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Environmental Education Based on *Tengger*'s Local Wisdom in Growing Conservation Character in Elementary School

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ABSTRACT

This study explores how the local wisdom of the Tenggerese people in East Java, Indonesia, can be used to cultivate conservation character among elementary school students. Using a participatory action research (PAR) approach, this study involved collaboration with three elementary teachers and 75 students aged 7–8 over two semesters. Data were collected through classroom observations, dialogue recordings, and photographic documentation, then analyzed using Critical Discourse Analysis (CDA) to identify themes and interpret meanings related to conservation values. Findings reveal two main outcomes: first, conservation character was effectively embodied through storytelling and traditional practices rooted in Tenggerese culture; second, students demonstrated increased environmental awareness and began applying conservation behaviors in daily life. These results suggest that local wisdom not only serves as a culturally rich pedagogical tool but also enhances student engagement and moral development. The study concludes that Tenggerese traditions can meaningfully support environmental education by connecting past cultural practices to present-day ecological responsibilities. Its impact lies in offering a culturally responsive teaching model that fosters conservation character through experiential and values-based learning—highlighting the transformative potential of integrating indigenous knowledge into primary education curricula.

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1. INTRODUCTION

Environmental issues and climate change are still in the spotlight, and the movement continues to be echoed (Aikens & McKenzie, 2021). This is because the climate catastrophe is hastening at an unparalleled rate (Jones & Podpadec, 2023). While crises have many issues that take part in exacerbating them, some require more attention than others. The loss of biodiversity is among them that most affect the current environmental damage. The past fifty years have seen rapid growth in human consumption, inhabitants, and urbanization, resulting in humanity using up much more of the Earth's resources than can be replenished naturally. A recent WWF report originate that inhabitants' sizes of mammals, fish, birds, reptiles, and amphibians diminished by a middling of 68% between 1970 and 2016. More broadly, a recent analysis found that a sixth mass loss of wildlife on Earth is quickening. Over 500 species of land animals are on the verge of extermination and will likely disappear within 20 years, the identical amount lost over the past century. Scientists say that this loss rate would take thousands of years without human destruction of nature (Kopnina, 2020).

Every single minute, a forest the size of twenty football fields is expurgated. By 2030, the earth may have only 10% of its forests; if deforestation is not at a standstill, it could all be gone in less than a hundred years. The three countries experiencing the highest rates of deforestation are Brazil, the Democratic Republic of the Congo, and Indonesia. However, Indonesia is dealing with deforestation, now seeing its lowermost rates since the commencement of this era (Alcántara-Rubio et al., 2022).

Based on the data, Indonesia has a high biodiversity level, marked by the diversity of ecosystems and species within ecosystems and the germplasm within each species. It is no exaggeration if Indonesia is one of the world's priority areas for biodiversity conservation. However, Indonesia is also a nation state with a high level of environmental vulnerability, especially the manifestation of species extinction and habitat destruction, which causes a decrease in biodiversity (Von Rintelen et al., 2017). In the economic field, Indonesia still relies on utilizing natural resources not generated from innovation. Therefore, our challenge is to advance science and technology based on biodiversity to support national development. Consequently, biology education or in particular environmental education is directed to respond to current challenges, namely being able to protect, employ and complement value to biodiversity by considering sustainability and conservation (biology for sustainable development) (Husamah et al., 2022).

One way to fulfil this mission is to use the culture of the community as an alternative source of learning and collaborate with local wisdom (ethnology) in learning activities. Local wisdom is a strategy for creating learning environments and plans that integrate cultures into the academic learning process. Moreover, utilizing local wisdom is an excellent approach to education in Indonesia. This is because local wisdom includes language, morality, customs, culture, and technology from communities with scientific knowledge (Druker-Ibáñez & Cáceres-Jensen, 2022).

Empirical evidence demonstrating the importance of integrating local knowledge into learning activities, such as A study by Okebukola (1986), found that students' cultural backgrounds had more of an effect on learning activities than the effects arising from the subject matter itself. It shows that it has a significant impact. This not only enhances student learning outcomes but can also facilitate the integration of local wisdom into science learning activities (Suryanti et al., 2020).

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Indonesian society is pluralistic, with different cultures and regional powers in each region (Subekti et al., 2020). Some local communities continue to uphold generation-to-generation traditions of using natural resources wisely. Historical studies have shown that Indonesia has inherited various ethnic cultures reflected in different local wisdom beliefs, governance systems, health, livelihood, and lineage systems (Dewi et al., 2021). Moreover, local knowledge is presented primarily regarding local beliefs in the Indonesian context and habits (*adat*).

