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Development of IPAS Learning Modules Based on Differentiated Instruction

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ABSTRACT

One of the challenges faced by elementary school students in learning science concepts is low achievement, partly due to limited teaching materials that match their diverse characteristics. This study aims to develop a valid, practical, and effective Science and Social Studies (IPAS) module based on differentiated learning. The research used a Research and Development (R&D) approach with the 4-D model (Define, Design, Develop, Disseminate). Data were collected through interviews, questionnaires, expert validation, and learning tests with fourth-grade students at SDN 9 Rantau Bayur, South Sumatra. The results indicate that the module developed meets high standards of validity, practicality, and effectiveness. Its implementation in the classroom significantly improved student learning outcomes, showing that differentiated learning can enhance students' understanding and engagement. The module not only serves as teaching material but also as a tool for teachers to implement learning that accommodates students' readiness, interests, and profiles. The findings suggest that differentiated learning-based modules are a promising strategy to improve the quality of IPAS instruction in elementary schools. Furthermore, this study can serve as a reference for the development of similar teaching materials in other subjects or different levels of education.

1. Introduction

Natural and Social Sciences Education (IPAS) is an important component of the elementary school curriculum. IPAS serves to equip students with basic knowledge and skills regarding natural and social phenomena in their surroundings. IPAS learning also contributes to shaping critical, creative, and analytical thinking skills that are necessary for facing global challenges. Mastery of IPAS can enhance students' academic competencies and their ability to solve real-world problems collaboratively (Setyawati et al., 2024). Therefore, IPAS not only serves as a means to achieve cognitive competencies but also as a foundation for character development and social responsibility among students. To make IPAS learning more meaningful, relevant and contextual teaching materials are needed, one of

which is a learning module. Modules assist teachers in presenting material systematically and provide students with opportunities to learn actively and independently. Research by Özdeniz et al. (2023) shows that contextual modules can improve students' conceptual understanding and engagement in IPAS learning at the elementary level. Modules tailored to students' characteristics and learning styles are also found to enhance learning motivation and facilitate the development of critical and creative thinking skills (DemiR, 2021).

In the context of the Merdeka Curriculum, which emphasizes learner-centered learning, differentiated learning strategies are important to implement. Differentiated learning allows teachers to tailor content, processes, and learning outcomes to the needs and abilities of individual learners (Priawasana & Subiyantoro, 2024). This strategy provides space for students to actively engage in learning, in line with their interests, readiness, and learning styles (Beck & Beasley, 2021). In IPAS learning, which requires conceptual understanding and analytical skills, differentiated learning is a highly relevant approach to use (Maisarah et al., 2023).

Various studies have shown the effectiveness of differentiated learning in improving student learning outcomes and participation. Putri et al. (2022) successfully improved numeracy skills through the use of IPAS modules based on differentiation. Al-Shehri (2020) stated that differentiation strategies in content, process, and products can increase enthusiasm and learning outcomes. However, the implementation of differentiated learning still faces various obstacles, especially in elementary schools located in areas with limited resources (Geletu & Mihiretie, 2024). The dominant explanatory method, lack of active interaction, and teaching materials that are not contextual and do not support student diversity are some of the factors that hinder the effectiveness of IPAS learning (Haelermans, 2022). Modules that are purely theoretical, written in formal language, and lacking in creative activities are the cause of low student understanding of the material. Suhartami et al. (2023) found that the effectiveness of the modules used is still relatively low because they do not meet the needs of active and differentiated learning.

Unlike previous studies that focused more on urban school contexts or on the implementation of differentiation strategies in general, this study adapted the module to be effective in learning environments with limited access to resources and high student heterogeneity (Estaiteyeh & DeCoito, 2023; Grecu, 2023). Thus, this study is expected to fill a gap in the literature by providing a real contribution to improving the quality of learning in elementary schools located in remote areas or facing socioeconomic challenges.

This study aims to: (1) describe the results of the analysis of students' needs for the development of IPAS modules based on differentiated learning, (2) describe the results of the analysis of teachers' needs for the development of IPAS modules based on differentiated learning, (3) produce a prototype of IPAS modules based on differentiated learning and assess its suitability to the needs and characteristics of students, (4) to describe the results of the validation by subject matter, media,

and language experts on the development of IPAS modules based on differentiated learning, (5) to produce a differentiated learning-based IPAS module and assess its suitability to the needs and characteristics of students, (6) to describe the practicality of the differentiated learning-based IPAS module developed, and (7) to describe the effectiveness of the differentiated learning-based IPAS module developed in grade 4 of SDN 9 Rantau Bayur.

