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A Variety of Research Methods and Differentiated Learning Patterns for Science and Social Subjects (IPAS) in Primary Education

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Abstract: The implementation of differentiated learning in the realm of basic education, especially in science and social subjects - *Ilmu Pendidikan Alam dan Sosial* (IPAS) subjects, must be implemented as one of the demands of the independent curriculum in schools. New provisions and limited information about differentiated IPAS learning make the emergence of various ways of implementing differentiated IPAS learning depending on the level of understanding of each teacher which is packaged in the form of learning patterns and research methods. This study aims to analyze research methods and variants of differentiated learning patterns used in the realm of basic education. The research method used Systematic Literature Review (SLR) with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) method. A total of 18 articles sourced from SINTA and Google Scholar on differentiated IPAS learning were analyzed based on research methods and learning patterns. The results showed that there were 8 different research methods and 7 differentiated IPAS learning patterns at the basic education level.

Keywords: *IPAS subjects; differentiated; primary education*

A. INTRODUCTION

The A liberating education is one of the most important forms of education in preparing young people to pursue their dreams and reach their full potential. An education that liberates children allows them to become independent, creative and

open-minded individuals. This is in accordance with Ki Hajar Dewantara's philosophy which has become the foundation for education in Indonesia. Ki Hadjar Dewantara states that the essence of education is an effort to incorporate cultural values into the child, so as to form him into a complete human being both spiritually and



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mentally. This educational philosophy is known as the philosophy of education among which is the basic ability of children to overcome the problems they experience by providing broad freedom of thought (Tarigan et al., 2022). As individual beings, of course, humans have diverse characteristics, including in terms of gaining and obtaining knowledge. The world of education realizes that each individual has uniqueness and differences that must be considered.

However, this diversity is often overlooked by teachers and parents. This leads to a tendency to compare students' learning achievements without considering their needs and abilities as a whole. As educators, we must realize that every student has different learning styles and interests. Therefore, it is important for us to understand that academic success is not only determined by academic grades alone, but also by students' overall social, emotional, physical, and psychological development. In the Merdeka Curriculum currently in effect in Indonesia, emphasizing important material, developing competencies according to growth stages, and learning methods that are deep, meaningful, gradual, and fun are top priorities (Bima Prakarsa Arzfi, 2024).

The learning strategy that characterizes the Merdeka Curriculum to accommodate differences in diverse student characteristics is Differentiated Teaching. Suwartiningsih (2021) states that differentiated learning is all forms of learning that are tailored to meet student needs (Nahak, 2023). Tomlinson (2000) explains that differentiated learning is an effort to harmonize learning methods

in the classroom to meet the learning needs of each individual student. These adjustments must include students' interests, learning styles, and readiness levels in order to achieve progress in the learning process (Ayu Sri Wahyuni, 2022).

According to the view of Lestari and her team (2023), teachers have the ability to apply differentiation in learning, taking into account students' interests and readiness. Differentiated learning can be done through four aspects, namely content, process, product and learning environment. The content differentiation aspect involves the adjustment of learning materials, while process differentiation will be related to the flow of learning activities tailored to student needs. Product differentiation refers to diverse learning outcomes according to student needs, and environmental differentiation involves adjusting classroom environmental conditions according to the learning situation (Z. Arifin, 2024).

In addition to differentiated learning, changes in the Merdeka curriculum with the previous curriculum are also found in the merging of science and social studies subjects into new subjects, namely IPAS at the elementary school level. This has an impact on the learning implementation process in elementary schools, especially the science and social studies materials are united into IPAS at the elementary school level (Anisah et al., 2023). According to the Ministry of Education, Culture, Research, and Technology, (2021) with the Integration of Science (Natural Sciences) and Social Studies (Social Sciences) in the Merdeka Belajar Curriculum, students are expected

to understand the relationship between natural and social phenomena in everyday life. This will provide a deeper and holistic understanding for students, and prepare them to become individuals who are able to think multidisciplinarily and contextually (Erwinda Fitriana, Ana Fitrotun Nisa, 2024).

