EXPLORING RURAL INDONESIAN STUDENTS' AWARENESS AND UNDERSTANDING OF CLIMATE CHANGE THROUGH ENGLISH EDUCATION

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Abstract

This study examines students' awareness and understanding of climate change through English language learning in a rural senior high school. Using a descriptive quantitative design, 200 students from grades X–XII at SMA Negeri 1 Jejawi completed a 15-item Likert-scale online questionnaire. Data were analyzed using mean scores and standard deviations. Results show that students have a relatively high level of awareness, especially regarding climate change as a global issue, its human causes, and environmental impacts presented in English materials. However, their understanding varies, particularly in higher-order skills such as distinguishing climate from weather, summarizing solution-based texts, and expressing opinions in English. Overall, while English learning supports awareness, greater instructional support is needed to enhance deeper conceptual understanding in rural EFL contexts.

Keywords: *awareness; climate change education; English language teaching; rural EFL context: understanding*

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Introduction

Climate change has become a critical global issue that increasingly intersects with educational practices. Education plays an essential role in developing students' climate literacy, which includes both awareness of environmental issues and understanding of the scientific concepts underlying climate change. However, these two dimensions are not always developed equally, particularly in rural school contexts where access to learning resources and exposure to global issues are often limited (Marquette, 2023).

Within school curricula, English Language Teaching (ELT) offers a strategic pedagogical lens for integrating climate change topics. English learning materials commonly address global issues through reading texts, discussions, listening activities, and writing tasks, allowing students to encounter climate-related content while developing language skills (Hasrina et al., 2025). In this context, awareness refers to students' exposure-based recognition of climate change topics, terminology, and relevance through English learning, whereas understanding involves deeper conceptual and cognitive processing, such as explaining mechanisms, interpreting texts, and articulating ideas in English.

Previous studies have shown that integrating environmental issues into ELT can enhance students' environmental awareness and engagement (Putri et al., 2024; Silvhiany et al., 2023). Nevertheless, most existing research focuses on instructional approaches or material development, with limited attention to student learning outcomes measured quantitatively. Moreover, few studies explicitly distinguish awareness from understanding, particularly in rural Indonesian EFL contexts. Therefore, this study addresses these gaps by providing quantitative evidence on both constructs while clearly differentiating awareness and understanding. It contributes to the

literature by offering empirical insights into climate change learning outcomes in a rural EFL context, an area that remains underexplored.

SMA Negeri 1 Jejawi Ogan Komering Ilir is a rural high school situated near agricultural areas and river basins vulnerable to climate change impacts. Despite this contextual relevance, students' awareness and understanding of climate change through English language learning at this school have not been systematically examined. Therefore, this study aims to explore and differentiate students' awareness and understanding of climate change through ELT. The novelty of this study lies in its explicit distinction between awareness and understanding as separate constructs measured quantitatively, as well as its focus on a rural Indonesian EFL context, which has received limited empirical attention. By doing so, it contributes new empirical evidence to climate change education research in underrepresented rural settings.

Research Methodology

This study employed a descriptive quantitative survey design to examine students' awareness and understanding of climate change through English language learning. The design was appropriate because the research questions focused on determining levels of awareness and the extent of understanding, which require numerical measurement rather than experimental manipulation (Creswell, 2013; Miksza et al., 2023). Understanding was operationalized as students' self-reported conceptual comprehension derived from English texts and tasks, rather than as performance on a cognitive achievement test.

The participants consisted of 200 students from grades X to XII at SMA Negeri 1 Jejawi, a rural public high school in Ogan Komering Ilir, Indonesia. The school was selected due to its rural context and students' close proximity to climate-vulnerable environments, such as agricultural land and river basins, which makes it relevant for examining climate change issues through English language learning. The sample size was determined based on the Krejcie & Morgan (1970) table for a population of approximately 400 students, supported by recent methodological studies on adequate sample size in survey research (Memon et al., 2020; Taherdoost, 2017). The participants were selected using simple random sampling, a technique that gives every student an equal chance of being chosen, thereby minimizing selection bias and ensuring that the sample fairly represents the population. This method is widely recommended in educational survey research when a complete sampling frame is available, as it enhances external validity and supports the generalizability of the findings (Creswell, 2013; Fraenkel et al., 2012).