2. Methodology

This study uses a *Research and Development* (R&D) approach with Thiagarajan's 4-D development model (*Define, Design, Development, and Dissemination*). The 4-D development model was chosen because its stages are structured and relevant to the development of IPAS teaching materials, which aim to improve students' understanding through a scientific approach (Waruwu, 2024). The subjects in this study involved fourth-grade students in the Rantau Bayur area, South Sumatra, namely from SDN 9 as the treatment class and SDN 13 as the control class. Data were collected through validation sheets, questionnaires, interview guidelines, and evaluation tests (*pretest* and *posttest* (Yuliani & Banjarnahor, 2021)). The analysis methods used in this study are as follows:

Module Validity Analysis

The analysis was conducted by tabulating data from validators, namely subject matter experts, media experts, and language experts. Then, the validity scores of each validator were calculated, and the total validity score was calculated. After conducting a combined validation analysis using the *Likert* scale, the validity of the module was determined by looking at the total P value that had been analyzed to be used in determining the validity level based on the following table 1.

Table 1. Validity Assessment Criteria

Achievement Level (%)	Qualification
$80 \leq P \leq 100$	Highly Valid
$60 \leq P < 80$	Valid
$40 \leq P < 60$	Sufficiently Valid
$20 \leq P < 40$	Insufficiently Valid
$0 \leq P < 20$	Very invalid

Modular Practicality Analysis

The practicality test analysis of the module was conducted in the same manner as the validity test analysis of the module, namely by calculating the average score of each statement item in the practicality questionnaire filled out by the students after using the module. The average scores were then categorized based on practicality level intervals, as shown in the following table 2.

Table 2. Practicality Assessment Criteria

Achievement Level (%)	Qualification
$80 \leq P \leq 100$	Very Practical
$60 \leq P < 80$	Practical
$40 \leq P < 60$	Fairly Practical
$20 \leq P < 40$	Less Practical
$0 \leq P < 20$	Very impractical

Module Effectiveness Analysis

The effectiveness of the module was analyzed using a *Non-Equivalent Control Group Design*. Data analysis was performed using SPSS version 22 for Windows. Classical assumption tests were conducted on the *post-test* data to ensure that the *post-test* data were normally distributed and homogeneous. The calculated t-value was then compared with the t-table value in the t-distribution table at a significance level of 0.05.

The criteria for evaluating t-tests are as follows:

- If $t_{hitung} > t_{Tabel}$, then **Reject the H_0 (there is a significant difference in learning outcomes)**.
- If $t_{hitung} \leq t_{Tabel}$, then **Accept H_0 (there is no significant difference in learning outcomes)**

To measure the improvement in learning outcomes after using the module, an N-Gain test was conducted between the *pretest* and *posttest* data in the treatment class. After obtaining the N-Gain values, the qualification of learning outcome improvement was determined by examining the intervals in the N-Gain values, which could then be interpreted into the level of module effectiveness. The criteria for evaluating effectiveness are shown in the following table:

Table 3. Criteria for Evaluating Effectiveness

N-Gain Value	Qualification	Interpretation
$g > 0.7$	High	Very Effective
$0.3 \leq g \leq 0.7$	Moderate	Effective
$0 \leq g < 0.3$	Low	Less effective
$g \leq 0$	Failed	Not Effective

3. Results and Discussion

Result

In this development study, the model used is the 4-D development model which consists of four stages, namely: definition, design, development, and dissemination. At the define stage, a needs analysis is conducted. Analysis of student and teacher needs shows that there is a significant diversity of learning styles in the classroom. However, most of the material is delivered in a traditional manner without any modification of content, process, or product to suit the diverse characteristics of the

students in the classroom. Therefore, it is considered necessary to develop IPAS modules based on differentiated learning.

