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Analysis of Students Ecological Intelligence through Differentiated Learning in Social Studies Subjects at Elementary School

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Abstract. This research aims to analyze students' ecological intelligence through differentiated learning in Social Studies (IPS) subjects in elementary schools. This research uses the Classroom Action Research (PTK) method which is carried out in class V of elementary school. The research subjects consisted of 36 students, with a focus on implementing diverse learning strategies to accommodate various student learning styles. Data was collected through observation, interviews and ecological intelligence tests. The research results show that the application of differentiated learning can significantly increase students' ecological intelligence. These findings indicate that diverse learning approaches can create learning environments that are more inclusive and responsive to student needs, thereby fostering a better understanding of ecological issues. The results of the research that has been carried out are getting improvement from cycle 1 to cycle 2. It can be said that theimplementation of the differentiation learning approach through the PBL model can be said to be successful. It is hoped that this research can become a reference for educators in developing more effective learning methods in the future.

Keywords: Social Studies, Ecological Intelligence, Differentation

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INTRODUCTION

In this modern era, environmental challenges have become increasingly urgent. Climate change, pollution, deforestation and biodiversity loss are some examples of problems that require immediate attention and action from various parties, including in the field of education (Bangay & Blum, 2010; Novacek, 2008). The importance of education plays an important role in shaping the sikaoof the younger generation towards the environment (Agbedahin, 2019; Ma, 2024; Robina-Ramírez et al., 2020; Wang & Degol, 2016). Therefore, ecological intelligence is thekey to facing this challenge. Ecological intelligence, which includes a deep understanding of the relationship between humans and the environment and the ability to make sustainable decisions, must be instilled through the education process (Rahayu, 2018).

The importance of education in shaping a young generation's thinking and behavior towards the environment. By introducing ecological concepts early on, students can develop awareness and responsibility for the environment. This view is in line with the thinking of philosopher Paula Freire regarding efforts to raise public awareness of the environment through education (Muhaimin, 2015). This awareness is not only limited to theoretical knowledge, but also includes a practical understanding of how daily actions can affect ecological balance (Eliana, 2023). For example, students can be taught about the importance of recycling, waste management (Wahyuni, 2017), energy saving, and

protection of natural habitats, all of which contribute to reducing negative impacts on the environment (Zuhriyah, 2023).

In addition, increasing ecological intelligence through learning is an effective method to increase students' concern for the environment so as to reduce environmental damage. We can see many environmental problems that occur in Indonesia such as forest fires, landslides and floods caused by people not protecting their environment (Rohmadi, 2023). When individuals understand the ecological consequences of their actions, they are more likely to make environmentally responsible choices. For example, they may choose environmentally friendly products, reduce the use of single-use plastics, reforest or participate in green initiatives. These decisions, if taken collectively, can have a significant impact in reducing pressure on our ecosystems (Duvall & Zint, 2007).

Learning that focuses on ecological intelligence also develops critical thinking andcreative solutions. Environmental challenges are often complex and require innovativeapproaches to solving them. By integrating learning that encourages students to think critically about environmental issues, we can help them develop the skills to analyzeproblems, evaluate various solutions and implement the most effective ones. For example, school projects that involve analyzing the environmental impact of human activities in local communities can provide practical experience in ecological problem solving (Rohmadi, 2023).

Instilling sustainability values is also one of the important benefits of enhancing ecological intelligence through learning. These values include respect for nature, responsibility towards future generations, and commitment to conserving natural resources.When these values are deeply embedded in students, they are more likely to apply them in their daily lives and influence those around them to do the same (Habibah, 2023). In addition, increasing ecological intelligence through learning is also in accordance with Permendikbud No. 22 of 2016 which regulates the education process at the primary and secondary levels which emphasizes the importance of character education and environmental awareness. This regulation is implemented in curriculum 13 which integrates the environment in subjects.

Ecological intelligence, a concept introduced by Daniel Goleman in his book "Ecological Intelligence" (2009), refers to an individual's ability to understand the impact of human actions on the environment as well as the ability to make sustainable decisions. Social Studies, with its various branches such as geography, sociology and anthropology, plays an important role in developing this ecological intelligence. Social studies not only provides knowledge about the interactions between humans and the environment, but also instills values,analytical skills and attitudes that support sustainability.

