Building Ecological Awareness Through Digital Literacy: A Case Study on The Millennial Generation in Higher Education

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Abstract: This research aims to investigate the impact of ecology-based digital literacy on the formation of ecological awareness among millennial generations in higher education. Millennials, as a significant demographic group, play a key role in shaping the future of the environment. In this context, digital literacy serves as an essential tool for disseminating knowledge and motivating pro-environmental actions. The research method employed a case study approach within the higher education environment, involving a group of millennial students participating in ecology-based digital literacy. Data were collected through initial observations, pre- and post-assessment of ecological awareness, and in-depth interviews. The research results indicate that ecology-based digital literacy can enhance ecological awareness among millennials. Participants or informants demonstrated an understanding of environmental issues and skills in using digital technology to disseminate pro-environmental information. In-depth interviews revealed that ecology-based digital literacy provides additional motivation for engaging in concrete actions that support environmental sustainability. The research findings have significant implications for the development of more effective environmental education and targeted pro-environment communication strategies for the millennial generation. In conclusion, ecology-based digital literacy can be a powerful means of shaping ecological awareness among millennials and motivating them to take positive actions in support of environmental sustainability.

Keywords: *Ecological Awareness; Environmental Education; Environmental Sustainability; Digital Literacy; Millennial Generation*

INTRODUCTION

In this increasingly digitized era, global environmental challenges have become increasingly urgent. Climate change, ecosystem degradation, and various other environmental issues have given rise to an urgent need for sustainable collective actions (Fill. 2001, 2017, 2018). The millennial generation, a demographic group consisting of individuals born between 1981 and 1996, plays a crucial role in addressing these challenges and shaping the future of the environment. In this context, digital literacy has emerged as a potential tool to address environmental issues more effectively and profoundly (Allan, 2008). Ecology-based digital literacy, which combines an understanding of environmental issues with digital technology skills, can play a vital role in shaping ecological awareness among the millennial generation and encouraging meaningful pro-environmental actions.

Over the past decade, climate change and environmental degradation have garnered increasing global attention. The widespread air pollution, declining water quality, loss of biodiversity, and numerous other environmental challenges threaten human well-being and the

Earth's ecosystems (UNESCO, 2011, 2017). Various scientific reports, including those from the Intergovernmental Panel on Climate Change (IPCC) and environmental organizations such as WWF and Greenpeace, have warned of the serious impacts of climate change and unsustainable exploitation of natural resources (Chawla, 2007). In this regard, it is crucial to understand that the millennial generation, a significant segment of the world's population today, will inherit the world and face the worsening impacts of climate change and other environmental issues. Millennials are key stakeholders in responding to these environmental challenges. However, to effectively fulfill their role, this generation needs a deep understanding of environmental issues and the skills that enable active participation in sustainability efforts.

Digital literacy is the ability to use digital technology to access, evaluate, create, and communicate information effectively. That aligns with Gilster's opinion; digital literacy is the ability to effectively and efficiently utilize technology and information from digital devices in various contexts such as academics, careers, and everyday life (Dyna, 2017).

In the midst of rapid information technology advancements, digital literacy has become one of the key competencies in this digital era. Millennials have grown up in an environment marked by information technology developments and are often identified as "digital natives" with access and proficiency in using digital devices. However, digital literacy is not limited to technical skills alone. In the environmental context, ecology-based digital literacy adds an additional dimension. It encompasses an understanding of environmental issues such as climate change, habitat destruction, and resource sustainability, as well as the skills to use digital technology to disseminate pro-environmental information, mobilize action, and participate in environmental activism (Boyd, et.al 2008).

Ecology-based digital literacy integrate understanding of environmental issues with digital technology skills. This matter can help millennials better understand and appreciate complex environmental issues. Furthermore, millennials can utilize digital technology to disseminate information about environmental challenges, garner support for environmental initiatives, and motivate tangible actions that support environmental sustainability. Despite the promising potential of ecology-based digital literacy programs in shaping ecological awareness among millennials, in-depth scientific research on their impact remains limited.

Previous studies have highlighted the importance of ecological awareness and digital literacy in the context of environmental sustainability (Gruenewald, 2003; Lankshear & Knobel, 2006; Rengganis, 2016). However, adequate research on how ecology-based digital literacy can help shape ecological awareness among millennials is still lacking. Therefore, this research aims to fill this knowledge gap by conducting an in-depth case study on the impact of implementing an ecology-based digital literacy program among millennials.