This module is expected to provide space for students to learn according to their learning styles and readiness levels, as well as assist teachers in implementing adaptive, creative, and student-centered learning strategies. The module is designed to address the limitations of existing teaching materials and encourage more effective and enjoyable IPAS learning at SDN 9 Rantau Bayur. At the design stage, teaching materials were selected and designed, and learning styles were adjusted to suit the needs of students in IPAS learning activities. Formats were selected to match the components in the module, and validation instruments were designed. Next, teaching modules were developed, as shown in the figure 1 below.

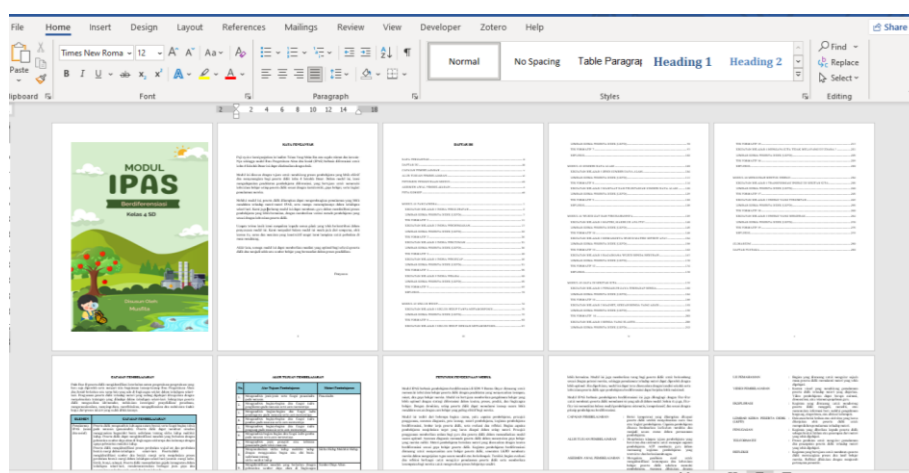


Figure 1. IPAS Module

Next the IPAS module prototype was validated by subject matter experts, media experts, and language experts to obtain comments and suggestions. Validation by subject matter experts, media experts, and language experts is a theoretical validity assessment. The validation of the IPAS module prototype refers to the IPAS module grid based on differentiated learning can be seen in Table 4.

Table 4. Result of Combined Validation of IPAS Module Prototypes

No	Validator	P_i	n	Combined Validation	Qualification
1	Subject Matter Expert	81	3	81	Very Valid
2	Media expert	80			
3.	Language expert	83			
Total		244			

Based on Table 4, the combined validation results of the IPAS module prototype by subject matter experts, media experts, and language experts obtained a validation percentage of 81% with a qualification of highly valid. The validation results of the differentiated learning-based IPAS module prototype based on assessments by subject matter experts, media experts, and language experts were categorized as

valid and suitable for use with revisions. Therefore, revisions were made to the module in the sections that needed improvement. This revision process aims to ensure that the differentiated learning-based IPAS module has a high level of validity and is suitable for use in learning. The revision was carried out comprehensively based on input from subject matter experts, media experts, and language experts. Improvements were made in accordance with the input from the validators and the results of limited testing.

The differentiated learning-based IPAS module was tested on a limited scale and field tested to observe and measure the practicality of the module. The limited testing was conducted with 10 students who were selected beforehand in guided interview groups. The field testing was conducted on the research object with 29 students participating. The interview results showed that teachers considered the module relevant to the curriculum, easy to use, and effective in supporting various learning styles of students. Fourth-grade teachers in the treatment class stated that "this module is appropriate for improving students' understanding and supporting various learning styles." Interviews with students indicated that the module was more interesting than textbooks, easy to use, and helped them understand the material better. Students stated that "yes, I like it because it is more interesting" (student K), "yes, it is easy to use because the content is clear" (student R), "yes, because the explanations are clear" (student C.H.A).

The results of the limited trial in the form of interview analysis, input and suggestions from teachers and students were then evaluated and revised so that the differentiated learning-based IPAS module was ready for field testing. After the learning process was carried out in the treatment class, all fourth grade students at SDN 9 Rantau Bayur were asked to fill out a questionnaire to observe and measure the practicality of the IPAS module can be seen in Table 5.

