

Exploration of Climate Literacy: The Construction of Pre-Service Teachers' Understanding and Awareness of Climate Change Education

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ARTICLE INFO	ABSTRACT
Keywords: environmental awareness; pre-service teachers; environment-based learning	Phenomena such as the increase in global temperatures are key indicators that climate change has become an urgent issue requiring collective attention. This study aims to investigate climate literacy by developing pre-service teachers' awareness and knowledge regarding Climate Change Education. The rationale of this research focuses on the significant role of pre-service teachers as agents of transformation in instilling environmental awareness values in students, as well as the limited integration of climate change education into the learning process. This research employed a descriptive quantitative method through a survey approach. The participants in this study were education students at UIN Ponorogo who were selected as respondents. Data were collected using a Likert-scale questionnaire covering four indicators: educational management, learning environment, understanding of climate change, and awareness of climate change. The findings indicate that climate literacy among pre-service teachers is in the fairly good category, particularly in terms of environmental awareness and ecological behavior. However, the ability to deeply understand climate change concepts and to communicate climate-related issues to others still needs improvement. Therefore, strengthening Climate Change Education through curriculum integration, environment-based learning, and sustainable educational activities is essential to develop pre-service teachers who possess strong environmental awareness and effective pedagogical readiness.
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INTRODUCTION

Implementation of Learning Models Literacy Environment show approach innovative in increase understanding as well as awareness about environment. In an era faced by various challenge environment global level, learning model this is very crucial for strengthen outlook student related not quite enough answer they in preserve and maintain nature. Change climate is one of the influential global issues big to life humans, environment, economy, and education. Phenomenon like increase temperature earth, change weather, floods, droughts, and damage ecosystem is indicator real that change climate has become issue urgent need attention collectively. Therefore that sector education own vital role in create awareness, knowledge, and attitude care to environment through implementation of Climate Change Education .

Education for change climate aim for create understanding and awareness as well as push action individual to problem this. Approach This No only focus on aspects cognitive like mastery concept, but also trying change more attitudes and behavior friendly environment. In the world of education, prospective teachers have role important as agent for spread values concern to environment to students at school. Therefore that 's important for explore more carry on understanding and awareness prospective teachers about issue change climate.

Literacy climate is part from literacy related environment with ability individual understand, interpret, apply information related change climate in life every day. According to Miterianifa and Mawarni (2024), literacy environment covers ability individual for understand and participate in issues complex environment so that capable take sustainable decisions. Literacy the environment also plays a role important in form awareness individual to impact activity man to environment as well as push responsible behavior answer to sustainability nature (Rokhmah & Fauziah, 2021). However, the reality on the ground show that understanding and awareness prospective teachers towards education about change climate Still not optimal. Change material climate in learning often only delivered in a way theoretical and not yet integrated in a way deep in the educational process. In addition, experience learning based environment that is still limited cause student Not yet fully capable linking draft change climate with action real in life every day. In fact, learning based literacy environment proven effective in increase knowledge and awareness environment participant educate (Miterianifa & Mawarni, 2024).

Based on observation beginning with use tool survey, the majority respondents disclose that institution education has support teaching about change climate to others and participation active in environmentally focused learning. This shows that formation understanding and awareness prospective teachers about education change climate Still need support additional. Approach literacy environment Can help individual for understand issue change climate with a better way contextual and applicable (Hayati, 2020). However, studies that specifically special discuss formation understanding and awareness prospective teachers regarding Climate Change Education are still Enough limited, especially among students who are currently prepare self for become a teacher. Based on explanation said, research This aim for investigate literacy climate through formation understanding and awareness prospective teachers related to Climate Change Education. Research This expected can give description

about level understanding and awareness prospective teachers towards issue change climate as well as become runway for development based on literacy environment at the level college tall.