The *Tengger* people are a somewhat isolated traditional society (Marzuki et al., 2018). Even though they live in a mountainous area with frigid weather, the *Tengger* people still interact with people outside their tribe. Because they live in the Bromo *Tengger* Semeru National Park area, a mainstay of national tourism objects, it is unsurprising that the *Tengger* people have also interacted openly with other people outside their tribe. Even though it is open to interaction with other communities, the condition of the *Tenggerese* community is still relatively homogeneous (Utomo et al., 2015). This condition can be seen from the type of livelihood and their religion. Most of the *Tengger* people have their main livelihood as vegetable farmers. They live in the Bromo *Tengger* Semeru National Park area, which is also a tourist destination, making several members of the *Tengger* tribe also work as tour operators. In tourism activities, they usually work as jeep transportation organizers, inn/villa brokers, souvenir sellers, or horse transport providers from the Caldera to the crater of Mt. Bromo.

Indigenous knowledge has changed through accumulated practical experience and has been passed down from generation to generation (Koirala, 2022). To achieve these goals, science teachers must look beyond the four walls of the classroom or school and look to their sources, the treasures of society, and local wisdom. *Society* is a living laboratory that mediates the learning process. It is a repository of theory and competence experts in various scientific and neighbouring fields and a rich source of hands-on learning. Integrating indigenous knowledge into education can help and benefit the 'preservation' of indigenous knowledge and societies for all. These descriptions assume that local parts of social life can be used as learning resources, especially in biology classes (Aikens & McKenzie, 2021; Briggs et al., 2019).

Previous research has emphasized the importance of environmental education in fostering conservation character among students (Tilbury, 1995; Arba'at et al., 2020). Various models of environmental education have been implemented in elementary schools, including inquiry-based learning, project-based learning, and outdoor learning approaches (Ballantyne & Packer, 2009). In recent years, scholars have also explored the integration of local wisdom in education to promote ecological values rooted in indigenous traditions (Subekti et al., 2020; Utami et al., 2022). For example, local wisdom from Bali and Papua has been shown to effectively enhance students' awareness of nature and sustainability (Yanti et al., 2021; Wambrauw et al., 2023). However, while these studies acknowledge the role of cultural heritage in environmental education, limited attention has been given to how specific indigenous communities, such as the Tengger people of East Java, transmit ecological values through localized knowledge systems.

Several studies have emphasized the role of environmental education in shaping students' ecological awareness and pro-environmental behaviors. Ecopedagogy-based programs such as Adiwiyata contributed to strengthening students' caring attitudes and environmental awareness. However, these efforts often remain generalized and do not consider the specific potential of local indigenous wisdom in shaping conservation character. Emphasized the need for teaching materials rooted in local wisdom (e.g.,

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Indramayu) to foster ecological literacy in elementary schools. Although such materials enrich contextual learning, their focus tends to be limited to cognitive and affective domains, without thoroughly addressing how local culture could holistically shape conservation-related character. Integrating local values into teaching can enhance motivation, participation, and environmental attitudes among students. Nevertheless, these studies largely remain descriptive and have not yet developed a structured, culturally embedded pedagogical model with long-term impact evaluation.

These findings indicate several gaps: first, there is limited research that explores how the rich ecological values of specific indigenous communities—such as the Tengger people in East Java—can be integrated into elementary school education. Second, most studies have yet to develop and empirically test a structured model that holistically cultivates conservation character by addressing cognitive, affective, and behavioral aspects. Third, the absence of long-term impact evaluation on students' conservation character further limits the development of sustainable environmental education strategies.

This study aims to fill those gaps by offering a novel approach to environmental education that is deeply rooted in Tengger's local wisdom—through rituals, land-use traditions, and spiritual values—integrated within a structured learning model for elementary students. The study not only contributes to the enrichment of culturally responsive environmental education in Indonesia but also presents a transformative learning model that fosters sustainable conservation character through contextual and community-based learning practices. This research is among the first to position Tengger wisdom as a foundational framework for character education in elementary schools, offering both theoretical and practical contributions to the field. Furthermore, most existing literature tends to focus on cognitive or affective outcomes, with less emphasis on the cultivation of conservation character as a holistic integration of knowledge, attitude, and behavior. This reveals a gap in both geographical coverage and pedagogical focus.

This study offers a novel contribution by investigating how Tengger's local wisdom—embodied in rituals, land management practices, and spiritual beliefs—can be adapted into environmental education to cultivate conservation character among elementary school students. The integration of localized cultural practices into formal education not only fills the existing research gap but also strengthens the contextual relevance of environmental learning for young learners in indigenous or rural settings. The two main objectives of this study were to (a) outline how *Tenggerese* local wisdom can be used to instill conservation values in students. (b) discover how valuable local knowledge was in encouraging students to build conservation-minded characters.