Table 5. Student Questionnaire Result on the IPAS Module

No	Aspect	Expected Score <i>TSh</i>	Maximum Score <i>TSe</i>	$\frac{TSh}{TSe} \times 100\%$	Qualification
1	The aspect of students' interest in the IPAS module based on differentiated learning using the " " method	13,276	1	8	Very Practical
	Ease of implementation of learning using IPAS modules based on differentiated learning	13,276	15	8	Very Practical
3	Benefits of the IPAS module based on differentiated learning	13,586	15	90	Very Practical
	Number	40,138	45	89	Very Practical

Based on Table 5, the results of the student questionnaire regarding the IPAS module in the stated aspects show that the IPAS module based on differentiated

learning was considered very practical by the students (score of 89%). Tests were conducted before and after learning on the topic of magnets in the control class and the treatment class. In the control class, tests were conducted before and after learning using conventional methods. In the treatment class, tests were conducted before and after learning using IPAS modules based on differentiated learning. Tests before and after learning, both conventional learning in the control class and learning using modules in the treatment class, used the same questions to measure improvements in students' understanding and learning outcomes. The average *pretest* score in the control class was 59.00, and the average *pretest* score in the treatment class was 58.55. To determine whether the data were normally distributed and homogeneous, normality and homogeneity tests were conducted for *the pretest* in the control class and treatment class. The results of the normality and homogeneity tests showed that *the pretest* in the control class and treatment class were normally distributed and homogeneous can be seen in table 6.

Table 6. Learning Test Result of Students

Class	n	Average Score	
		<i>Pre-test</i>	<i>Post-test</i>
Control	17	59	62.94
Treatment	29	58.55	73.48

To ensure that there were no differences in ability between the control class and the treatment class before the treatment was carried out, an analysis was conducted using a t-test. The results of the t-test showed that with a significance level of $0.747 > 0.05$, and a value of $t_{hitung} < t_{Tabel}$ of $0.325 < 2.015$. It can be concluded that there was no significant difference in the initial ability of students in the magnet material between students in the control class and the treatment class before the learning process. Therefore, further analysis can use the t-test to determine the significance of the *post-test* differences between the two research groups.

The *posttest* results for the control class and the treatment class showed that the average *posttest* score for the control class was 62.94 and the average *posttest* score for the treatment class was 73.48. To test the difference in *post-test scores* between the control class and the treatment class, a normality test was conducted using the Shapiro Wilk test because the sample size was small (46 people) and a homogeneity test was conducted using the F test. The normality test was conducted to ensure that the data analyzed was normally distributed. The homogeneity test was conducted to test the similarity of the variance between the control class and the treatment class. The results of the normality test and homogeneity test showed that *the post-test* in the control class and *the post-test* in the treatment class were normally distributed and homogeneous. If the data are normally distributed and homogeneous, then for further analysis, a parametric test using an independent sample t-test was conducted to compare the means of two unrelated groups. The result of the t-test are shown in table 7.

Based on Table 7, it can be seen that with a significance level of $0.000 < 0.05$, and the value of the t-test ($t_{hitung} > t_{Tabel}$) is $7.395 > 2.015$. It can be concluded that

the null hypothesis (H_0) is rejected, meaning there is a significant difference in learning outcomes in the magnet material between students in the control class and the treatment class after the instruction.

Table 7. Post t-test for Control Class and Treatment Class

		Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means						
						Sig. (two-tailed)	Mean Difference	Std. Error of the Difference	95% Confidence Interval of the Difference	
		F	Sig.	t	df				Lower	Upper
Posttest	Equal variances assumed	.024	.878	7.395	44	.000	10,542	1,425	7,669	13,414
	Equal variances not assumed			7,289	32,164	.000	10.542	1.446	7,596	13,487

H_0 : There was no significant difference in learning outcomes between students in the control class and the treatment class after the learning process.

H_a : There is a significant difference in learning outcomes between students in the control class and the treatment class after the learning process.

Based on the results of the effectiveness analysis, the differentiated learning-based IPAS module developed in this study proved to be effective in learning. This is evident from the t-test results, which show a significant difference at a significance level of <0.05 , and the average *posttest* scores of students in the treatment class (73.48) were higher than those in the control class (62.94). The level of effectiveness can be determined using the N-Gain test, as shown in Table 8.

