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Strengthening Students' Spatial Awareness through Eco-Pedagogical Activities: A Case Study at the Kuala Langat Learning Centre, Malaysia

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ABSTRACT

Spatial awareness is essential for developing students' understanding of their environment and strengthening their national identity. This study aimed to enhance spatial awareness among Indonesian migrant students at the Kuala Langat Learning Centre, Malaysia, through an eco-pedagogical approach as a means of fostering love for the homeland. The program involved 23 primary school students and employed several methods: information sessions, question-and-answer discussions, learning assistance, and evaluation. The evaluation results indicated that 78% of students demonstrated improved ability in recognising Indonesian geographical regions, and the average post-activity assessment score increased by 22% compared to the initial test. Furthermore, students' reflective discussions and creative projects (maps and posters) showed stronger ecological awareness and appreciation of Indonesia's cultural and environmental diversity. The eco-pedagogical approach thus proved effective in improving spatial understanding and instilling national values. These findings highlight the potential of experience-based learning to support migrant students in strengthening their sense of identity and patriotism.

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INTRODUCTION

Spatial ability is one of the abilities that is highly needed by humans. Spatial ability is often equated with the ability to read maps, yet spatial ability is not limited to maps alone (Chen et al., 2020). This aligns with Alkouri (2022) statement that spatial ability involves the capacity to mentally generate, modify, and rotate visual images, as well as understand spatial relationships between real and imaginary objects. Many fields of study require the integration of spatial ability, such as Mathematics, Science, Engineering, Geography, Meteorology, etc. Spatial awareness needs to be taught from an early age, particularly in relation to location, direction, or pathways (Phillips et al., 2015). According to Phillips et al. (2015), primary school students need to understand two spatial fundamentals: personal space and public space. Spatial awareness will help students understand the context of "where they are" and "where they are going." These two fundamental questions will ultimately help students think more critically.

Furthermore, the cultivation of spatial awareness has been demonstrated to foster the development of geometric understanding in students (Kusnadi et al., 2023). This assertion aligns with the findings reported by Temple et al. (2020), which indicated that students who have been exposed to learning about space and their place in that environment are more likely to engage with the subsequent study of spatial geometry. The promotion of self-confidence in students is contingent upon their active engagement in spatial awareness-related learning activities (Flynn & Popp, 2016).

Children who have spatial awareness will have a learning style based on their vision; therefore, the learning process that applies the imagination method will encourage students to have good spatial awareness. Imagination is needed in the learning process to create a better learning environment for students (Mahat & Loh, 2024). A common issue often encountered by students at the primary school level is their inability to determine direction effectively, and they also struggle to remember and categorise spatial shapes (Mahat & Loh, 2024). This aligns with Anjarsari (2019) view that students in Indonesia still have low spatial awareness. This low spatial awareness can be addressed if teachers can present an engaging and enjoyable learning process, one of which is through eco-pedagogy.

From a theoretical standpoint, the eco-pedagogical approach proved instrumental in establishing a nexus between spatial learning and ecological awareness, culminating in a profound sense of love for the homeland. This finding aligns with the principles of eco-pedagogy (Rizaq & Azizani, 2024; Yunansah & Herlambang, 2017), which emphasises contextual and participatory learning. Environmental awareness is important because it can encourage individuals to develop better character and awareness of nature (Nada et al., 2021). Especially considering the many environmental incidents caused by humans today, such as haze. Eco-pedagogy is a movement to raise awareness among students to become individuals with greater awareness and skills aligned with environmental conservation (Yunansah & Herlambang, 2017). Environmental awareness education cannot be achieved solely through knowledge transfer; active participation from students in the learning process is necessary to enhance their understanding of environmental awareness.

Based on an analysis of the general conditions, the low level of spatial awareness among students in Indonesia has also become a serious problem faced by Indonesian migrant students in Malaysia. This is reflected in their limited knowledge of Indonesian geography. Initial interviews with the manager of the Indonesian Learning Centre revealed that many migrant students had never visited Indonesia and were actually more familiar with Malaysian locations. Although they hold Indonesian citizenship, their low

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spatial awareness regarding Indonesia shows a weak connection to their homeland. Another challenge is that many students feel more comfortable communicating in Malaysian Malay than in Indonesian, and their use of technology for learning remains limited.