The primary objective of this research is to investigate the impact of implementing an ecology-based digital literacy program on the formation of ecological awareness among millennials. This research will analyze whether the program can provide millennials with a better understanding of environmental issues and motivate them to engage in concrete pro-environmental actions.

The results of this research are expected to provide valuable insights into the effectiveness of ecology-based digital literacy programs in shaping ecological awareness among millennials. The implications of this research can be used to develop more effective environmental education and more efficient pro-environmental communication strategies to engage millennials in supporting environmental sustainability.

RESEARCH METHODOLOG

This research adopts the Robert K. Yin (2004) case study approach, with a specific focus on ecology-based digital literacy implementation within the higher education environment. The case study approach enables a comprehensive understanding of the impact on the formation of ecological awareness among the millennial generation.

The informant in this study consist of millennial students who are participating in the ecologically-based digital literacy program at a higher education institution (Trunojoyo Madura University). Informant will be randomly selected from attendees and will serve as the research subjects. Random informant selection will help ensure better representation of various backgrounds and initial levels of understanding concerning environmental issues.

Data collection instruments include observation and interviews. Before commences, an initial observation will be conducted on the participants to assess their initial understanding of environmental issues, digital literacy skills, and levels of ecological awareness. Subsequently, focused interviews will be conducted, covering aspects such as understanding of climate change, resource sustainability, and habitat destruction. In-depth interviews will be conducted with a subset of randomly selected participants. These interviews will aid in obtaining a deeper understanding of how the ecologically-based digital literacy program has influenced the informants' views, knowledge, and actions related to environmental issues. The interviews will be recorded and analyzed to gain deeper insights into the participants' experiences. Following this, data analysis will be performed. The results of observations and in-depth interviews will be thematically analyzed to identify patterns and emerging findings.

RESULTS AND DISCUSSION

The research has yielded results within the context of digital literacy theories, ecological awareness, and the implications of these findings in supporting environmental sustainability efforts. This discussion is supported by relevant and accountable scholarly literature. The analysis results indicate changes in participants' understanding of environmental issues, digital literacy levels, and ecological awareness.

Understanding of Environmental Issues

The research results indicate that the ecologically-based digital literacy fosters informants' understanding of complex environmental issues. Prior to participating, most informants had a basic understanding of climate change, habitat degradation, and other environmental issues. However, after completing the program, informants demonstrated a positive change in their understanding. This finding aligns with digital literacy theories that emphasize the importance of using digital technology to access and comprehend information (Lankshear & Knobel, 2006). The ecologically-based digital literacy provides informants with access to relevant online information and resources related to environmental issues, enabling them to gain a deeper understanding.

Here are the interview results with an ecologically-based digital literacy informant that reflect a change in understanding of environmental issues:

Before gaining ecological awareness through ecologically-based digital literacy.

Initial interview with the informant:

Researcher   : "How do you think climate change affects our environment?"

Informant : "I think climate change just makes the temperature hotter. That's all I know."

After gaining ecological awareness through ecologically-based digital literacy.

Follow-up interview with the same informant:

Researcher : "Could you explain further about climate change and its impacts after participating in the program?"

Informant : "Certainly, after participating in the program, I now understand that climate change involves more than just a hotter temperature. It's about how air pollution and greenhouse gas emissions can harm the environment and alter the global climate. I also learned about efforts we can make to reduce these negative impacts, such as using renewable energy."

This evidence demonstrates a change in the informant's understanding of climate change before and after the program. Initially, the informant's understanding was limited to basic concepts, but after gaining ecological awareness through ecologically-based digital literacy, they can explain in more detail and comprehensively about the issue. This reflects the positive impact of improving understanding of environmental issues.

Improved Digital Literacy

Improved digital literacy is also a positive outcome. The program offers comprehensive training on using social media, video-sharing platforms, and other online tools to disseminate pro-environment information and collaborate with online communities sharing similar interests. This improvement is crucial, given the significance of digital media in disseminating pro-environment messages to a broader audience. This finding aligns with the concept of digital literacy, which combines an understanding of digital technology with the ability to use it effectively (Lankshear & Knobel, 2006). Participants become more confident in operating digital technology, potentially having a greater impact on public opinion, mobilizing support, and participating in online environmental campaigns.

Here is the evidence related to the improvement in digital literacy of the informant after gaining knowledge of ecologically-based digital literacy:

Before gaining knowledge of ecologically-based digital literacy.

Initial interview with the informant:

Researcher : "How do you typically use social media to share information or participate in online discussions related to environmental issues?"