Table 8. N-Gain Test

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Standard Deviation
N gain	29	.16	.51	.3622	.07094
Valid N (listwise)	29				

Based on Table 8, the average N-Gain of 0.3622 indicates that the learning outcomes of students in the magnet material are in the moderate category, so the use of IPAS modules based on differentiated learning can be considered effective. Thus, referring to the results of the validity, practicality, and effectiveness analyses, it can be concluded that the IPAS module based on differentiated learning is highly valid, very practical to use in learning, and effective in improving the learning outcomes of students in grade 4 at SDN 9 Rantau Bayur. The validity of the module is supported by expert statements that "the content and structure of the module are

in line with the principles of differentiated learning." Regarding practicality, teachers stated that "the module is easy to use and very helpful in teaching." The effectiveness of the module is reinforced by one of the students who said, "Learning has become easier and more enjoyable."

Discussion

An analysis of students' needs indicates that fourth-grade students at SDN 9 Rantau Bayur exhibit diverse learning styles (visual, auditory, and kinesthetic) and varying levels of readiness for learning. However, the modules or instructional materials used to date have not accommodated these differences. The decision to develop an IPAS module based on differentiated instruction aligns with the perspective of Sun & Xiao (2024) which emphasizes that differentiated instruction must be designed based on students' learning profiles to ensure optimal learning for each individual. According to Maisarah et al. (2023), Nainggolan & Rachman, (2024), Suhartami et al. (2023) students' learning styles can influence how they understand concepts and absorb information. Therefore, learning modules need to be designed in such a way that they align with their learning characteristics. Pozas et al. (2020) also emphasizes that learning media that facilitate interaction and varied learning experiences can enhance student participation and understanding. This is particularly relevant in the context of developing differentiated IPAS modules at SDN 9 Rantau Bayur, which has students with diverse backgrounds in terms of ability, interests, and learning styles.

Some students find it easier to understand material through visual approaches, such as pictures and diagrams, while others are more responsive to kinesthetic activities or group discussions. If not properly facilitated, these variations in learning styles can hinder students' understanding of abstract and contextual IPAS concepts. Therefore, the development of modules that consider learning styles and the unique characteristics of students at SDN 9 Rantau Bayur is a necessity to make learning more inclusive, meaningful, and able to accommodate the potential of each student optimally. Thus, the results of the analysis of students' needs in this study reinforce the urgency of developing IPAS modules that can accommodate diverse learning styles, to bridge the gap in understanding complex and contextual IPAS concepts.

Teachers need teaching materials that are practical, flexible, and support differentiated instruction. Teachers find it difficult to develop learning activities tailored to student characteristics due to limited resources and time. Teacher involvement in the module development process is important to ensure that the modules are truly tailored to classroom needs. In the context of differentiated learning, teachers' perspectives are crucial because they are the ones who best understand the real conditions in the classroom, including differences in students' abilities, interests, and learning styles. Teachers also have direct experience in managing classroom dynamics and know which strategies are effective and appropriate for the characteristics of their students. Therefore, the development of IPAS modules should not only be theory-based but also consider practical input from teachers to ensure that the resulting modules are applicable, contextual, and

capable of supporting the implementation of differentiated learning in real-world settings.

Beck & Beasley (2021) state that good learning tools should be easy to implement and give teachers the freedom to innovate in organizing learning strategies, so that teacher involvement in this process becomes an aspect that cannot be ignored. Özdeniz et al. (2023) also add that modules designed systematically with clear instructions can enhance teachers' readiness to implement differentiated instruction in the classroom. Thus, the results of the teachers' needs analysis in this study emphasize the importance of developing practical, adaptive, and responsive learning modules that address challenges in the field, and are designed with consideration for teachers' involvement as the primary users.

The IPAS module prototype was developed based on data from an analysis of student and teacher needs, as well as IPAS learning outcomes in fourth grade elementary schools (Kamilah & Astriani, 2024). The module was designed to accommodate differences in student learning styles and local school characteristics. The presentation of content, processes, and products in the module was designed to be varied so that students can learn actively and independently. Suhartami et al. (2023) who states that an effective module must be designed according to the characteristics of students to facilitate learner-centered learning.