This issue illustrates a research gap: while previous studies have explored spatial awareness and eco-pedagogy in local school contexts, little attention has been given to migrant students who live outside Indonesia and experience identity challenges in addition to educational ones. Addressing the problem of spatial awareness among these students is therefore urgent, as it is directly linked to strengthening their sense of patriotism and national identity. The volunteer team chose SB Kuala Langat, one of 21 Indonesian Learning Centres in Malaysia, as the location for this program. Although relatively small in scale and limited in facilities, the centre represents the broader challenges faced by Indonesian migrant students.

Accordingly, this study aims to examine how eco-pedagogical activities can strengthen spatial awareness and foster love for the homeland among Indonesian migrant students at the Kuala Langat Learning Centre.

METHOD

This community service activity is aimed at strengthening spatial awareness among Indonesian immigrant students in Malaysia who are enrolled at the Kuala Langat Learning Centre so that they maintain a good understanding of Indonesia. This community service activity is carried out in the form of learning assistance with the following stages:

Information, questions and answers, and discussions

This stage is carried out by providing an understanding of the regions of Indonesia that have distinctive characteristics and are often tourist destinations. It is hoped that through this material, students will be more interested in coming to Indonesia or learning more about the regions in Indonesia so that they can increase their spatial awareness. Additionally, at this stage, direct observation activities and interviews are conducted with educators and students at the Kuala Langat Learning Centre to assess their level of spatial awareness and their connection to the surrounding environment.

Learning Assitance

Students were then encouraged to select one or more regions of Indonesia that interested them for deeper study. This flexible approach acknowledged the diverse backgrounds and learning challenges faced by migrant students. Learning materials also integrated eco-pedagogical concepts, linking environmental awareness with love for the homeland. Interactive methods such as map exploration, simple digital tools, and group discussions were employed to engage students actively. This method was chosen because eco-pedagogy encourages contextual learning and spatial reasoning, which previous studies have shown to be effective for fostering both spatial skills and ecological awareness.

Evaluation

To systematically measure the impact of the activities, both qualitative reflections and quantitative assessments were applied. A short pre-test and post-test consisting of 10 spatial-awareness questions

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(e.g., recognising Indonesian regions on a map, identifying directions, and relating places to cultural or ecological features) was administered to all 23 participating students. The pre-test served as a baseline, while the post-test measured improvements after the activities. The results showed an average increase of 22% in student scores, with 78% of students demonstrating better recognition of Indonesian geographical regions. In addition, joint reflections and student-created projects (maps and posters) were used to capture attitudes and ecological awareness. This mixed evaluation ensured that both cognitive gains and affective outcomes could be assessed.

The combination of structured instruction, student-centred learning, and mixed-method evaluation provides a reliable basis for assessing spatial awareness. Although mostly qualitative in nature, the integration of pre-test/post-test instruments offers a systematic measurement tool, thereby strengthening the validity of the findings.

RESULTS AND DISCUSSION

The eco-pedagogical programme at the Kuala Langat Learning Centre involved 23 Indonesian migrant students in grades 1 to 6. A short pre-test and post-test consisting of 10 spatial-awareness questions was administered to measure learning outcomes. The average pre-test score was 46%, while the post-test average increased to 68%, representing a 22% improvement. In addition, 78% of students demonstrated the ability to correctly identify Indonesian regions on maps after the activities, compared to only 39% before.

Qualitative data supported these findings. During discussions and reflections, students articulated stronger recognition of geographical differences between Indonesian regions and their relation to cultural and ecological features. Creative projects such as maps and posters revealed not only geographical knowledge but also recommendations for environmental conservation, demonstrating the integration of spatial awareness with ecological concern.

Activity Preparation

The preparation stage includes a series of steps to ensure the smooth running and success of the programme. Activities carried out include:

Needs Identification: Conducting an initial assessment of the needs of students at the Kuala Langat Learning Centre, including interviews with center managers and observations of the learning environment

This stage began with a preliminary study to understand the conditions and needs of the students at the Kuala Langat Learning Centre. This study was conducted by gathering information about the students' backgrounds, including their ages, educational levels, and social and cultural backgrounds. In addition, an analysis of the learning methods that had been implemented at the centre was conducted to evaluate their effectiveness in improving the students' spatial awareness. To gain a deeper understanding, interviews with the centre's managers are a crucial step in this phase. These interviews aim to uncover information related to the educational goals to be achieved, challenges in the learning process, and specific needs in strengthening students' spatial awareness. Through discussions with the managers, insights are gained into the teaching methods most suitable for the students' characteristics and the potential of the surrounding environment that can be utilised as a learning resource.