The data obtained from the questionnaire was analyzed using descriptive statistics to describe the level of awareness and understanding of students regarding climate change issues through English language learning. The analysis was conducted by calculating the mean and standard deviation for each item and each construct. This approach was chosen because the study aimed to map the actual conditions of students without manipulating variables, so descriptive statistics were considered most appropriate for answering research questions based on "how aware" and "to what extent" (Creswell, 2013; Miksza et al., 2023).

Before descriptive analysis was performed, the validity and reliability of the instrument were tested to ensure data quality. Item validity was tested using Pearson Product Moment correlation by correlating the score of each item with the total score of its construct. With a total of

200 student respondents, the r-table value at a significance level of 0.05 was 0.138. The analysis results showed that all items in the awareness aspect (items 1–7) and understanding aspect (items 8–15) had correlation coefficients above the r-table and were significant ($p < 0.05$), so all items were declared valid and suitable for further analysis (Field, 2018).

The reliability of the instrument was tested using Cronbach's Alpha to assess internal consistency between items. The test results showed that the awareness scale had an Alpha value of 0.788 and the understanding scale had a value of 0.807, while the overall instrument obtained an Alpha value of 0.879. These values indicate good to very good reliability, considering that an Alpha coefficient ≥ 0.70 is considered adequate in questionnaire-based educational research (Tavakol & Dennick, 2011).

For the purposes of interpreting the results, the mean scores were classified into three categories, namely low (1.00–2.33), medium (2.34–3.66), and high (3.67–5.00). These categories were used to interpret students' awareness and understanding levels more systematically and consistently with analysis practices in educational survey research (Boone & Boone, 2012). These criteria formed the basis for discussing the findings, particularly in identifying the pattern that students' awareness levels tended to be higher than their conceptual understanding levels.

Findings

This section reports the findings of the study based on quantitative data obtained from a Likert-scale questionnaire administered to 200 students at SMA Negeri 1 Jejawi, OKI. Descriptive statistics were used to examine students' awareness and understanding of climate change through English language learning.

Table 1 presents students' responses regarding their awareness of climate change through English language learning. Overall, students demonstrated a moderate to high level of awareness. A large proportion of respondents agreed or strongly agreed that climate change is a global issue frequently introduced in English learning materials and that human activities, such as fossil fuel use and deforestation, are discussed as major causes. Students also perceived English learning as a meaningful medium for increasing awareness of global and local environmental issues. However, familiarity with specific climate-related terminology appeared more moderate, indicating uneven depth of exposure across students.

Table 1. *Students' Awareness of Climate Change through English Language Learning (N = 200)*

No.	Statements	SA n(%)	A n(%)	N n(%)	D n(%)	SD n(%)
1	I am aware that climate change is a global issue that often appears in English learning materials.	97 (48.5)	30 (15.0)	42 (21.0)	11 (5.5)	20 (10.0)
2	I have read or heard about climate change through texts, dialogues, or activities in English lessons.	44 (22.0)	29 (14.5)	56 (28.0)	38 (19.0)	33 (16.5)
3	I recognize that human activities such as burning fossil fuels are discussed as causes of climate change in English materials.	97 (48.5)	37 (18.5)	34 (17.0)	11 (5.5)	21 (10.5)
4	I realize that human activities such as deforestation are linked to climate change in English readings or discussions.	112 (56.0)	32 (16.0)	27 (13.5)	9 (4.5)	20 (10.0)
5	I feel that English learning helps me become more aware of global environmental issues.	69 (34.5)	34 (17.0)	57 (28.5)	21 (10.5)	19 (9.5)

6	I am familiar with climate change-related terms such as *global warming*, *carbon footprint*, or *climate action* from English materials.	53 (26.5)	41 (20.5)	54 (27.0)	29 (14.5)	23 (11.5)
7	I realize that the impact of climate change on my surrounding environment has been discussed in English materials or assignments.	117 (58.5)	32 (16.0)	25 (12.5)	13 (6.5)	13 (6.5)

These results indicate that English language learning functions effectively as an exposure-based medium for raising students' awareness of climate change, although the depth and consistency of such exposure vary across different aspects of awareness.

