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Communication Strategy of Social Studies Teachers in Integrating Climate Change Issues in Semarang

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Abstract

This study examines how Social Studies teachers in Semarang, Indonesia, frame and communicate climate change issues through the lenses of environmental communication and ecopedagogy. Drawing on a structured online survey of 116 I teachers from Musyawarah Guru Mata Pelajaran Ilmu Pengetahuan Sosial Semarang, the research identifies four perceptual constructs: awareness, knowledge, perception, institutional responsibility, and self-efficacy. It classifies the topics teachers choose into pragmatic mitigation measures or constitutive identity - building issues and their strategies, e.g., class discussions, project-based learning, visual media, and policy advocacy. Descriptive analyses show that while teachers recognize climate change and its future risks (means ⩾ 4.18/5), they tend to favor conventional, one-way informational methods alongside participatory projects. By mapping these practices onto Kahn's three-dimensional ecopedagogy, cosmological, technological, and organizational, the study reveals both strengths in building planetary consciousness and gaps, including overreliance on deficit-model framing and limited cultural contextualization. The findings underscore the need for IPS curricula to integrate deliberative, community-centered pedagogies and professional development that apply critical, context-sensitive ecopedagogical practice.

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INTRODUCTION

Climate change has become one of the most pressing global issues that systemically affects environmental, social, and economic aspects(Klein, 2014; Thompson, 2010; WHO, 2023). In education, this issue is not only a topic of scientific discussion but also the realm of formal curriculum(Facer et al., 2020; Monroe et al., 2019). Through the Merdeka Curriculum, the Indonesian government places climate change as one of the three priority issues schools must integrate across subjects, including Social Studies (Kurniawan et al., 2024). As a discipline that examines the relationship between humans and the environment in social, economic, and political contexts, social studies is a strategic space to build students' climate literacy critically and contextually(Septiani, 2024).

The emphasis on education for sustainability is also on the global agenda. UNESCO (Michelsen & Wells, 2017), through The Decade of Education for Sustainable Development, emphasizes that education should encourage behavioral changes to create a more environmentally, economically, and socially sustainable future. In this context, students need to be equipped with factual knowledge about environmental issues, critical skills, ecological empathy, and the capacity to act.

Several empirical studies have shown that the integration of sustainability concepts into the school curriculum has a positive impact on increasing students' environmental awareness and behavior (Frank & Ricci, 2023). A bibliometric study by Gulzar et al. (2023) revealed that most research in the field of sustainability consciousness still focuses on students as the main subject, while the role and strategies of teachers, especially in the context of secondary education, have not been systematically explored. Meanwhile, Almeida et al. (2018) emphasized the importance of teachers' professional identity in the success of education for sustainability, including how teachers build their communication strategies in the classroom.

Research in Indonesia also shows that some teachers have indirectly applied ecopedagogy principles, for example, by linking learning materials with local environmental issues or implementing project-based learning that emphasizes real action (Anggawirya et al., 2023). The study of Maulidah et al.(2021) added that learning through natural experiences can develop students' eco-literacy and form adaptive, emotional, and social skills. Meanwhile, Adnyana et al. (2023) emphasized that environmental education or sustainable education teaches conservation and changes how students think and act toward the surrounding environment.

Integrating climate change education in social studies learning requires adjusting the content and transforming the pedagogical approach and communication strategies teachers use (Newsome et al., 2023). In this case, the ecopedagogy approach offers a conceptual framework emphasizing the importance of ecological awareness, social justice, and collective action in education. Ecopedagogy departs from the critique of transmissive and market-oriented education models towards a participatory, reflective, and sustainability-oriented learning paradigm. The principles of ecopedagogy emphasize a just relationship between humans and nature, empowerment through action, and critical dialogue that involves understanding the local context (Norat et al., 2016).

Although many studies show the importance of integrating environmental education into the curriculum, empirical studies in Indonesia still focus on student literacy. In contrast, how social studies teachers systematically design communication strategies to teach climate change has not been widely explored. Social studies, as a discipline that studies human-environment interactions in social, economic, and political contexts, has the potential to be a strategic space for sustainability action.

