results of the Wide-Scale Test Teacher and Student Response Questionnaire

Respondents	Average Percentage	Information
Teacher	91%	Excellent
Student	98%	Excellent

Based on the table above, teaching materials have the attraction of helping students to understand the material and strengthening students' character. Teachers believe that the use of PjBL makes it easier to link science learning with strengthening the Pancasila student profile, which has been a challenge. In addition, the teaching materials successfully increased student active involvement, with very high levels of readability and student interest. The teaching materials developed have good practicality. The development of teaching materials with the PjBL model is very practical for elementary school children. (Ismail et al., 2021).

Jurnal Cakrawala Pendas Vol. 10, No. 4, October 2024, pp. 928-940

Next is *Product Implementation* which was carried out at SDN 1 Kaleo, SDN 2 Kaleo, and SD Inpres Kaleo with a total of 103 students, this aims to see the effectiveness of teaching materials. The indicators of the effectiveness of teaching materials in this study are the average completeness test, classical completeness test, average difference test, and N-gain test.

Average Completeness Test, this test is carried out to determine the completeness of student learning through the implementation of teaching materials, and data analysis using *the One Sample t-Test* test on students' critical-creative skills, the results of the calculation can be seen in the following table:

Table 4. Results *of the One Sample t-Test* of Critical-Creative Skills

Skills	BTA	Sig. 2-tailed	Sig.
Critical	39	0,000	0,05
Creative	39	0,000	0,05

Integration of the Pancasila profile into PjBL teaching materials is an important aspect of supporting students in achieving critical and creative attitudes. Components such as LKPD focus on contextual problems that are relevant to students' daily lives. The results of the critical thinking skills test with a sig. 2-tailed value <0.05 indicates that students can exceed the set BTA, which means that the teaching materials are effective in helping students analyze, evaluate, and solve problems independently. This shows that strengthening the profile of Pancasila students through PjBL can form critical and creative characters that are in line with learning needs in the 21st century (Ananda et al., 2021; Widayanto & Farida, 2022).

Classical Completeness Test, this test was carried out to find out if students' critical-creative thinking skills reached the 75% completion limit, data analysis using the Z test obtained the following results:

Table 5. Results *of the* Critical-Creative Skills Z Test

Skills	Ztabel	Sign Description	Zhitung
Critical	1,64	<	2,206
Creative	1,64	<	1,7605

Based on Table 5, it can be seen that $Z_{table} < Z_{calculates}$ both critical thinking skills and creative thinking skills so that it can be concluded that the proportion of complete critical-creative thinking skills exceeds 75%.

Average Difference Test, this test is carried out to determine the significant differences in the results of students' critical-creative thinking skills in the pre-test and post-test, so that the effectiveness of learning with the teaching materials that have been developed can be known. The following are the results of the data analysis that has been carried out *by the Paired Sample t-test* with the help of *SPSS 20* at a significance level of 5%

Table 6. Results of the Average Difference Test of Pre-Post Critical-Creative Skills

Skills	Sig. 2-tailed	Sign Description	Sig.
Critical	0,000	<	0,05
Creative	0,000	<	0,05

The results of the test of the average difference in critical-creative thinking skills have a sig. 2 tailed is 0.000 < 0.05 so there is a difference in the average ability of students in critical-creative thinking skills during the pre-test and after learning with the teaching materials that have been developed (post-test). This shows that the project-based approach is relevant in the elementary school context, indicating that PjBL is effective in supporting critical-creative thinking skills at the elementary level.

N-gain test, this test is carried out to determine the improvement of students' critical-creative thinking skills during the pre-test and post-test, the results of data analysis can be seen in the following table:

Table 7. Critical-Creative Skills Pre-Post N-gain Test Results

Skills	N-gain rate			
	Tall	Medium	Low	Not
Critical	19	50	28	6
Creative	19	44	35	5

Based on the table above, it can be seen that the achievement of improving students' critical-creative skills after learning with the teaching materials that have been developed. In critical skills, 94% of students have improved, while in creative thinking skills, students have increased by 95%. This finding is consistent with several previous studies showing that PjBL can improve students' critical and creative skills (Ananda et al., 2021; A. Fitriyah & Ramadani, 2021) with research results that the PjBL model in science learning improves students' critical thinking skills by 92%. Indicates higher achievement compared to previous research. This can be associated with special components in teaching materials that contain critical-creative reinforcement LKPD and interactive games, which enable students to learn collaboratively and independently. Project-based learning can improve students' critical thinking skills (Hariyanti et al., 2024) and improve students' creative thinking skills (Nita & Irwandi, 2021).

The teaching materials applied to the science subjects have succeeded in emphasizing the basic competencies of the Pancasila student profile, namely critical thinking, creativity, and mutual cooperation. Project activities in PjBL learning allow students to analyze, collaborate, and create solutions, which are in accordance with the objectives of the Independent Curriculum.

This teaching material not only supports academic skills but also focuses on strengthening students' character through Pancasila values. In LKPD, there are components that encourage students to think critically in the context of the social and natural environment. For example, students are given project assignments to identify social or environmental problems, such as waste management or energy conservation, and offer creative solutions. This is in accordance with the critical and creative thinking character expected from the profile of Pancasila students.

The games in the quiz questions are also designed to develop attitudes of mutual cooperation and social interaction, adding an element of collaboration to learning. This model involves students in joint decision-making, group reflection, and joint problem-solving, which are direct practices of Pancasila values in everyday learning.

The development of this teaching material shows that the PjBL model based on the Pancasila profile not only improves critical-creative skills but also encourages independence and understanding of character (Warni et al., 2023). In the long term, the use of this teaching material can become a sustainable learning model and can be applied to various subjects, especially for basic education. This approach enables students not only to master academic content but also to become students who have a character in accordance with Pancasila values, ready to face the challenges of the dynamic modern era.

This discussion shows that the PjBL teaching materials based on the Pancasila profile that were developed have advantages in terms of content, design, and practical implementation in supporting the formation of character and important skills for elementary school students.

Conclusion

Based on the results of the study, it was concluded that the development of PjBL teaching materials based on strengthening the profile of Pancasila students in the science and science subjects to improve the critical-creative skills of students is valid or suitable for use, this is evidenced by the percentage of validation results from the four expert validators, namely 2

validators giving validation in the very valid category and 2 other validators in the valid category. The use of teaching materials by science subjects and elementary school students, as well as practical to be applied in training students' critical-creative skills, is evidenced by the results of the teacher's response and the student's response, namely in the very good category. The teaching materials that have been developed are very effective in improving students' critical-creative thinking skills, this is evidenced by (1) the average completeness test of critical-creative skills with the results of sig. 2 tailed 0.000 < 0.05 so that the student's critical-creative skills were completed above average; (2) the classical completeness test with the results on the zhitung critical skills of 2.206 > 1.64 so that the students' critical skills are completed beyond 75%, while on the zhitung creative thinking skills of 1.7605 > 1.64, it can be concluded that the students' creative skills are complete beyond 75%; (3) test the difference between the average difference of critical-creative skills and the results of sig. 2 tailed 0.000 < 0.05 so there was a significant difference between pre-post critical-creative skills; and (4) the n-gain test on students' critical skills has increased by 94% while on creative skills by 95%, this occurred after learning with PjBL teaching materials based on strengthening the profile of Pancasila students in IPAS subjects to improve the critical-creative skills of elementary school students. Further research will develop a PjBL-based critical-creative skills assessment sheet.

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