Based on some of the descriptions above, differentiated learning is one of the priorities in implementing the Merdeka Curriculum. Therefore, it is important for teachers to know and apply a variety of differentiated learning patterns. However, literature studies that examine variations in differentiated learning patterns, especially in IPAS subjects, especially in science as a new subject content at the primary school level, are still limited in number. Some of the results of the literature review related to differentiated learning are the results of research at the elementary, junior high and high school levels which concluded that the integration of science lessons with the Qur'an in madrasas has not been integrated (Z.Arifin, 2024). The results of the literature review on differentiated approaches in science learning at elementary, junior high, high school, and university levels can be through several learning models such as problem-based learning, blended learning's station rotation, and project-based learning (Ayu Sri Wahyuni, 2022). As well as a literature review of differentiated approaches as a learning solution in diversity with research results that tend to only discuss measuring learning outcomes, learning styles, and student interest (Wulandari, 2022).

So far, no research results have been found on the variety of learning patterns used by teachers in implementing differentiated learning in IPAS subjects in basic education comprehensively. This research is important to provide an overview of the variety of differentiated learning patterns of IPAS material, especially for educators as a reference in classroom implementation. The purpose of this research is to find out the variety of differentiated learning patterns of IPAS material in basic education as well as related research methods.

B. MATERIALS AND METHODS

This study uses the Systematic Literature Review (SLR) method or a systematic literature review using the *Preferred Reporting Items for Systematic Reviews and Meta-Analysis* (PRISMA) method. The steps in carrying out PRISMA are as follows: First, *Identification*, which aims to identify the literature to be used as a sample; second, *Screening*, which is an attempt to make selections based on the aspects measured; third, *Filtering*, which is filtering data with the aim of initial assessment based on correlation variables and parameters to be extracted; fourth, *Eligibility*, which is an eligibility assessment of the quality of the literature; and fifth, *Included*, which is the step of compiling meta-analytic data and conducting literature reviews of selected articles (Z.Arifin, 2024).

Article data collection uses *Harzing's Publish or Perish* application with a search focus on Google Scholar. Article search restrictions are only on articles published

between 2021 and 2024 and use article title searches with the word differentiated learning and use four keywords, namely: differentiation, IPA, IPAS, and SD. The search results found 18 articles that fit the search criteria.

C. RESULT AND DISCUSSION

The results of the article search were followed up according to the steps in the PRISMA method. These steps include *identification, screening, filtering, eligibility, and inclusion*. The detailed results obtained by applying these steps are presented in Tables 1, 2, and 3.

Table 1

Literature Review Analysis of Variations in Differentiated Learning Patterns in the Primary Education Domain

No.	Researcher and year	Journal	Methods	Research Results	Pattern
1	Bima Prakarsa Arzfi, 2024	Journal of MI Education	Qualitative: descriptive case study	The application of humanistic learning theory in science differentiated learning has a positive impact on students' creativity and learning achievement.	Application of humanistic learning theory
2	Deasy Fatma Arini, Mursidah Rahmah, 2024	Scientific Journal of Basic Education	R&D: ADDIE Model (Analysis, Design, Development, Implementation, and Evaluation)	The product of the development of a Google Sites-based learning website on IPAS Learning Grade IV Elementary School in Chapter 6 My Indonesia is Rich in Culture, is very feasible to use, with the results of the average percentage of expert assessment, namely (96.3%), with material experts providing (94%), media experts providing (96%), linguists providing (97%), and the one to one stage test when	Development of Google Sites-based Process Differentiated Learning Website

No.	Researcher and year	Journal	Methods	Research Results	Pattern
				averaged produces (94%).	
3	Erwinda Fitriana, Ana Fitrotun Nisa, 2024	Scientific Journal of Basic Education	Qualitative: descriptive <i>field research</i>	Combining the application of differentiated learning with the Problem Based learning (PBL) model in IPAS subjects can improve students' understanding and learning motivation.	Application of differentiated learning with Problem Based learning (PBL) model
4	Oktavia Nur Hasanah, 2024	Elementary School Education Journal	Qualitative: descriptive case study	Teachers make learning plans by mapping learning needs through diagnostic assessments and then creating teaching modules based on the results of the mapping.	Designing teaching modules
5	Istiqomah et al., 2024	Journal on Education	Quantitative: Experiments	Differentiated learning strategies affect the learning outcomes of fifth grade students of SDN Sawah Besar 01 in IPAS subjects.	Differentiated learning strategy
6	Kusumani ngpuri, 2024	Journal of Elementary Education Didactics	Qualitative: descriptive case study	The implementation of differentiated learning that begins with the planning, implementation, and evaluation stages, in learning the parts of the plant body in stage B science learning in class IV Elementary School is optimal and effective.	The research design of differentiated learning implementation begins with the planning stage including learning style diagnostic tests and cognitive diagnostics, learning implementation according to learning