RESEARCH METHOD

Study This apply approach descriptive quantitative with method survey. Approach descriptive quantitative chosen Because objective study is for in a way systematic describe level understanding and awareness prospective teachers regarding Climate Change Education based on the numerical data collected through questionnaire. Survey method used for get information direct from respondents related with views, understanding, and awareness they to problem change climate and education environment. Research descriptive aim give description real about phenomena that exist in the field without intervention to variables research. Research done to Mathematics Study Program students who are in semester 2 and semester 4. Subject study consists of of the 10 selected students as sample. Based on respondent data, there are 7 students women and 3 students men. All respondents confess has follow learning related environment and change climate, good through lectures and activity Study other.

Election student prospective teachers as object study based on the role important they as future educators who will contribute in increase awareness environment for participant educated at school. Measuring tools research used is questionnaire with Likert scale 1 to 5. The scale includes 1 = very much not agree, 2 = no agree, 3 = neutral, 4 = agree, and 5 = strongly agree. Use of Likert scale aims for evaluate attitudes, views, and levels understanding respondents on Climate Change Education. Measuring tools study This arranged based on four indicator main, namely: (1) management education, (2) environment learning, (3) understanding about change climate, and (4) awareness to change climate. Every indicator consists of of the five statements designed for dig information about support institution education, conditions learning, level understanding student about change climate, and awareness as well as behavior care environment. Indicators management education emphasize on policy institutions, curriculum, and supporting facilities learning based environment. Indicators environment learning focused on the atmosphere learning, interaction in learning and engagement student in activity environment. On the other hand, indicators understanding related change climate related with aspect cognitive student about concepts, causes, impacts, and efforts in handle change climate. Meanwhile indicator awareness change climate evaluate attitude, concern, and trend behavior student to

protection environment. The data collection process is carried out with method share questionnaire direct to respondents.

Respondents requested for give appropriate answer with experiences and conditions that they experience during the learning process. The data obtained Then will analyzed with use method analysis descriptive quantitative involving calculation frequency as well as percentage from answer respondents for every indicator research. Analysis descriptive functioning for give description about level literacy climate prospective teachers based on understanding as well as awareness they on Climate Change Education. The results of data analysis will displayed in form table as well as explanation descriptive to make it easier understanding research data. Focus from study This is exploring construction understanding and awareness prospective teachers regarding change climate. With Thus, the results from study expected can give donation positive for development based learning literacy environment at college high. Approach literacy environment believed will increase ability individual for understand issues environment in a way critical and contextual as well as push action sustainable real in guard sustainability environment. In line with view Miterianifa and Mawarni, learning based on literacy environment can increase knowledge, awareness and sense of responsibility answer individual to environment, so that education own significant role in face challenge change future climate (Miterianifa & Mawarni, 2024).

RESULTS AND DISCUSSION

Based on results from distribution questionnaire to Mathematics Education students at UIN Ponorogo, research This collect data that includes four aspect important, namely Educational Management (MP), Environment Learning (LP), Understanding about Climate Change (PCC), and Awareness to Climate Change (KCC). Every aspect containing a number of indicators used for evaluate level knowledge and awareness student regarding Climate Change Education. Furthermore, the results study analyzed with method descriptive for understand condition literacy climate among students who are currently go through studies teacher education.

Table 1. Questionnaire Educational Management (MP)

No	Question	ANA	DA	N	A	SA	D
1.	Institution I own supportive policies				90%	10%	A

	climate change learning						
2.	The curriculum that I learn load material about climate change			50%	50%		N and A.
3.	Lecturers/teachers integrate climate change issues in learning			50%	40%	10%	N
4.	Institution provide supporting facilities learning based environment			40%	50%	10%	A.
5.	There are programs or activity related campus / school with preservation environment			40%	50%	10%	N

Table 2. Questionnaire Environment Learning (LP)