Table 2 further summarizes the descriptive statistics of awareness items. The mean scores ranged from 3.07 to 4.14, reflecting generally high awareness levels, particularly for items related to global issues, human causes, and local environmental impacts. The moderate standard deviation values suggest some variation in students' experiences and engagement with climate-related content in English classes.

Table 2. Descriptive Statistics of Students' Awareness of Climate Change Through English Language Learning

Statement	N	Mean	Std. Deviation
Statement 1	200	3.86	1.344
Statement 2	200	3.07	1.371
Statement 3	200	3.89	1.348
Statement 4	200	4.03	1.335
Statement 5	200	3.56	1.313
Statement 6	200	3.36	1.323
Statement 7	200	4.14	1.243

The awareness findings reveal a clear pattern of relatively high awareness driven by exposure in English learning, supporting the notion that ELT is effective in introducing climate issues at a recognition level rather than at a deeply conceptual level.

Table 3 presents students' responses regarding their understanding of climate change concepts through English language learning. In general, students showed a moderate level of understanding. Higher levels of agreement were observed for items related to concrete impacts and practical actions, such as sea level rise and reducing single-use plastics. In contrast, lower agreement levels appeared in items requiring abstract reasoning and higher-order cognitive skills, such as distinguishing climate from weather, summarizing solution-focused texts, and expressing opinions in English.

Table 3. *Students' Understanding of Climate Change through English Language Learning (N = 200)*

No.	Statements	SA n(%)	A n(%)	N n(%)	D n(%)	SD n(%)
8	I understand the greenhouse effect mechanism based on explanations in English texts or materials.	72 (36.0)	49 (24.5)	44 (22.0)	14 (7.0)	21 (10.5)
9	I can explain the effects of climate change on extreme weather based on readings or discussions in English lessons.	54 (27.0)	41 (20.5)	66 (33.0)	27 (13.5)	12 (6.0)
10	I understand the difference between climate and weather as explained in English materials.	31 (15.5)	35 (17.5)	67 (33.5)	38 (19.0)	29 (14.5)

11	I can explain examples of simple actions to reduce the impact of climate change based on English texts or assignments.	64 (32.0)	51 (25.5)	49 (24.5)	23 (11.5)	13 (6.5)
12	I understand that sea level rise is one of the impacts of climate change as explained in English materials.	73 (36.5)	55 (27.5)	38 (19.0)	20 (10.0)	14 (7.0)
13	I am able to summarize the content of English texts that discuss solutions to climate change.	42 (21.0)	36 (18.0)	57 (28.5)	32 (16.0)	33 (16.5)
14	I understand the reasons for the importance of reducing the use of single-use plastics based on English reading or materials.	106 (53.0)	42 (21.0)	23 (11.5)	12 (6.0)	17 (8.5)
15	I can write or express my opinion about climate change in English based on my understanding of the learning materials.	39 (19.5)	32 (16.0)	59 (29.5)	37 (18.5)	33 (16.5)

These results suggest that students' understanding is stronger for concrete and familiar concepts but weaker for abstract scientific explanations and productive language tasks.

Furthermore, table 4 displays the descriptive statistics for understanding items, with mean scores ranging from 3.01 to 4.04. Items related to practical mitigation and observable impacts obtained higher means, while those requiring conceptual differentiation and productive language use showed lower means and greater variability.

Table 4. Descriptive Statistics of Students' Understanding of Climate Change Through sEnglish Language Learning

Statement	N	Mean	Std. Deviation
Statement 8	200	3.68	1.309
Statement 9	200	3.49	1.195
Statement 10	200	3.01	1.254
Statement 11	200	3.65	1.223
Statement 12	200	3.77	1.240
Statement 13	200	3.11	1.355
Statement 14	200	4.04	1.287
Statement 15	200	3.03	1.339

The understanding results highlight a consistent pattern in which students' conceptual understanding lags behind their awareness, particularly for abstract climate concepts and tasks demanding higher-order thinking and English language production

Discussion

The findings of this study indicate a clear pattern in which students' awareness of climate change through English language learning is relatively high, while their conceptual understanding remains moderate. This pattern suggests that ELT at SMA Negeri 1 Jejawi functions more effectively as an awareness-raising medium than as a vehicle for deeper conceptual climate literacy. The high awareness scores reflect students' frequent exposure to climate-related topics, causes, and impacts through English texts and classroom activities, supporting previous studies that highlight ELT's role in familiarizing learners with global environmental issues (Qizi, 2025; Silvhiany et al., 2023).