No.	Researcher and year	Journal	Methods	Research Results	Pattern
					styles, and evaluation.
7	Nadwah & Prayito, 2024	Journal on Education	Quantitative: correlation with <i>pretest-posttest</i> N-gain	Differentiated learning is effective for IPAS learning for Grade V students of SD Supriyadi Semarang.	Differentiated education by forming groups of learners according to their learning styles
8	Rosiyani et al., 2024	Journal of Primary School Teacher Education	Qualitative: <i>field research</i>	The implementation of differentiated science learning gives a good impression for students which is shown by the increasing enthusiasm and enthusiasm of students during learning.	Mapping student needs through non-cognitive assessment, designing differentiated learning plans, evaluating and reflecting on learning.
9	Siti Aisah, 2024	Journal of Education and development	R&D: 4D instrument development model	Science Process Skills assessment instrument with differentiated learning design is feasible to use as a tool to measure the science process skills of students	Science Process Skills assessment instrument with differentiated learning design
10	Anik Nawati, Yuyun Yulia, 2023	Scientific Journal of Basic Education	Quantitative: quasi-experiment	There is a significant difference between students' science learning outcomes before and after the use of differentiated learning strategies problem-based learning model.	Differentiated learning with problem-based learning model
11	Avandra & Desyandri, 2023	Scientific Journal of PGSD FKIP Mandiri University	Qualitative: Classroom Action Research	The implementation of differentiated learning can improve students' critical thinking skills.	Classroom Action Research includes aspects of designing, implementing and evaluating learning.

No.	Researcher and year	Journal	Methods	Research Results	Pattern
12	Fitriah & Widiyono, 2023	Indo-MathEdu Intellectual s Journal	Qualitative: descriptive <i>field research</i>	Teachers find it difficult to categorize the abilities and learning styles of each student, limited time allocation, facilities and media that must be prepared by teachers.	Learning style groupings of primary school learners in differentiated learning
13	Ismail & Lasari, 2023	Journal of PGMI, Madrosatuna	Qualitative: descriptive <i>field research</i>	Differentiated learning has been implemented at school by teachers and teachers are very happy because students are more active and enthusiastic when learning IPAS material.	Differentiated learning with problem-based learning model
14	Miqwati, Euis Susilowati, 2023	Journal of Primary School Education	Qualitative: Classroom Action Research	The application of different learning methods can increase the average score and also student activeness in learning, especially in science subjects at elementary school.	Differentiated learning using three strategies include content, process, and product differentiation
15	Nadia Imti Khaningrum, Sunarti, Daimul Hasanah, 2023	Scientific Journal of Basic Education	Qualitative: Classroom Action Research	Utilization of the surrounding natural environment with differentiated learning can improve science learning outcomes in class IV SD Negeri 2 Kalipetir.	Differentiated learning by utilizing the environment as a learning resource.
16	Nahak, 2023	Scientific Journal of Basic Education	Qualitative: Descriptive analysis	The application of differentiated learning in IPAS subjects has a positive impact on students and teachers. As well as making students feel comfortable to	The learning steps are mapping student needs, determining strategies and assessment tools,

No.	Researcher and year	Journal	Methods	Research Results	Pattern
				learn so that it can improve the learning outcomes of fourth grade students of SD Inpres Labat Kupang City.	implementing differentiated learning includes content, process, and product, and ends with evaluation and reflection steps.
17	Ryandini Dwi Puspita, Hendrik Pandu Paksi, 2023	Journal on Education	Qualitative: Classroom Action Research	Differentiated learning by involving visual and kinesthetic learning styles with PBL steps can improve activity and learning outcomes of IPAS content on the human respiratory system chapter on how the body processes air in grade V students of SDN Sukowati, Kapas District, Bojonegoro Regency.	Learning style differentiated learning with PBL model
18	Wahyudi et al., 2023	Journal of Mathematics and Natural Sciences Education	Qualitative: descriptive <i>field research</i>	The implementation of differentiated learning can address the diverse needs of students.	The implementation of differentiated learning includes three aspects: content, process and product differentiation

Based on Table 1, it can be analyzed that the 18 research results found a variety of research methods on differentiated learning of IPAS materials in the realm of basic education as

many as 8 kinds in Table 2. When viewed carefully, all methods are met, namely qualitative, quantitative, and mix-methods with different numbers of methods.