By implementing learning approaches that enhance ecological intelligence, we can ensure that students not only meet the set educational standards, but are also prepared to face future environmental challenges. Preparing future generations for global challenges is also an important reason to enhance ecological intelligence through learning (Noverita, 2022). One effective approach to developing ecological intelligence is through differentiated learning. Differentiated learning is a teaching method that customizes content, processes, products, and learning environments according to the needs, interests, and learning styles of individual students (Khristiani, 2021). This approach allows each student to learn in the way that is most effective for them, increasing their engagement and understanding of the subject matter. In the context of environmental education, differentiated learning can be a very powerful tool to increase students' ecological intelligence.

A differentiated approach is a strategy in education that aims to meet the diverse learning needs of each student. It recognizes that each student has different needs, interests, learning styles and readiness levels, which require different approaches to learning. The main goal of a differentiated approach is to ensure that all students can achieve a high level of success, regardless of their background, abilities or needs.

Carol Ann Tomlinson is a professor of special education and educational leadership at the University of Virginia. She is one of the main experts in the differentiated approach. According to her, the differentiated approach is about understanding students' needs, interests and readiness levels, and then designing learning experiences that meet those needs.

Howard Gardner is a psychologist and author of the book "Frames of Mind: The Theory of Multiple Intelligences." According to Gardner, a differentiated approach can allow teachers to accommodate the diversity of intelligences possessed by students. Teachers can design lessons that recognize and utilize different types of intelligence, such as linguistic, mathematical, spatial, kinesthetic, musical, interpersonal, and intrapersonal intelligence.

A differentiated approach to education offers a number of significant benefits to students, teachers and the education system as a whole. These are some of the key benefits of a differentiated approach.

Meeting Diverse Learning Needs: Every student has different learning styles, readiness levels and needs. A differentiated approach allows teachers to customize learning to suit students' individual needs and interests. This helps ensure that every student can achieve success in learning. By responding to students' individual learning needs, a differentiated approach can increase student engagement in learning. Whenstudents feel that learning is relevant to their lives and interests, they tend to be more motivated to learn and actively participate in the learning process. Each student is unique, with different strengths, weaknesses and backgrounds. A differentiated approach respects the diversity of students by recognizing and responding to their individual differences. It promotes inclusion and equity in the learning environment. By responding to students' individual learning needs, a differentiated approach can help improve academic achievement. When students feel supported in understanding the material, they tend to achieve better results in assessments and exams. A differentiated approach not onlyfocuses on understanding the subject matter, but also on developing important life skills, such as critical thinking, cooperation, communication and problem-solving. This helps students to be ready for real-life challenges. By allowing teachers to respond to students' individual learning needs, a differentiated approach can increase teachers' satisfaction and confidence in teaching. Teachers feel successful when they see student progress and achievement. Implementing a differentiated approach encourages teachers to seek innovative and effective learning methods. This triggers teachers' professional developmentand improves their teaching practices.

The differentiated approach in education involves various components that areorganized based on theories and expert views in the field of education. Here are some important components of the differentiated approach, based on expert thinking and related theories:

1. Identify Individual Needs: Experts like Carol Ann Tomlinson emphasize theimportance of identifying the individual needs of students. This includes understanding the individual's learning style, readiness level, interests, and strengths.
2. Flexibility in Teaching: Constructivism-based theory, as proposed by Jean Piaget, emphasizes the importance of flexibility in teaching. Teachers need to design learning experiences that allow students to construct their ownknowledge through interaction with the material.

3. Curriculum Adjustment: Experts like Howard Gardner, with his theory of multiple intelligences, highlight the importance of paying attention to variations in how students learn and demonstrate their intelligence. A differentiated approachintegrates curriculum adjustments to allow each student to stand out in their strengths and interests.

4. Use of Continuous Assessment: Formative-based assessment theory, as proposed by Paul Black and Dylan Wiliam, emphasizes the importance of continuous assessment to support learning. In a differentiated approach, assessment plays an important role in understanding students' progress and adjusting teaching according to their needs.

5. Collaborative Support: The social theory of constructivism, introduced by Lev Vygotsky, highlights the importance of social interaction in learning. In a differentiated approach, collaboration between students, teachers and peers is key in creating a supportive learning environment.