However, the more variable and lower understanding scores, particularly on abstract concepts such as the distinction between climate and weather and tasks requiring summarization or opinion expression, indicate limitations in students' higher-order cognitive processing. This gap can be explained by

linguistic constraints and instructional focus. In rural EFL contexts, students limited English proficiency often restricts their ability to process abstract scientific explanations and articulate ideas beyond basic comprehension. Consequently, students may recognize climate change issues without fully understanding underlying mechanisms or being able to express them productively in English. This finding aligns with Yu et al. (2024), who argue that ELT commonly emphasizes comprehension and exposure rather than analytical and evaluative thinking unless explicitly designed otherwise.

The rural context of SMA Negeri 1 Jejawi further explains this pattern. Although students live close to climate-vulnerable environments such as agricultural land and river basins, limited access to enriched learning resources and concept-focused instructional strategies may hinder the transformation of lived experience into structured scientific understanding. English lessons tend to prioritize reading comprehension and vocabulary acquisition, which supports awareness but does not automatically foster conceptual reasoning or synthesis. This is consistent with Dewayani et al. (2020), who found that EFL learning materials tend to emphasize lower-level comprehension skills, with limited opportunities for developing higher-order thinking, thereby constraining students' deeper conceptual understanding.

From a pedagogical perspective, these findings suggest the need to shift ELT practices toward higher-order thinking-oriented instruction. Activities such as guided critical reading, concept mapping, problem-based discussions, and reflective writing can help bridge the gap between awareness and understanding by requiring students to analyze, interpret, and evaluate climate-related information in English. Without such approaches, ELT risks remaining at the level of exposure-based awareness rather than contributing meaningfully to conceptual climate literacy.

Nevertheless, the results of this study contrast with findings from Laabidi & Charafi (2023) who reported low environmental awareness and limited engagement with environmental issues among EFL students. This discrepancy may be attributed to contextual differences, as students in the present study were more frequently exposed to climate-related content in English learning materials and lived in environments directly affected by climate change. These contrasting findings highlight the importance of contextual factors, instructional emphasis, and material selection in shaping the outcomes of climate change education through ELT.

Overall, this study provides empirical evidence that while ELT in rural contexts can successfully raise students' awareness of climate change, it requires more cognitively demanding and language-supported pedagogical strategies to develop deeper conceptual understanding. This contribution extends previous research by demonstrating the uneven relationship between awareness and understanding in rural ELT settings and emphasizing the need for higher-order, concept-focused instruction.

Conclusion

This study examined students' awareness and understanding of climate change through English Language Teaching (ELT) in a rural Indonesian high school context. The findings indicate that students demonstrated a moderate to high level of awareness of climate change issues, particularly in recognizing climate change as a global issue, identifying human causes, and acknowledging its local impacts through English learning materials. This suggests

that ELT functions effectively as a medium for exposure-based awareness building.

However, students' conceptual understanding of climate change was more varied and generally moderate, especially for abstract scientific concepts and tasks requiring higher-order cognitive and productive language skills, such as distinguishing climate from weather, summarizing solution-oriented texts, and expressing opinions in English. These results highlight a clear gap between students' awareness and their deeper conceptual understanding of climate change.

Overall, this study contributes empirical evidence that English Language Teaching tends to be more effective as a medium for raising students' climate change awareness than as a vehicle for developing conceptual climate literacy in rural educational contexts. The findings underscore the need to reconceptualize ELT practices so that exposure to environmental issues is complemented by instructional strategies that foster higher-order thinking and deeper conceptual processing. For future research, it is recommended to employ mixed-methods or experimental designs to further investigate the relationship between awareness and understanding and to examine the effectiveness of specific instructional approaches, such as CLIL or project-based learning, in improving students' conceptual understanding. Additionally, studies in diverse educational contexts are needed to enhance the generalizability of findings.

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