No	Question	ANA	DA	N	A	SA	D
1.	Learning process push discussion about climate change issues		10 %	50 %	40 %		N
2.	Lecturers/teachers provide example behavior care environment		10 %	20 %	50 %	20 %	A
3.	I am involved in activity related learning with environment		10 %	20 %	70 %		A
4.	Environment Study support I For more care against climate change			30 %	60 %	10 %	A

5.	Interaction in class help I understand issue environment with more good			50 %	40 %	10 %	N
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Table 3. Questionnaire Understanding Climate Change (PCC)

No	Question	ANA	DA	N	A	SA	D
1.	I understand draft the basis of climate change			40 %	60 %		A
2.	I know reason main the occurrence of climate change			50%	50 %		A and N
3.	I understand the impact of climate change on life			40 %	60 %		A
4.	I know method reduce impact of climate change			40 %	60 %		A
5.	I am able explain climate change to others			70 %	30 %		N

Table 4. Questionnaire Climate Change (KCC)

No	Question	ANA	DA	N	A	SA	D
1.	I care to climate change problem			20 %	50 %	30 %	A
2.	I feel own not quite enough answer for guard environment			20%	40 %	40 %	A and SA
3.	I intend to for apply behavior friendly environment in life daily			10 %	50 %	40 %	A.
4.	I'm trying reduce destructive activities			10 %	50 %	40 %	A

	environment						
5.	I invite others to care to environment			50 %	10 %	40 %	N

from the analysis of respondents' identities, all respondents confirmed that they had participated in learning activities related to environmental issues and climate change. This study was analyzed based on four key indicators, namely educational management, environmental learning, understanding of climate change, and awareness of climate change.

The research instrument employed a Likert scale with six response categories: ANA (Absolutely Not Agree), DA (Don't Agree), N (Neutral), A (Agree), SA (Strongly Agree), and D (Dominant). The results of this study aim to investigate climate understanding through the development of insights and awareness among prospective educators regarding *Climate Change Education*.

On the indicator management education, mostly respondents give bait come back positive related support institution in teaching about change climate. When it comes to policy supporting institutions learning change climate, seven respondents agree, while three respondents behave neutral. This data show that institution education start give attention to the problem environment in the learning process teaching. In addition, in context curriculum, four respondents agree that material change climate has entered in learning, whereas six respondents choose for behave neutral. Findings This show that material about change climate start known, but not yet fully integrated with Good in curriculum teaching.

On the indicator about integration issue change climate by lecturers in the learning process, four respondents state agree, and six respondents behave neutral. This is show that delivery material about change climate Still not enough consistent in every session learning. On the other hand, related with facility oriented learning environment, four respondents state agree, four respondents neutral, and two respondents strongly agreed. This data indicates that facility supporters for learning environment Already available, although still need improvement in order to be able to support a better learning process relevant and applicable. In the section activity related campuses with preservation environment, four respondents agree, four respondents neutral, and two respondents strongly agreed. The situation This show that activity based environment has on going, but required consolidation in intensity and participation students. Research on indicators environment learning show that the learning process relatively support development literacy climate for students.

Regarding stimulating learning discussion question issue change climate, three respondents agree, while five respondents behave neutral, and two respondents No agree.

In indicator understanding change climate, mostly respondents show that they own sufficient understanding good. A total of 6 respondents agree that they understand draft base related change climate, while 4 respondents choose neutral. Regarding reason main change climate, there were 4 respondents who agreed and 6 respondents who were neutral. These results show that student Already own knowledge base about change climate, although they Still need improvement greater understanding deep. Furthermore, there were 6 respondents who stated agree that they understand effect change climate to life, while 4 respondents choose neutral. On the side knowledge about method reduce impact change climate, there were 5 respondents who agreed and 4 respondents neutral. Although thus, the ability student in explain issue change climate to others still classified as low. It looks of the 6 respondents who chose neutral and only 4 respondents stated agree. This data show that student Still feel not enough believe self in convey understanding they about change climate to public or colleague study. (Harpina Harpina et al., 2025).