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In addition to interviews, direct observations were conducted of the learning environment at Sanggar Guru Kuala Langat to identify factors that could hinder or obstruct the application of eco-pedagogical principles. These observations included an evaluation of available facilities, the accessibility of the learning environment, and student interactions with their surroundings. Observations of spatial patterns in learning activities were also conducted to determine the extent to which students understand and utilise their environment as an integral part of their learning process.

The results of these interviews and observations were then analysed to design a programme tailored to the needs of the students and the conditions of the studio. This analysis resulted in recommendations for an exploration-based learning approach, which not only enhances students' spatial awareness but also instils a love for their homeland through an understanding of their surroundings.

Program Design: Developing eco-pedagogical activities based on strengthening spatial awareness, tailored to the geographical and socio-cultural conditions of the students

This stage aims to develop an eco-pedagogical activity concept that focuses on strengthening the spatial awareness of students at the Kuala Langat Learning Centre. This concept was developed by considering the local geographical and socio-cultural conditions so that the learning material is more relevant and easier to understand (Mandang & Medellu, 2019). In this design, the eco-pedagogical approach is chosen as the primary strategy to connect students with their environment through direct exploration, critical reflection, and the use of local resources as learning media. The designed concept also emphasises the importance of observation-based learning experiences and interaction with the environment, enabling students to understand the interconnections between space, ecosystems, and human activities (Yasida, 2020).

In addition to environmental aspects, socio-cultural factors are also key considerations in the design of this programme. Local values, traditions, and the wisdom of the local community are integrated into the learning methods to strengthen a sense of belonging and love for the environment and the homeland. This programme is designed so that students not only understand spatial concepts theoretically but also apply them in their daily lives, such as reading simple maps, recognising land use patterns, and identifying the potential and challenges of their surrounding environment. With this approach, it is hoped that the programme will provide meaningful and sustainable learning experiences while fostering ecological awareness and pride in their own environment.

Coordination with Partners: Communicate with stakeholders, including studio managers, teaching staff, and local communities, to ensure active involvement in activities

This stage is carried out to ensure the active involvement of various stakeholders in the implementation of eco-pedagogical activities at the Kuala Langat Learning Centre. This coordination includes intensive communication with the centre manager (Mr. Slamet Rebianto), teaching staff, and the local community to build a common understanding of the objectives, benefits, and technical implementation of the programme. During this stage, meetings and discussions are held to align the activity concepts with the needs and capacities of the centre and the community. The centre manager provides insights into the conditions of the students and the challenges they may face, while the teaching staff are involved in designing learning methods that are appropriate for the characteristics of the students.

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In addition, the local community also plays an important role in supporting the success of the programme. Their involvement is not limited to facilitating activities, but also as a source of local knowledge that can enrich the learning experience of students. Through good coordination, it is hoped that synergy will be created between all parties involved so that the programme can run effectively and sustainably. The outcome of this phase is an agreement on role distribution, activity schedules, and implementation strategies that enable all parties to actively contribute to strengthening students' spatial awareness through an eco-pedagogical approach.

Schedule and Logistics Preparation: Determining the schedule of activities, preparing supporting equipment such as stationery, maps, and documentation tools, as well as arranging transportation and accommodation for the implementation team

This stage aims to ensure the smooth implementation of eco-pedagogical activities at the Kuala Langat Learning Centre through careful planning of time, equipment, and operational needs. The schedule is drawn up taking into account the availability of students, teaching staff, and partners involved, so that each session can run effectively without disrupting routine activities at the centre. Scheduling also includes time allocation for environmental exploration activities, reflective discussions, and evaluation sessions to ensure that all designed materials are effectively conveyed.

In addition, this stage also includes logistical preparations, which involve procuring supporting equipment such as stationery, maps, environment-based teaching materials, and documentation tools to record the learning process. The selection and provision of this equipment is tailored to the needs of the activity and the methods that will be used in eco-pedagogical learning. Equally important, arranging transportation and accommodation for the implementation team is also part of this stage to ensure smooth mobility and comfort throughout the activity. With thorough scheduling and logistics planning, it is hoped that the activity will run optimally, support the effectiveness of learning, and provide a memorable experience for the students and all parties involved.

Learning Assitance

This stage is the core of the programme, in which students are directly involved in eco-pedagogical learning.