Table 2

Research methods of differentiated learning of watershed materials in primary education

Qualitative		Quantitative		Mix method	
Design	Total	Design	Total	Design	Total
Descriptive Case Study	3	Experiment	2	ADDIE model	1
Descriptive Analysis	1	Correlation	1	R&D instrument development	1
Descriptive <i>field research</i>	5				
Classroom Action Research	4				
Total	13		3		2

Based on Table 2, it is known that the research method is the most chosen method in differentiated learning research on science materials in elementary schools with a total of 13 articles, followed by quantitative methods as many as 3 articles, and mix-method research as the least method chosen by researchers, namely 2 articles. Looking further at the results of the analysis of table 2 shows that the use of qualitative research methods is divided into 5 designs, namely 3 articles using descriptive case study methods. One article uses descriptive analysis method, 5 articles with descriptive field research method, and as many as 4 articles use class action research method. While research on differentiated learning of IPAS material at the elementary school level using quantitative methods is also divided into 2 designs, namely 2 articles using experimental methods and one article with quantitative correlation

methods. In addition, the mix-method method is also used in this study and consists of 2 designs, namely the ADDIE model R&D and the instrument development model R&D. Observing the results of the analysis of the design used in the research has been considered sufficient as a scientific footing so that sufficient samples can be obtained to determine the variation of differentiated learning of IPAS material in the realm of basic education.

Furthermore, based on the analysis of the patterns used by teachers in implementing differentiated learning, there are some similarities. This is understandable because implementing differentiated learning is highly dependent on the level of teachers' understanding of the extent to which they know and apply differentiated learning in the classroom. The variants of the pattern can be seen in Table 3.

Table 3

Research Articles on Differentiated Learning of IPAS Materials in Elementary Schools Based on Variants of Learning Patterns Used by Teachers

Pattern	Total
Differentiated learning by applying humanistic learning theory	1
Differentiated learning by applying IT utilization	1

Differentiated learning by applying the Problem Based Learning (PBL) Learning Model	4
Differentiated learning by compiling and implementing learning designs, one of which is in the form of teaching modules.	8
Differentiated learning by applying learning style groupings	2
Differentiated learning with an emphasis on developing assessment instruments	1
Differentiated learning by implementing environment-based learning as a learning resource	1
Total	18

The study of various learning patterns used in the implementation of differentiated learning in IPAS subjects at the primary level is grouped into 7 patterns. The first pattern is differentiated learning by applying humanistic learning theory. This pattern is found in one article. The application of humanistic learning theory in science differentiated learning has a positive impact on the creativity and learning achievement of students (Bima Prakarsa Arzfi, 2024). The second pattern is differentiated learning by applying IT utilization. This pattern is also only found in one article. Product Development of Google Sites-Based Differentiated Learning Website on IPAS Learning for Grade IV Elementary School in Chapter 6 My Indonesia is Rich in Culture, very feasible to use (Deasy Fatma Arini, Mursidah Rahmah, 2024).

The third pattern is found in 4 articles, namely Differentiated learning by applying the Problem Based Learning (PBL) Learning Model. The research is Combining the application of differentiated learning with the Problem Based learning (PBL) model in IPAS subjects can improve students' understanding and learning motivation (Erwinda Fitriana, Ana Fitrotun Nisa, 2024). There is a significant difference between students' science learning outcomes before and after the use of differentiated learning strategies with problem-based learning models (Anik Nawati, Yuyun Yulia, 2023). Differentiated learning has been implemented at school by teachers and

teachers are very happy because students are more active and enthusiastic when learning IPAS material (Ismail & Lasari, 2023). Differentiated learning by involving visual and kinesthetic learning styles with PBL steps can improve activity and learning outcomes in the material of the human respiratory system chapter on how the body processes air in grade V students of SDN Sukowati, Kapas District, Bojonegoro Regency (Ryandini Dwi Puspita, Hendrik Pandu Paksi, 2023).