The ecopedagogy framework offers a solution by emphasizing three cosmological, technological, and organizational dimensions that critically incorporate systemic understanding, green innovation, and collective dialogue(Kahn et al., 2010). The urgency of ecopedagogy in the social studies context lies in its ability to foster planetary consciousness while equipping teachers and students with the practical and collaborative skills needed to face the challenges of climate change. Thus, there is a need for research that examines the practices of social studies teachers through the lens of ecopedagogy and environmental communication.

Research Questions

1. How do social studies teachers in Semarang perceive climate change, including awareness and knowledge, perceived impact, institutional responsibility, and self-efficacy?
2. What climate change issues are selected, and how do teachers classify them into pragmatic and constitutive functions?
3. What communication strategies do social studies teachers use to integrate climate change into learning, and how does this reflect the dimensions of ecopedagogy?

Based on the background and problem formulation, this study aims to explore social studies teachers' communication patterns and strategies for integrating climate change issues in learning in Semarang. The ecopedagogy approach is used to emphasize that educational communication is not just a transfer of information but also a dialogic, participatory, and reflective process oriented towards ecological awareness and responsibility.

METHOD

This study uses an exploratory, descriptive quantitative approach to examine the communication strategies used by social studies teachers in discussing climate change issues in the classroom. This approach was chosen because it allows researchers to describe general patterns, variations, and trends in learning practices in various schools.

The research subjects comprised 116 junior high school social studies teachers in Semarang who are members of the social studies subject teachers' association called Musyawarah Guru Mata Pelajaran Ilmu Pengatahuan Sosial (MGMP IPS). Respondents were selected through random sampling from the list of MGMP IPS members to ensure representativeness and reduce selection bias. Semarang was chosen as the research site because it is a coastal urban area that is geographically directly affected by climate change, such as tidal flooding, rising temperatures, and changing rainfall patterns, making it an important context for integrating environmental education.

The instrument used was an online questionnaire developed based on indicators from the National Survey on Climate and Environmental Education in K-12 Classrooms by the North American Association for Environmental Education (NAAEE, 2022). The instrument was adapted to the context of Indonesia's national curriculum and developed to measure several aspects of:

1. Teachers' beliefs and knowledge on climate change issues,
2. Climate change issues discussed in social studies learning,
3. Communication strategies and forms of activities used,

Data was collected by distributing a Google Forms online questionnaire form in November 2024. In addition to closed quantitative data in the Likert scale and multiple choice, the questionnaire also included open-ended questions to explore teachers' practices in more depth. The collected data were analyzed descriptively using frequencies, percentages, and cross-tabulations to describe teachers' communication patterns in conveying climate change issues.

RESULT AND DISCUSSION

The results of this study show that social studies teachers in Semarang have developed various communication strategies for conveying climate change issues to students in the classroom. This finding reflects the growing ecopedagogical awareness among educators and how education for sustainability practices is applied contextually according to local environmental challenges.

Result

In detail, the research results are divided into three main findings that represent important dimensions of the integration of climate change education in social studies learning, namely social studies teachers' perceptions of climate change, climate change issues discussed in learning, and communication strategies used by teachers. These three findings provide a comprehensive picture of the pedagogical approach chosen by teachers in responding to environmental issues.

1. Social studies teachers' perception of climate change

In this study, social studies teachers' perceptions were divided into four perception constructs. Awareness and knowledge examine the belief that climate change is real and caused by

human activities. Perceived impact is the teacher's assessment of the magnitude of the climate change risk for students' future. Institutional responsibility assesses teachers' belief in the important role of schools in climate change education. Self-efficacy measures teachers' confidence in discussing climate change issues in learning. These four constructs describe teachers' readiness to integrate climate change into social studies learning.