Opening and Introduction to Concepts: The initial session covers an introduction to the concepts of spatial awareness and eco-pedagogy, as well as the objectives of the activities to be carried out

This stage marks the initial session of the eco-pedagogical activities at the Kuala Langat Learning Centre, aimed at providing students with a foundational understanding of spatial awareness and eco-pedagogy, as well as their connection to daily life. The session began with an introduction between the implementation team, educators, and students to foster an interactive atmosphere and build a sense of community. This stage was conducted on 27 July 2022 at the Kuala Langat Learning Centre. The activity was attended by 21 students from grades 1 to 6 of the primary school. Subsequently, the students were introduced to the concept of spatial awareness, which emphasises the importance of understanding space and the surrounding environment, including how they can observe, recognise patterns, and

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interact with geographical elements around them.

After that, the concept of eco-pedagogy was introduced as an environment-based learning approach that encourages students to critically understand the relationship between humans and nature and contribute to its preservation. This explanation was delivered through interactive discussions, real-life examples, and the use of visual media such as maps and pictures of the surrounding environment. Additionally, students were encouraged to identify various geographical aspects in their environment and how these influence their daily lives. During this session, the primary objective of the activities to be conducted was also explained: to enhance students' spatial awareness while instilling a sense of love for the environment and their homeland. With a strong foundational understanding, it is hoped that students will be more enthusiastic and prepared to participate in the series of activities that have been designed.

Use of Maps and Technology: Using simple maps and technology to help students understand the spatial relationships between regions in Indonesia

The Map and Technology Utilisation Stage aims to help students understand the spatial relationships between regions in Indonesia through an interactive approach using simple technology. This stage was held on 19 and 20 August 2022. In this session, students are introduced to various types of maps, including topographic maps, thematic maps, and digital maps, which are used to identify geographical locations, regional boundaries, and environmental characteristics in Indonesia. Students are encouraged to analyse maps to understand the distribution patterns of natural resources, population density, and other geospatial phenomena that influence community life.

In addition to using conventional maps, this session also utilises simple technologies such as online mapping applications and Google Earth to provide a more in-depth learning experience. Through this technology, students can conduct virtual explorations of various regions in Indonesia, compare environmental characteristics between regions, and understand the concepts of distance, relative location, and interregional connections. This approach not only enhances map-reading skills but also strengthens their spatial awareness on a broader scale. By integrating maps and technology, it is hoped that students will be better able to understand the structure and dynamics of regions in Indonesia and recognise the importance of mapping in daily life.

FIGURE 1. Implementation of learning using analogue maps at SB Kuala Langat

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FIGURE 2. Implementation of learning using simple digital maps at SB Kuala Langat

Discussion and Reflection: Encourage students to share their experiences and insights after the exploration, and discuss how this knowledge can increase their love for their country

This stage is an important session in eco-pedagogical activities that aims to explore the understanding and experiences of students after conducting explorations using maps and technology. In this session, students are invited to share their findings related to spatial relationships in Indonesia, such as differences in geographical conditions between regions, distribution of resources, and environmental factors that affect people's lives. The discussion is conducted interactively, allowing students to express their views, ask questions, and connect their exploration results with their personal experiences and the surrounding environment.

FIGURE 3. Discussion and reflection on learning activities using analogue and digital maps

In addition to sharing experiences, this session also emphasises critical reflection on how understanding space and the environment can strengthen love for the homeland. Students are encouraged to reflect on the importance of preserving the environment, appreciating Indonesia's cultural and natural diversity, and contributing to sustainable development. Through a dialogic approach, students can realise that spatial understanding is not only useful in an academic context but also in daily life to enhance ecological awareness and pride in their homeland. Through these discussions and

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reflections, it is hoped that students will develop a deeper understanding and a more positive attitude toward their environment and nation.

Evaluation

The final stage aims to assess the effectiveness of the programme and provide feedback for future improvements. Activities carried out include:

Creative Project: Students are given the task of creating a map or poster depicting the condition of the surrounding environment and recommendations for environmental conservation based on the results of their exploration

This stage is an applied activity that encourages students to express their understanding in visual form by creating simple maps or posters. This is because they are still in the lower grades of primary school. In this session, students are given the task of illustrating the conditions of their surrounding environment based on their explorations, whether through direct observation or the use of maps and technology. The maps created may include elements such as land use, distribution of natural resources, or the ecological conditions of the local area, while the posters may contain educational messages about the importance of preserving the environment.