The fourth pattern is the pattern that most teachers apply in differentiated learning in IPAS subjects in elementary schools, namely 8 articles. The pattern used is differentiated learning by applying module design. Eight studies with this pattern, namely teachers design teaching modules including learning planning by mapping learning needs through diagnostic assessments then making teaching modules based on the results of the mapping (Oktavia Nur Hasanah, 2024). Differentiated learning strategies affect the learning outcomes of fifth grade students of SDN Sawah Besar 01 in IPAS subjects (Istiqomah et al., 2024). The implementation of differentiated learning starting with the planning stage including learning style diagnostic tests and cognitive diagnostics, implementation of learning according to learning styles, and evaluation in learning plant body parts in learning IPA stage B grade IV Elementary School is optimal and effective (Kusumaningpuri, 2024). Mapping students' needs through

non-cognitive assessment, designing differentiated learning plans, evaluating and reflecting on learning gives a good impression for students as shown by the increased enthusiasm and enthusiasm of students during learning (Rosiyani et al., 2024). The application of differentiated learning with the steps of designing, implementing, and evaluating learning, can improve students' critical thinking skills (Avandra & Desyandri, 2023). The application of differentiated learning by using three strategies including content, process, and product differentiation can increase the average score and also student activeness in learning, especially in science subjects in elementary school (Miqwati, Euis Susilowati, 2023). The application of differentiated learning in IPAS subjects with the first step is mapping student needs, determining strategies and assessment tools, implementing differentiated learning including content, process, and product, and ending with evaluation and reflection steps, has a positive impact on students and teachers and makes students feel comfortable to learn so that it can improve the learning outcomes of fourth grade students of SD Inpres Labat Kupang City (Nahak, 2023). The implementation of differentiated learning includes three aspects, namely, differentiation of content, process, and product, which can overcome the diverse needs of diverse students (Wahyudi et al., 2023).

The fifth pattern used by teachers in the implementation of differentiated learning in IPAS subjects in elementary schools is differentiated learning by applying learning style grouping. This pattern is found in 2 articles, namely Differentiated learning by forming groups of students according to their learning styles has been proven to be effective for IPAS learning for Grade V students of SD Supriyadi Semarang (Nadwah & Prayito, 2024) and 2) Teachers' difficulties in categorizing the learning style abilities of each learner, limited time

allocation, and constraints on the preparation of facilities and media used (Fitriah & Widiyono, 2023).

The sixth pattern is the utilization of assessment instruments. The pattern of utilization of assessment instruments as an application of differentiated learning is found in one research article, namely the feasibility of using Science Process Skills assessment instruments with differentiated learning design as a tool to measure students' science process skills (Siti Aisah, 2024). The seventh pattern used by teachers in the application of differentiated learning in IPAS subjects in elementary schools is differentiated learning by applying environment-based learning as a learning resource. The article that explains this pattern is Differentiated learning by utilizing the environment as a learning resource can improve science learning outcomes in class IV SD Negeri 2 Kalipetir (Nadia Imti Khaningrum, Sunarti, Daimul Hasanah, 2023).

D. CONCLUSION

Based on the results of research using the Systematic Literature Review (SLR) method, it can be concluded that there are 8 various research methods for differentiated learning of IPAS material at the basic education level. Most research methods use qualitative as many as 13 articles with field research designs (5 articles), followed by qualitative methods of Classroom Action Research designs (4 articles), qualitative methods of case study designs (3 articles), and finally qualitative methods with descriptive analysis designs (1 article). Quantitative methods are also the choice of researchers with experimental designs (2 articles) and correlation designs (1 article). In addition, there are also researchers using the mix-method method as many as 2 articles, each using the ADDIE model R&D design and the instrument development model R&D. There are 7 variants of teacher patterns in implementing differentiated

learning in IPAS subjects in the realm of basic education. The most common pattern is differentiated learning by applying learning design, one of which is teaching modules (8 articles), followed by differentiated learning patterns by applying the Problem Based Learning Model (4 articles), differentiated learning patterns by applying learning style groupings (2 articles), and patterns that have one article each, namely the application of humanistic learning theory, applying IT utilization, applying assessment instruments, and applying environment-based learning as a learning resource. The variety of methods and patterns used by teachers in implementing differentiated learning in IPAS subjects in basic education shows the varying levels of teacher ability and understanding of the concept of differentiated learning. This is interesting to study more deeply in order to achieve a common understanding in the implementation of the independent curriculum so that it is hoped that differentiated learning can be implemented, namely learning that is tailored to meet the needs of students according to their respective characters.

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