Magableh & Abdullah (2020) added that the success of learning is not only determined by the content of the material, but also by how the material is presented in a form that suits the learning styles and needs of the students. Therefore, the IPAS module prototype developed in this study was deliberately designed to support the implementation of differentiated learning in the classroom. This is based on the fact that in elementary school classrooms, including at SDN 9 Rantau Bayur, there is diversity in terms of learning readiness, interests, and learning profiles of students. Without teaching materials specifically designed to accommodate this diversity, teachers will find it difficult to create fair and meaningful learning for all students. The prototype modules oriented toward differentiation enable teachers to more easily adapt materials, activities, and assessments to the needs of each individual student. Thus, the direction of module development is not only aimed at conveying IPAS content but also serves as a means to realize inclusive and responsive learning in the classroom. Furthermore, Rijal et al. (2025) reveals that differentiation in learning products allows students to express their understanding more flexibly, which can increase their confidence and engagement in learning.

The IPAS module, which was developed systematically through the 4-D model (*Define, Design, Develop, and Disseminate*), resulted in a structured, attractive, and ready-to-use module. For SDN 9 Rantau Bayur, the benefits of this module are significant as it provides a concrete solution to the challenges faced by teachers in implementing differentiated instruction, particularly in the context of limited access to learning materials that align with the characteristics of the students. The developed module not only presents IPAS material in a contextual and easy-to-understand manner but is also designed to be flexible, allowing teachers to adapt

activities and approaches according to students' learning styles and readiness levels (Kamilah & Astriani, 2024).

In addition, the existence of this module can improve the effectiveness of learning in the classroom and facilitate teachers in designing inclusive teaching strategies. For other elementary schools, especially those with similar student characteristics, this module can be used as a model or reference for developing adaptive and applicable teaching materials, thereby supporting the implementation of the Merdeka Curriculum and strengthening learner-centered learning (Estaiteyeh & DeCoito, 2023). This module has undergone a validation and revision process to improve its quality and has been tested on a limited scale to assess its acceptability and functionality in learning. Nainggolan & Rachman, (2024) explains that teaching materials developed using a valid and tested model will be easier for teachers to implement and will increase their confidence in using them in the classroom.

This module is designed with consideration of the local context of students at SDN 9 Rantau Bayur. The material used is adapted to the surrounding environment. This is in line with the *Contextual Teaching and Learning (CTL)* theory, which emphasizes the importance of linking lesson material to students' real-life experiences in order to create meaningful and applicable learning (Zahrah & Febriani, 2020). Therefore, the integration of local context in this IPAS module is crucial to making the learning process more relevant, concrete, and aligned with the needs and realities of students at SDN 9 Rantau Bayur.

The results of validation by subject matter, media, and language experts indicate that the differentiated learning-based IPAS module has a very good level of validity, with average scores of 81%, 80%, and 83%, respectively. This shows that the module has met the criteria for content, presentation, and language validity. The high validity of the differentiated learning module () indicates that the module is consistent with the principles of differentiated learning, namely the ability to accommodate differences in learners' learning styles. This finding is in line with the opinion of Sapan & Mede (2022) , which states that differentiated learning requires teaching tools that are systematically designed to accommodate the diverse needs of learners. Differentiated instruction aims to meet individual learning needs through adjustments to content, process, and learning outcomes. Valid modules enable teachers to provide more personalized learning experiences, allowing students with visual, auditory, or kinesthetic learning styles to understand the material optimally.

High module validity also indicates that the content, structure, and presentation are in line with the learning objectives and needs of the students. Valid modules can increase learning motivation and learning effectiveness because students feel that their learning styles are being taken into account. In addition, modules that have undergone validation tend to have high instructional quality, which has a direct impact on improving learning outcomes (Wibowo et al., 2025).

In field trials, students demonstrated increased activity and engagement in learning. This is consistent with research by Easa & Blonder (2023), which shows that differentiated learning modules can significantly improve student active participation and learning outcomes. Valid modules not only provide clarity in the learning structure but also allow flexibility in delivering content according to students' readiness, interests, and learning profiles. A total of 87% of students stated that the modules helped them understand the material better, while teachers assessed that the modules facilitated the management of differentiated learning. Activities in the modules, such as exploration, discussion, and simple experiments, proved effective in supporting visual, auditory, and kinesthetic learning styles.