In addition to describing environmental conditions, students are also encouraged to include environmental conservation recommendations relevant to the issues they encounter. These recommendations can take the form of concrete action proposals such as reducing plastic waste, greening the surrounding area, or locally-based disaster mitigation efforts. The process of creating maps and posters not only trains students' spatial skills and creativity but also instills critical thinking and environmental responsibility. Their final works will be presented and discussed collectively, enabling students to learn from one another and expand their understanding of the diversity of environmental conditions across various regions. Through this creative project, it is hoped that students will increasingly understand the importance of their role in protecting the environment and cultivate a sense of love for their homeland through concrete actions.

Learning Evaluation: Assessing the creative projects made by students as an indicator of their success in understanding the concepts taught

This stage aims to assess the extent to which students understand the concepts of spatial awareness and eco-pedagogy through the creative projects they have created. The assessment is carried out by examining the accuracy of geographical information, creativity in presentation, and the relevance of the proposed environmental conservation recommendations. Each map or poster created by the students is analysed based on their ability to interpret the surrounding environmental conditions and their capacity to formulate practical and contextual solutions.

In addition to product-based assessment, the evaluation also includes presentation and discussion sessions, where students are asked to explain their work and the reasons behind each element they include. This process provides students with the opportunity to hone their critical thinking and communication skills, as well as reflect on what they have learned (Susanti et al., 2020). Feedback from facilitators and fellow students is also provided to enrich their insights and improve their understanding of spatial relationships and the importance of environmental awareness. Through this evaluation, it is

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hoped that the learning process is not merely theoretical but also impacts students' attitudes and actions in preserving the environment and strengthening their love for their homeland.

Discussions with Stakeholders: Hold evaluation sessions with studio managers and teaching staff to discuss the sustainability of the programme and potential for future development

This stage is an evaluation session involving the studio manager, teaching staff, and implementation team to review the implementation of activities and formulate strategies for program sustainability. During this session, various aspects of the programme are evaluated, including the effectiveness of the eco-pedagogical methods applied, the level of participants' understanding of spatial awareness concepts, and the impact of the activities on enhancing environmental awareness and patriotism. Studio managers and educators also provide feedback on the challenges faced during the activities and suggestions for improvements and future programme development.

This discussion not only focused on evaluating existing programmes, but also discussed the potential for sustainability through the integration of spatial awareness concepts into learning methods at the studio in a more systematic manner. With this session, it is hoped that the programme will not only be a temporary activity, but can continue to be developed as part of the studio's educational strategy, providing long-term benefits for students in understanding the environment and strengthening their attachment to their homeland.

The results indicate that eco-pedagogical methods—through the use of maps, interactive discussions, and creative projects—are effective in improving spatial awareness. The measurable improvement in test scores confirms that structured activities can enhance cognitive understanding of spatial concepts. These outcomes are consistent with earlier findings that spatial awareness contributes to students' ability to think critically about their environment (Kusnadi et al., 2023).

The uniqueness of this study lies in its focus on Indonesian migrant students in Malaysia, a group that faces distinctive challenges in maintaining cultural and national attachment. While previous studies have largely examined spatial awareness within domestic contexts, these findings show that eco-pedagogical strategies can also be effective for diaspora communities.

CONCLUSION

The spatial awareness strengthening activity through an eco-pedagogical approach at the Kuala Langat Learning Centre in Malaysia was implemented systematically, considering the needs of students as well as socio-cultural and geographical contexts. The programme involved 23 students, and the evaluation results showed a measurable improvement: the average post-test score increased by 22% compared to the pre-test, and 78% of students demonstrated better recognition of Indonesian geographical regions. Student-created maps and posters also reflected not only spatial understanding but also ecological awareness and a stronger sense of patriotism. These findings confirm that eco-pedagogical learning—through interactive use of maps, exploration, and reflective activities—effectively enhances students' spatial skills while fostering environmental concern and national identity. The active involvement of teachers, managers, and the local community further strengthened the programme's sustainability and impact.

Nevertheless, it is important to acknowledge the limitations of this study. The sample size was modest, limited to a single learning centre, and the collected data were chiefly descriptive, with only rudimentary pre- and post-tests serving as quantitative indicators. It is recommended that future

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research endeavours focus on expanding the sample size, employing more rigorous measurement tools, and integrating longitudinal studies to examine the sustainability of these outcomes.

The implications of this study are twofold: firstly, in terms of practice, eco-pedagogical strategies can be adopted by Indonesian learning centres abroad to address both cognitive and identity-related challenges among migrant students; and secondly, in terms of research, further studies should refine methods of assessing spatial awareness and explore how eco-pedagogy can be scaled to broader educational contexts.

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