6. Continuous Reflection and Evaluation: The concept of continuous reflection and evaluation, introduced in reflective learning theory by Donald Schön, is importantin the differentiated approach. Teachers need to constantly reflect on their teaching practices and evaluate their impact on students.

By integrating these components, the differentiated approach creates a learning environment that is responsive to students' individual needs and characteristics, in line withthe underlying thinking and theories.

A differentiated approach to learning involves using a variety of strategies to meet the diverse learning needs of students. Here are some strategies that can be applied in a differentiated approach:

1. Delivering Materials in Different Ways: Teachers can deliver materials in different ways, such as live lectures, group discussions, learning videos, demonstrations, or project-based learning. This allows students with different learning styles to absorb information in a way that is most effective for them.

2. Use of Diverse Learning Resource Materials: Teachers can provide access to different types of learning materials and resources, including textbooks, articles, videos, simulations, and digital applications. This allows students to learn through various media that suit their learning preferences.

3. Selection of Varied Tasks and Activities: Teachers can design tasks and diverse activities to allow students to demonstrate their understanding in different ways. This could include written assignments, oral presentations, collaborative projects, role plays

or practical experiments.Support and Differentiation on Level of Difficulty: Teachers can provide additional support or extra challenge for students based on the difficulty level of the task. For example, students who need additional support can be given extra guidance or reading materials, while more advanced students can be given extra assignments or challenging projects.

4. Differentiated Assessments: Teachers can use different forms of assessment, including written tests, projects, portfolios, group discussions, or creative assignments, to assess students' understanding. This allows students to demonstrate their abilities through various means according to their strengths and interests.

5. Group and Collaborative Work: Encouraging group and collaborative work allows students to learn from each other and utilize their collective strength. Teachers can organize groups based on students' learning needs and provide additional support if needed.

6. Individual and Small Group Approach: Teachers can give individual or smallgroup time to students to provide additional guidance or explain difficult concepts.This allows teachers to give more attention to students who need additional help.

By implementing these strategies, a differentiated approach can create an inclusive and responsive learning environment, allowing each student to develop according to his or her own needs and potential.

In many countries, environmental education has become an integral part of the school curriculum. Challenges such as climate change and biodiversity loss are global issues that require a global response. One of the strategic steps that can be taken to address these challenges is through education that instills ecological awareness from an early age. Elementary school is a very strategic level of education to instill these values andknowledge, because it is at this stage that the character and basic understanding ofstudents begin to form. Social Studies (IPS) in elementary school has an important role in helping students understand the relationship between humans and their environment (Seran, 2023). This subject not only focuses on social and cultural aspects, but alsoincludes an understanding of the environment and ecosystems. Integrating the concept of ecological intelligence in social studies learning can help students develop a deep awareness and understanding of the environment. the importance of protecting and preserving the environment.

However, the challenge is how to teach these ecological concepts in a way that is effective and engaging for students. This is where differentiated learning comes into play. This approach allows each student to learn in the way that works best for them, thereby

increasing their engagement and understanding of the subject matter. Differentiated learning in the context of social studies in primary schools can include various strategies such as environmental projects, case studies, use of media and technology, and interdisciplinary approaches. For example, students can engage in recycling projects, plant trees in the school environment, or make observations of local ecosystems. By tailoring teaching methods based on students' needs and interests, differentiated learning not only makes lessons more interesting but also helps students better internalize ecological concepts (Seran, 2023).

This research aims to explore how differentiated learning can be applied in social studies subjects to improve students' ecological intelligence at SDN 256 Cigondewah Hilir. AtSDN 256 Cigondewah Hilir, the issue of students' low ecological intelligence is a major concern. Initial observations showed that students lacked awareness and deep understanding of environmental issues. This may be caused by teaching methods that are less varied and do not provide space for students to explore and understand environmental concepts in depth. Therefore, it is necessary to conduct research to examine the application of differentiated learning in social studies subjects to improve students' ecological intelligence.