2. METHODS

2.1. Design

This study used participatory action research (PAR). Research aimed at transformation, especially in the framework of education. This research goals were: (a) to describe how the Local Wisdom of *Tenggerese* can be used to teach conservation character in elementary education. (b) to investigate how practical local wisdom was in promoting student conservation character development.

This research conducted by association with three teachers in East Java, Indonesia. They voluntarily agreed to participate in this study to gain insight into the pedagogical practices based on the local wisdom of *Tenggerese*. The study was conducted for two semesters, three days a week, Monday, Tuesday, and Friday, excluding semester breaks and holidays.

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Each session was forty-five minutes. Activities accompanying the class were designed to introduce themes and stories, tell stories based on conservation character over *Tengger's* tradition, and reflect the contents of the tradition.

They finished by reviewing the activity and strengthening the children's conservation character. Malandrakis et al., (2019) claim that people can achieve encouraging mindset by using the gifts already in their nature more consistently. In additional, the potentially constructive appeal of the students participating in this research will empower them to strengthen their conservation character.

2.2. Participants

The current study was joint and led amid the researchers and three elementary teachers at private school. The contributing educators had years of experience teaching elementary students. To achieve the purpose of this study, we, as outcasts, wrote materials containing conservation character values to instil in children. The teachers were also trained to design post-story learning tasks to create introspective exercises. In addition, 75 children aged 7 to 8 participated in the study. They were encouraged to develop conservation and environmentally caring characters. Students' efforts in research were appreciated because of their potential.

The study proceeded with formal interviews with the student's parents and informed consent letters were distributed detailing the purpose of the study and their consent to participate. From this, the student's parents understood that their child was participating in the research, that the data collected were personal, and that they could take out from the research without notice. They approved to undertake and support this study, and not a single student declined until the study was completed. Photographs of the children were allowed, but their faces were blurred.

2.3. Data collection and analysis

In this study, we approached data collection methods through class observation, recording of class interactions, and photo analysis as learning products. Through participatory observation, researchers can directly observe learning processes in the classroom. Research observational data on participants' activities in the learning process was obtained by recording students' participation and responses to learning activities. Classroom dialogue recordings, on the other hand, relate to interactions between teachers and students and are used to know how students respond to learning. This was done during a classroom dialogue, and the audio was recorded. Classroom interactions were guided by questions related to the theme of each story.

For example:

(1) What is the ceremony's name?

(2) What is the purpose of the ceremony?

(3) What if a member of the tribe cut down a tree?

(4) What can you learn from the tribal agreement?

We transcribed the results of the conversation recordings in the classroom. The final method of data collection is photography. Photographs were taken while the study was being conducted. Julien et al., (2021) state that usage of photography is advantageous for promoting ideas, linking perceptions, and generating alternative analyses. Presenting photos of the *Tenggerese*'s activities in conserve the nature helps researchers conduct learning assessments. In addition, photographs can serve as knowledge relics that help us think and act. In conclusion, all collected data were transliterated and interpreted using

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critical discourse analysis (CDA). Wood et al., (2020) refer to the approach used by Fairclough, according to which CDA "examines the transcribed portions of dialogue and identifies recognizable assumptions and social Prejudice can be done by looking for types." CDA is, therefore, essential for interpretive analysis, helping to code and theme all transliterated data, which will later be analysed and construed according to research goals.

3. RESULTS AND DISCUSSION

Based on the analysis results, two primary outcomes of this study were obtained by leveraging the local wisdom of the *Tenggerese* people to instill the conservation character in environmental education; 1) Embody conservation character through stories and practices of local wisdom; and 2) Encourage students to practice conservation (environmental caring) in their daily life.

3.1. Embody conservation character through stories and practices of local wisdom

With their main livelihood as farmers, the people of the *Tengger* tribe maintain the harmony of their lives with natural resources, which are the primary support of their lives. The value of maintaining the harmony of the social life of the *Tenggerese* people with nature is not only in the context of human relations with nature as their economic resource, but the *Tenggerese* people also place nature as the leading center (qibla) of their worship in the context of their spiritual life (Jati et al., 2018).

This can be seen by making Mount Bromo and the Ocean of Sand (Caldera) the main centers of their worship. This boldness of harmonizing the life of the *Tenggerese* people with nature is reflected in the customs among them to carry out traditional ceremonial activities before cultivating agricultural land (Hariyati et al., 2020).