The results seen in Table 1 show that social studies teachers generally strongly agreed with the statements, with the highest mean scores for Perceived Impact (4.42; SD 0.87) and Awareness and knowledge (4.40; SD 0.70). While institutional responsibility also received a high mean (4.18; SD 1.01), the variation was greater, indicating the need for further support to strengthen school commitment. Self-efficacy came in at a mean of 4.23 (SD 0.92), indicating that most teachers feel relatively confident, although a small number still need to improve their capabilities.

Table 1. Descriptive Statistics Distribution Table of Social Studies Teachers' Perception of Climate Change Constructs

Constructs	Mean	Std Dev
Awareness & Knowledge	4.40	0.70
Perceived Impact	4.42	0.87
Institutional Responsibility	4.18	1.01
Self-Efficacy	4.23	0.92

2. Climate Change Issues in Learning

To understand how social studies teachers in Semarang communicate climate change issues, the findings of this study are grouped into two main functions, namely the Pragmatic Function, which emphasizes encouragement for concrete actions in mitigation and adaptation, and the Constitutive Function, which focuses on shaping students' ecological awareness and identity (Pezzullo & Cox, 2018). Both functions are then analyzed through three dimensions of ecopedagogy. The Technological Dimension highlights the critical evaluation of destructive technologies and the promotion of green solutions through active student participation. The Cosmological Dimension builds planetary consciousness by presenting a thorough understanding of the interconnectedness of earth systems from local to global scales. The Organizational Dimension encourages collective dialogue between schools, communities, and policymakers to strengthen collective action in the face of climate change challenges.

The research results in Table 2 show climate change issues discussed by social studies teachers in Semarang and divided into two communication functions: pragmatic and constitutive. The pragmatic Function includes issues encouraging concrete actions such as renewable energy, tree planting, recycling and composting, energy saving, and green technology research that places students as actors in environmental mitigation. The constitutive Function includes issues that foster ecological awareness and identity, including extreme weather changes, global temperature rise, air pollution, tidal flooding, and environmental policy advocacy that positions students as concerned ecological citizens.

Table 3. Classification Table of Climate Change Issues in Learning

Dimensions of Ecopedagogy	Pragmatic Function (%)	Constitutive Function (%)
Technological	– Renewable energy – Tree planting and forest maintenance – Recycling and composting – Energy saving	

– Green research & innovation	
Cosmological	– Global temperature and ice melt – Extreme weather – Sea level – Species extinction – Monsoon & rain patterns – Disease spread – Ocean acidification – Coral reefs – Air pollution – Crop decline – Tidal flooding – Local rain patterns – Abrasion & mangroves – Heat waves – Mount Ungaran ecosystem – Vehicles & pollution
Organizational	– Environmental awareness campaign – Eco-friendly policy support – Lack of green open space in Semarang

The results in Table 3 show that, technologically, teachers not only present issues about criticism of technology being destructive but also introduce clean and participatory solutions through mitigation projects. In the cosmological dimension, the presentation of global-local issues (temperature, sea level, extreme weather) builds planetary consciousness and a systemic understanding of ecosystem linkages. As for the organizational dimension, teachers facilitate collective dialogue between schools, communities, and policymakers through awareness campaigns, policy support, and green open space advocacy in line with ecopedagogy principles that emphasize social transformation through education.

Table 3. Frequency Table of Climate Change Issues in Learning

No.	Related Issues	n	Percentage (%)
1.	The increase in global temperature causes the melting of polar ice caps.	54	46,55%
2.	Changes in extreme weather such as storms, floods, and droughts.	70	60,34%
3.	Sea level rise threatens coastal areas.	52	44,83%
4.	Species extinction due to loss of natural habitat.	40	34,48%
5.	Disruption of seasonal patterns that affect agriculture.	51	43,97%
6.	The spread of diseases due to climate change affects ecosystems.	37	31,90%
7.	Ocean acidification is due to increased CO2 levels in the atmosphere.	15	12,93%
8.	Coral reef destruction impacting marine biodiversity.	39	33,62%
9.	Decreased air quality due to pollution from burning fossil fuels.	42	36,21%
10.	Declining crop yields that threaten global food security.	42	36,21%
11.	Reduce greenhouse gas emissions by using renewable energy.	37	31,90%
12.	Planting trees and maintaining forests to absorb CO2.	54	46,55%
13.	Reducing the use of single-use plastics to reduce waste.	49	42,24%
14.	Encouraging the use of public transportation and electric vehicles.	47	40,52%
15.	Reduce meat consumption to lower emissions from livestock.	6	5,17%
16.	Better manage waste through recycling and composting.	54	46,55%
17.	Saving energy by using energy-efficient appliances.	48	41,38%
18.	Organizing environmental awareness campaigns in the community.	33	28,45%