Differentiated learning is expected to help students of SDN 256 Cigondewah Hilir to better understand and appreciate their environment. With strategies tailored to the characteristics of each student, it is expected that they can be more actively involved in the learning process, better understand the material taught, and ultimately develop higher ecological intelligence. This research is important to provide evidence on the effectiveness of differentiated learning in improving students' ecological intelligence and to provide practical recommendations for teachers in implementing this approach in their classrooms. With this background, this study will answer the question of how the implementation of differentiated learning can improve students' ecological intelligence at SDN 256 Cigondewah Hilir. It is expected that the results of this study can make a significant contribution to improving the quality of environmental education in elementary schools.

METHODOLOGY

This research utilizes a classroom action research (CAR) approach as a methodological framework to understand and address specific problems that arise in the context of learning. Action research was chosen because it provides a systematic and reflectiveapproach in responding to learning challenges faced in the classroom context. According toKemmis and McTaggart (1988), Classroom Action Research (CAR) is a systematic effort made by teachers or educational practitioners to improve learning practices in their own classrooms. It involves a continuous cycle of reflection, planning, action and evaluation to achieve significant improvements in the learning process.

In this study, researchers sought to collect data from the field through observation and interviews with participants class V elementary school, focusing on the topics of ecoliteracy, ecopedagogy, and school environmental management. The approach used is qualitative, which aims to develop theories that are partial and have not been able to fully describe the complexity of existing problems (Creswell (2014: 65).

This research was conducted at SDN 256 Cigondewah Hilir with a Class V subject of 36 students. In the classroom action research at SDN 256 Cigondewah Hilir, the researcher will follow the steps in accordance with the methodology. As the main instrument, the researcher will collect data from action activities carried out in cycles, including observations of respondents both in the school environment and in the classroom. Furthermore, the researcher will collect data through interviews, both structured and unstructured, with research informants during the research process. Data from these observations will be supported by a study of documents relevant to the problem or focus of the research, as well as support from theories or statements from experts in the field.

The next step is data presentation, which will take the form of detailed descriptions. After that, researchers will analyze the data that has been collected and processed. The final step is to compile a research report. The use of action research is based on the criteria described by Creswell (2014:135-137), including the importance of research conducted in real-life cases and being contextualized in real time. This shows that the action research approach was chosen because it is in accordance with the characteristics of the research context to be studied, namely the direct school and classroom environment.

RESULTS AND DISCUSSION

The findings of this study resulted in the main discussion, namely the application of differentiated learning to improve students' ecological intelligence at SDN 256 Cigondewah Hilir which was carried out into 2 cycles. The results of each cycle are as follows.

Cycle 1

1. Problem Identification

At this stage, interviews and discussions were held with the principal, class teacher, and grade V students. After the discussion process was carried out, it was known that students' understanding of the concept of ecoliteracy was still low and had difficulty in applying its principles in everyday life.

2. Planning

In the next planning stage, we arrange the things that are needed and can help the learning process to be carried out. This includes developing learning materials that are in accordance with the principles of ecoliteracy, making teaching materials including materials and student worksheets, implementing learning strategies, making learning media and formative assessments and providing the necessary resources.

For the purpose of obtaining research results, student and teacher activity observation instruments and questionnaires for students were also prepared. Facilities needed in this study include laptops, cell phones, computers and the internet. The infrastructure needed isa classroom that is comfortable to use for learning.

3. Implementation

Implementing the action plan that has been developed in the classroom. This involves the implementation of learning materials, the use of different learning strategies to meet the needs of diverse students, as well as monitoring student and teacher responses to the actions taken. At this stage, the learning process was carried out using cooperative *learning* and PBL *learning* models. The first stage students were given motivation and apperception by the teacher followed by the delivery of learning objectives and the use of clasical learning methods. The learning media used were *powerpoint* and *projector.* In this cycle the teacher isstill dominant as a source of information, students listen to the teacher's explanation andthen are given independent assignments by the teacher. This stage also carried out a questionand answer process to find out where the students' understanding had reached. The learningprocess that was carried out was in accordance with the classical learning method used, except that it had not implemented differentiated learning emphasis.

4. Observation and Evaluation

Observers observe the learning process to see how far the effectiveness of lesson planning when applied in the classroom by making notes on the advantages and disadvantages of money can later be used in making decisions whether learning using PBL with a classical approach can improve or not on ecoliteracy material.

5. Reflection

This stage identifies the successes and obstacles encountered during the implementation, with this reflection can find out the shortcomings and advantages of the learning process that has been implemented. After evaluating the learning process carried out, researchers can plan the next plan in cycle 2.