Informant : "I only use social media to share personal photos and status updates. I don't know how to use these platforms to communicate environmental issues."

After gaining knowledge of ecologically-based digital literacy.

Follow-up interview with the same informant:

Researcher : "Has there been a change in how you use social media after participating in the ecologically-based digital literacy program?"

Informant : "Yes, definitely. The program taught us how to create relevant content about environmental issues and how to share it on social media. I can now create short videos explaining environmental problems and share them with others. I also joined some online communities that care about the environment, where we discuss and collaborate on pro-environment campaigns."

This evidence demonstrates a change in the use of social media and collaborative abilities of the participant after gaining knowledge of ecologically-based digital literacy. Before, the informant had limited understanding of using social media for environmental issues. However, after gaining knowledge of ecologically-based digital literacy, the informant has improved their ability to use digital technology to disseminate pro-environmental information and participate in online environmental campaigns. This reflects an improvement in digital literacy in line with the concept of digital literacy, which combines an understanding of digital technology with effective usage skills (Lankshear & Knobel, 2006).

Ecological Awareness

One notable finding is the change in participants' ecological awareness levels. Observational data indicates that most participants experienced an increase in ecological awareness after participating in the ecologically-based digital literacy program. They became more conscious of the human impact on the environment and felt a greater sense of responsibility to take pro-environmental actions. This finding reflects the importance of ecologically-based digital literacy, which enables participants to actively engage in building knowledge about environmental issues (Gruenewald, 2003). By participating in activities that encourage reflection and dialogue, participants can internalize pro-environmental values and respond to them with tangible actions.

Here is the evidence related to the change in ecological awareness of the informant after gaining knowledge of ecologically-based digital literacy:

Before gaining knowledge of ecologically-based digital literacy.

Initial interview with the informant:

Researcher : "How do you see the role of individuals in preserving the environment?"

Informant : "I think the environment is a collective responsibility, and I'm not sure what I can do as an individual to make a difference."

After gaining knowledge of ecologically-based digital literacy.

Follow-up interview with the same informant:

Researcher : "Has there been a change in your view of the role of individuals in preserving the environment after participating in the ecologically-

based digital literacy program?"

Informant   : "Yes, there has definitely been a significant change. This program made me realize that individual actions are truly important in protecting the environment. I now understand how everyday decisions like energy use, waste management, and consumption patterns can have a significant impact on the environment. I feel more responsible for taking small, sustainable actions, such as reducing plastic waste and conserving energy."

This evidence reflects a change in the level of ecological awareness of the informant after participating in ecologically-based digital literacy. Before gaining knowledge, the informant may have been less aware of the role of individuals in environmental preservation. However, after gaining knowledge, the informant has gained a deeper understanding of how individual actions can impact the environment. The informant now feels more responsible and capable of connecting knowledge to real actions that support environmental sustainability. This reflects the positive impact of the ecologically-based digital literacy program in enhancing the ecological awareness of informant.

Implications and Relevance of Findings

These findings have significant implications for supporting environmental sustainability efforts. Millennials, as a large and influential demographic group, have the potential to shape the future of the environment. The research results indicate that ecologically-based digital literacy programs can be effective tools in shaping millennials' views, knowledge, and actions related to environmental issues. Programs like these can be adopted by higher education institutions, environmental organizations, and governments as part of their strategies to enhance ecological awareness and digital literacy among millennials. Interactive and action-oriented approaches in these programs can help create a more environmentally conscious generation actively supporting sustainability efforts.

CONCLUSION

This research demonstrates the positive impact of ecologically-based digital literacy programs on the millennial generation in higher education, specifically in the context of shaping their understanding of environmental issues, enhancing digital literacy, and elevating ecological awareness. The findings of this study hold significant implications for supporting environmental sustainability efforts and provide a profound insight into how digital literacy-based education and training can shape a more environmentally conscious generation. This offers compelling evidence that ecologically-based digital literacy programs can build understanding of environmental issues, improve digital literacy, and raise ecological awareness among millennials in higher education. In an increasingly interconnected digital era, millennials play an increasingly crucial role in shaping the future of the environment, and programs like these have substantial potential to assist them in fulfilling this role more effectively.

Future research can build upon this study by involving a more diverse range of participants and encompassing various educational and environmental contexts. Additionally, measuring ecological awareness still involves subjective elements, and there may be other factors influencing changes in ecological awareness that cannot be identified through this research.

Therefore, further research may employ more objective approaches and employ sophisticated measurement methods to gain a deeper understanding of changes in ecological awareness.

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