19.	Support environmentally friendly government policies.	43	37,07%
20.	Research and technological innovation for green solutions.	18	15,52%
21.	Increasingly frequent tidal flooding in the coastal areas of Semarang.	45	38,79%
22.	Changes in rainfall patterns that affect agriculture in areas around Semarang.	28	24,14%
23.	Mangrove destruction reduces natural protection against abrasion.	32	27,59%
24.	Temperature rises in Semarang, which causes heat waves.	33	28,45%
25.	Decreased air quality due to pollution from vehicles and industries.	46	39,66%
26.	Ineffective waste management in some areas.	42	36,21%
27.	Clean water crisis in the dry season due to decreased rainfall.	43	37,07%
28.	Ecosystem damage around Mount Ungaran due to human activities.	24	20,69%
29.	Increase in the number of motorized vehicles that cause pollution.	59	50,86%
30.	Lack of green open space in the center of Semarang.	42	36,21%

3. Communication Strategies Used by Social Studies Teachers

Communication strategies play a central role in the learning process, especially in conveying complex issues such as climate change. The results of this study show that social studies teachers in Semarang adopt various communication strategies that are interactive, participatory, and contextual to link the subject matter with students' real lives. This shows a trend that aligns with the principles of ecopedagogy, which encourages critical awareness and collective action through an empowering approach.

Social studies teachers in Semarang apply various complementary communication strategies to teach climate change issues. Class discussions and debates create dialogic spaces that encourage critical thinking, while presentations provide a structured conceptual framework before students explore the topic further. Using visual and digital media such as posters, documentaries, blogs, vlogs, and educational apps enriches material delivery with visual elements and opens up opportunities for independent learning outside the classroom. Involving students in environmental campaigns and collaborations with NGOs positions them as agents of change in society, while collaborative assignments and long-term projects, case studies, and mini-constructions to research and journaling hone cooperation skills and analytical thinking. Integrating gamification elements through interactive quizzes, educational games, and simulations increases motivation while deepening understanding of concepts. Essay writing provides a space for students to reflect on their understanding of writing, while lab experiments and field trips connect theory with empirical experience. By combining these methods, teachers can customize their communication approach according to student characteristics and the complexity of climate change issues, making the learning process richer, more contextual, and transformative.

Table 3. Frequency Table of Teachers' Communication Strategies

No.	Communication Strategy	n	Percentage (%)
1.	Class discussion	100	97,1
2.	Presentation	89	86,4
3.	Poster Making	85	82,5
4.	Environmental Campaign	83	80,6
5.	Collaborative Task	80	77,7
6.	Case Study	65	63,1
7.	Interactive Quiz	60	58,3
8.	Educational Games	55	53,4
9.	Documentary Movie	53	51,4
10.	Mini Construction Project (ecobricks, etc.)	48	46,6
11.	Debate	35	33,9
12.	Essay Writing	27	26,2
13.	Blog or Vlog	22	21,4
14.	Simulation	16	15,5

15.	Research Project	13	12,6
16.	Field Trip	9	8,7
17.	Journal Project	6	5,8
18.	Science Experiment	3	2,9
19.	Collaboration with NGOs	1	1,0
20.	Application Development	0	0

This data shows that social studies teachers tend to prefer communicative, visual, and easy to implement in the classroom, such as discussions and posters, compared to high-tech approaches or limited external collaboration.