6. Cycle 1 Learning Outcomes

The evaluation in cycle I was attended by all students, namely 36 students. The following is table 1 regarding the evaluation results in cycle 1.

Table. 1 Student Learning Outcomes Cycle 1

Aspects	Description
Number of students who took theevaluation	36 Students
Number of students who completed theKKM	22 Students (61%)
Number of students who did not completethe KKM	14 students (39%)
Highest Score	80
Lowest Score	45

7. Advanced Action

Based on the results of reflection and evaluation, then create learning activities to improve social studies learning using differentiated pedagogics and the application of ecoliteracy at D 256 Cigondewah Hilir.

Cycle 2

1. Planning

The action plan II was prepared based on the results of the analysis of findings andreflection during the activities in cycle I, to get improvements in accordance with the research objectives, namely increasing students' ability to understand the concept of ecoliteracy and the difficulty of applying its principles in everyday life. In addition, there was a change in the

learning approach which was originally classical developed with differentiated learning. Prepare observation sheet of learning implementation and evaluation materials in the form ofquestions to be done by students at the end of the cycle.

2. Implementation

Learners are first conducted a non-cognitive diagnostic assessment for mapping audio, visual and kinesthetic learning styles. After that, students are formed into groups according to learning styles. The action stage is the teacher implementing the learning process according to the lesson plan that has been made using differentiated learning. Beginning with prayer followed by ice breaking. The teacher provides motivation and conveys learning objectives. The teacher asks sparking questions so that students can play an active role in learning. Next, the teacher starts the YouTube show about ecoliteracy material and how to use it in everyday life. Students express their opinion about the content of the video. After that, students are in groups and discuss according to the learning style that has been known at the beginning. At the end of learning, a post test evaluation with multiple choice questions is carried out to measure the learning achievements of students.

3. Observation and Evaluation

Observation activities were carried out during the PBL learning process based on content, process and product differentiation with the host teacher. As for some notes in the observation sheet of cycle II, the application of differentiated learning has gone well. In groups, students are also very enthusiastic because they are grouped with learning styles so that the discussion process is very enthusiastic.

4. Reflection

The results of the reflection on the actions of cycle II include: Teachers have regularly conducted teaching mobility to each group and can communicate learning difficulties experienced by group members by identifying students' learning experiences. Teachers have also provided intensive assistance.

5. Cycle 2 Learning Outcomes

The evaluation in cycle 2 was still the same as cycle 1, namely 36 students. This cycle 2 evaluation is by working on multiple choice questions. Based on the evaluation results, the following data is obtained in table 2.

Table. 1 Student Learning Outcomes Cycle 2

Aspects	Description
Number of students who took theevaluation	36 Students
Number of students who completed the KKM	32 Students (89%)
Number of students who did not complete the KKM	4 students (11%)
Highest Score	100
Lowest Score	75

Through observations, it was found that there was an increase in student interest in learning during the learning process from cycle I to cycle II. The following is a recapitulation of learning outcomes from cycle 1 and cycle 2 which can be seen in table 3.

Table 3. Recapitulation of Student Learning Outcome

Description	Student Frequency	Completion	%	Incomplete Frequency	Students	%
Cycle I	14		61%	22		39%
Cycle II	32		89%	4		11%

There was an increase from cycle I to cycle II from 61% to 89%, this proves that the learning outcomes of students increased by 28% with the implementation of PBL learning with differentiated content, process, product.

The improvement of learning outcomes through differentiated learning with PBL method can be seen as a whole that: 1) Students: There is an increase in interest in learning social studies through differentiated learning with PBL method between cycle I; 2) Students: The fulfillment of learning needs in accordance with their respective learning styles; 3) Students: Increased student interest in learning so that the realization of wellbeing (a sense of comfort and fun in learning); 4) Teacher: Resolved the problem of differentiated learning with PBL method in class V.

CONCLUSION

The results of the research and discussion provide a conclusion that the application of a differentiated learning approach through the Problem Based Learning (PBL) learning model, there has been an increase in student learning outcomes, and the research is considered "successful". This can be seen from the acquisition of cycle 2 results with a completeness of 89%. Therefore, the use of differentiated learning in social studies subjects can increase the ecological intelligence of elementary school students.

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