On the indicator awareness change climate, results studies show level awareness sufficient environment high. Six respondents state agree, while four respondents strongly agree that they care with issue change climate. On the other hand, five respondents agree and five respondents strongly agree feel responsible answer for guard environment. This indicates that majority student show attitude care to sustainability environment. In the aspect friendly behavior environment, five respondents agree and five respondents strongly agree intend apply behavior friendly environment in life daily they. A similar pattern also emerged from statement about business reduce destructive activities environment, where five respondents agree and five respondents strongly agree. In matter invite others to care to environment, there is four respondents who strongly agree, two respondents agree, and four respondents neutral. Situation This show that Lots student make an effort become agent change in increase concern environment in society. In general overall, research This show that literacy climate for prospective teachers are in sufficient category good, especially in aspect awareness environment. However, in matter understanding depth and ability for communicate issue change climate Still need emphasis more.

Findings This in line with view Miterianifa and Mawarni who stated that literacy environment can increase understanding and awareness individual about issues environment. In addition, the study by Rokhmah and Fauziah also revealed that learning based

environment potential form attitude care and behavior responsible answer to environment. Based on results study this is very important for strengthen implementation of Climate Change Education in education programs prospective teachers through integration material change climate in curriculum, learning based project environment, seminars, training and activities sustainable campus. With method this, prospective teachers do not only will own knowledge about change climate, but it will also become educators who have awareness ecological as well as capable implant values concern environment to students in the future.

CONCLUSION

Based on results research, can concluded that ability literacy climate prospective teachers are classified as Enough good, especially in matter awareness will importance guard environment as well as apply friendly behavior environment in life every day. The majority respondents show concern to issue change climate and feeling responsible answer for look after sustainability environment. In addition, the environment learning and support from institution education considered Enough help in increase understanding student regarding Climate Change Education. However, there are need for increase greater understanding deep about draft change climate as well as ability for explain issues change climate to others. Findings study This show that strengthening literacy climate through integration education change climate in curriculum, methods learning based environment, as well as activity educative related the environment is very important in education of prospective teachers. With So, prospective teachers are expected to can become agent changes that have awareness to ecology as well as capable implant values concern environment to students in the future.

REFERENCES

- References Hayati, RS (2020). Environmental education based on experiential learning for increase literacy environment. *Humanika*, 20 (1), 63–82.
<https://doi.org/10.21831/hum.v20i1.29039> .
- Miterianifa, & Mawarni, MF (2024). Application of learning models literacy environment in increase knowledge and awareness environment. *Journal of Science and Science Education*, 7 (1), 68–73. <https://doi.org/10.24246/juses.v7i1p68-73> .
- Rokhmah, Z., & Fauziah, ANM (2021). Analysis literacy environment junior high school students at school curriculum outlook environment. *Pensa E- Journal of Science Education*, 9 (2), 176–181.

- Gunantiani , JM, Zehan, TH, Yanwar , A., & Irvani, AI (2026). Climate Change in Science Textbooks: Exploring the Breadth and Depth of Content Connections. *RAJENDRA: Journal of Science and Technology Learning Innovation* , 1 (1). <https://journal.sigufi.com/index.php/rajendra/index>
- Haoxing , Z., & System, C. (nd). *HISTORY, THEORY, AND FUTURE CHALLENGES*.
- Harpina Harpina, Early Sutra Darfin, & Umi Nur Kholifatun. (2025). Science Literacy and Climate Change Issues in Elementary School Science Learning as a Green Education Effort. *Journal of Humanities, Social Sciences, and Education* , 1 (2), 55–68. <https://doi.org/10.64690/jhuse.v1i2.34>
- Kundariati , M., Aulia , Z., & Putra, Z. (2025). *Responding Challenge Climate Crisis through Education : SDG 4 Synergy “Quality” Education ” and 13 “Climate Action ” in Indonesia* . 8 , 11–23.