Discussion

The research findings confirm that social studies teachers in Semarang have applied ecopedagogy principles in three dimensions: cosmological, technological, and organizational, as defined in the ecopedagogy movement that emphasizes planetary consciousness, critique and innovation of green technology and collective dialogue between schools, communities, and policymakers. In the cosmological dimension, teachers make global-local issues (temperature, sea level, tidal flooding) a means of building systemic understanding; in the technological dimension, they encourage pragmatic solutions (renewable energy, recycling, mitigation projects) that hone students' skills in resource governance; and in the organizational dimension, through awareness campaigns and policy advocacy, teachers facilitate institutional collaboration and responsibility. Thus, social studies learning in Semarang transfers knowledge about climate change and equips students with analytical, procedural, and normative abilities to actively participate in sustainability efforts as outlined by the social studies goal of creating capable and environmentally concerned citizens.

Although the findings of this study reveal various positive ecopedagogical practices, such as building planetary consciousness, encouraging technological engagement, and promoting collective dialogue, from the perspective of environmental communication and critical ecopedagogy, several potential negative implications warrant critical attention. First, from an environmental communication perspective, the predominantly informative and pragmatic approach has the potential to be trapped in the information deficit model, which assumes that the more facts given to students, the more students will automatically act. Research shows that excessive framing of scientific data can lead to "echo chambers" and confirmation bias, so climate discussions reinforce existing beliefs rather than encourage attitude change. Reliance on one-way communication strategies (e.g., posters and videos) without adequate feedback mechanisms can also lead to message fatigue and apathy among students.

Secondly, from an ecopedagogy perspective, there is a concern that the uniform application of Freirean principles may ignore the local cultural context and traditional knowledge of the people of Semarang. For example, mitigation projects such as eco-bricks or eco-campaigns, if not culturally appropriated, risk becoming merely symbolic activities without profound transformation of socio-economic structures.

Third, there is a risk of pedagogical tokenism, where teachers only adopt a few interactive strategies without integrating ecopedagogy holistically. Data on the low use of simulations and research projects indicate a tendency to choose easy methods while developing critical thinking capabilities and policy advocacy is still limited.

Fourth, from an organizational perspective, campaigns and policy advocacy without coordination across institutions can waste energy and resources. Without real support from schools and local governments, such as policies on urban green spaces or integration of climate issues into the School Work Plan, teachers' initiatives are vulnerable to stalling at the level of classroom projects without sustainable impact. Overall, to minimize these negative implications, a more critical and contextual ecopedagogy approach is needed, as well as dialogical and reflexive environmental communication strategies, for example, using more holistic methods, community

participation, and integration of local knowledge so that social studies learning about climate change is genuinely transformative.

CONCLUSION

The conclusion of this study confirms that social studies learning in Semarang has moved beyond simply conveying scientific facts about climate change, with teachers successfully applying ecopedagogy principles such as building systemic awareness (cosmological), encouraging green technology-based solutions (technological), and facilitating collaboration between schools, communities, and policymakers (organizational). This approach not only strengthens students' understanding of global-local linkages and the impacts of human activities but also equips them with analytical, procedural, and normative skills to actively contribute to sustainability efforts.

On the other hand, important caveats emerge from the perspective of environmental communication and ecopedagogy critiques, such as the dominance of the "information-deficit" model, which has the potential to cause message fatigue without guaranteeing attitudinal change. At the same time, adopting mitigation strategies without contextualizing local culture may end up as symbolic rituals, and the tendency for partial pedagogical practices suggests the risk of curriculum tokenism. Without adequate institutional support - whether in social studies curriculum revision, ongoing teacher professional development, or cross-sector partnerships - this initiative will likely stop at the level of a classroom project without long-term impact.

Therefore, in the future, the social studies curriculum can be redesigned so that the issue of climate change becomes a cross-curricular theme accompanied by learning methods that prioritize active discussion and community participation. At the same time, educational institutions need to strengthen networks with stakeholders to ensure the sustainability of collective action. Further research should measure the long-term effects of ecopedagogy on students' environmentally friendly behavior and explore the role of traditional knowledge in the local-rural context so that social studies learning truly becomes a motor of transformative social-ecological change.

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