The aspects that make this module practical at SDN 9 Rantau Bayur include its simple yet systematic structure, the use of communicative language appropriate to the cognitive development level of elementary school students, and the completeness of the implementation guidelines for teachers. Additionally, each activity in the module is tailored to the availability of school facilities and resources, so it does not require tools or materials that are difficult to obtain. The module also offers flexible alternative activities and assessments, allowing teachers to adapt instruction to the diverse conditions of their classrooms. As a result, this module is not only easy to implement but also relevant and contextual to the real-world needs of SDN 9 Rantau Bayur.

The practicality of the module is also evident from the positive response of teachers to the module usage guidelines. Teachers stated that the systematic structure of the module and clear instructions facilitated the implementation of learning. This shows that the module is not only easy to understand but also easy to apply in real learning conditions (Grecu, 2023). These findings indicate that the practicality of the module is highly dependent on the comprehensibility of the instructions for teachers and students, as well as the suitability of the format to the learning flow in schools. Practical modules help teachers save time in planning and improve the effectiveness of the teaching and learning process. Modules that are systematically structured and complete with usage instructions can enhance teachers' readiness to implement differentiated learning (Maryam et al., 2022). This module is effective for use in learning because the scores obtained from the learning evaluation tests of students in the treatment class showed a significant increase after learning using the IPAS module based on differentiated learning compared to the control class that used conventional methods. This is in accordance with the opinion of which states that effective modules can improve student learning outcomes.

The effectiveness of this module is due to several important aspects of its design. First, the module is structured using a differentiated approach that takes into account the readiness, interests, and learning profiles of the students, so that they can learn in a way that best suits their needs. Second, the material is presented in a contextual manner and accompanied by interesting visual illustrations, which help to improve understanding of abstract IPAS concepts. Third, the variety of learning activities, such as exploration, discussion, simple experiments, and reflection, allows students to actively engage and build understanding through direct experience (Stollman et al., 2021). Fourth, the module is equipped with graded

exercises and a flexible assessment format, which helps teachers evaluate students' learning outcomes more comprehensively. It is the combination of these various aspects that makes this module capable of significantly improving students' learning motivation and outcomes.

This study makes an important contribution to the implementation of differentiated learning at SDN 9 Rantau Bayur because it supports the creation of a more inclusive, effective, and student-centered learning process. Differentiated learning is becoming increasingly relevant given that each student has different backgrounds, abilities, interests, and learning styles, so a uniform approach is no longer adequate. This was clearly evident during the implementation of the IPAS module that was developed. The evaluation results showed an increase in student participation, especially among those who previously tended to be passive when participating in conventional learning approaches. The module also provides alternative activities and assessments, allowing teachers to adjust their teaching strategies without significantly increasing their workload. Thus, the use of the IPAS module not only demonstrates the theoretical potential of differentiated learning but also proves its effectiveness in real classroom settings, particularly at SDN 9 Rantau Bayur, which has a diverse student population in terms of both academic and social backgrounds.

According to Haelermans (2022), differentiated learning is a proactive approach to designing and adapting curriculum, teaching strategies, learning environments, and assessments to address the diversity of students in the classroom. The module developed in this study serves as a concrete tool to facilitate teachers in applying the principles of differentiation, both in terms of content, process, and learning outcomes. This module can be a solution for teachers to overcome challenges in managing classrooms with diverse learning styles. Thus, this module strengthens the implementation of fair and meaningful learning for all students.

4. Conclusion

The differentiated learning-based IPAS module developed at SDN 9 Rantau Bayur is an innovative learning tool designed using a differentiated approach based on students' interests, readiness, and learning profiles. Expert validation of the content, media, and language indicates that the module is of high quality, well-structured, contextual, and suitable for both independent and guided learning, while also supporting the differentiation process in the classroom. The developed module has proven to be effective, as evidenced by a significant improvement in student learning outcomes in the treatment class. The innovation of this study lies in the development of an IPAS module with a differentiated learning approach integrated into the module structure, which has not been widely developed at the elementary school level. This module is not only a teaching material but also a tool for teachers to implement learning that is tailored to the individual needs of students. The implications of this research are that schools are expected to support the implementation of the IPAS module, including facilitating training for teachers in the application of differentiated learning and providing supporting learning

resources. This research can be used as a reference in developing similar teaching materials for other subjects or different levels of education.

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