Before planting vegetable seeds, the *Tengger* people usually start by holding a small traditional ceremony that several families attend. Every year, the people of the *Tengger* tribe also hold traditional ceremonies as a sign of their respect and gratitude to nature for their abundant harvests. This traditional ceremony is known as the Kesada Ceremony. The people's attitude toward harmonizing with nature is also reflected in customary sanctions among the *Tengger* tribe community for residents caught cutting down trees. Customary sanctions can be restitutive, in which residents are asked to replant replacement trees at the felling location, and customary repressive sanctions by parading the violators around the village. Parading offenders is intended to humiliate offenders socially so that offenders no longer repeat their actions. Restitutive and repressive customary sanctions can be given simultaneously (restitutive and repressive customary sanctions are given) but can also only be restitutive (Jati et al., 2018).

Residents who violate the provisions of cutting down trees outside the Bromo *Tengger,* Semeru National Park area will only be given restitution customary sanctions. Violators are given customary sanctions to replant replacement trees at the site felling (Handayani, 2019). Meanwhile, residents who are caught cutting down trees within the National Park area will be subject to customary sanctions to replant the tree at the location where the tree was cut (restitutive) and parading the offenders around the village (repressive) by wearing the branches of the tree they cut down around their necks. For every five trees cut down, an offender must pay five sacks of cement and replant 200-300 trees at the felling site (Astriyantika et al., 2014).

The provision of restitutive and repressive customary sanctions to logging offenders becomes interesting when viewed from the theory put forward by Emile Durkheim. In his

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theory, Durkheim said that imposing repressive sanctions is standard in traditional societies (Musa, 2024). In traditional societies, the social structure consists of many choice units for the division of labour, each of which is small in format. In traditional societies, these small units of division of labour have something in common with one another. This condition makes social solidarity also mechanical. The occurrence of mechanical solidarity in traditional societies is caused by the homogeneity of small units of society so that if each small unit is separated from one another, it will not disrupt the function of the entire social system. The activity of learning in the class shown in **Figure 1**.



Figure 1. The Activity of Learning About *Tengger's* Tradition in Environmental Education.

The value of this local wisdom is instilled in students when learning using storytelling and audiovisual methods. Every time the story is finished, or the audiovisual has been played, students are asked to retell, give some questions, or present in front of the class about the moral value they get from the story and audiovisual about the *Tengger* tribe. This will be discussed further in point 2.

3.2. Encourage students to practice conservation (environmental caring) in their daily life

This research aims to help students learn from tradition or culture from what they have seen and heard, also known as "learning by doing." Another purpose of this learning is to encourage people to work on conservation and environmental conservation by seeing and hearing local wisdom. Widodo et al., (2020) argue that "one of the educational goals set out in Indonesian education policy and curriculum documents is to foster character virtues and moral values in students." In this regard, the student's personality virtues and moral values are provided to the student in activities around the school environment. B. Water the flowers, clean the schoolyard, and plant the trees. These activities include character virtues and moral values such as environmental care, social awareness, kindness, responsibility, and cultural identity. Therefore, the teacher's responsibility to provide students with adequate opportunities to practice good character outside the classroom through service programs, clubs, tutoring, etc. (Sadia, 2013; Subianto, 2013). One of the teacher and students' activity to conserving nature shown in **Figure 2**.

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Figure 2. Teacher and Students Plant Trees as an Effort to Conserve Nature

The teacher's observation notes show that the students are putting conservation values into practice by planting trees. In this regard, the students learned about character development through stories told through *Kesada* ceremony and practiced character development in conservation. This meaningful experience becomes a learning resource for both teachers and students. Dewey (1934) argues that it is always 'transactional,' that our experience is part of what it means to 'be in the world,' and that it necessarily moves us into the past, present, and future—claimed to be connected. With this in mind, students connected what they learned from the story to their actions (such as watering the plants), environmental protection, and what benefits you might get from watering your plants. In this way, students implicitly learn to reflect on their experiences. Furthermore, Arora et al., (2020) argues that to be educationally valuable, experiences must have meaning and that educators must consciously try to make sense of the experiences of those they are educating. The following illustration also records student interactions during the care learning activity (Fig 2).

Figure 2 shows how *Tengger*'s local wisdom and traditions help students understand the message (compassion) presented in learning activities. The narrator actively participated by watering the plants to raise the students' environmental awareness and teach critical thinking. From this analysis, the students' "watering the plants'' symbolizes conservation character and allows them to demonstrate their good character. McClaren, (2019) suggest that teachers can engage students in many meaningful ways to train character strengths. **Figure 3** shows the interview activity in teacher and students.



Figure 3. Interview Activity in Teacher and Student

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4. CONCLUSION

This study describes how the Tengger tradition integrates storytelling, rituals, and local practices in a meaningful way to help students internalise conservation values. The results show that moral values like humanism, compassion, and environmental awareness are fostered by *Tenggerese* local wisdom. In addition to capturing students' attention, using tradition as a teaching tool promoted active engagement and learning-by-doing both inside and outside of the classroom. Students developed empathy and environmental responsibility by performing conservation character in real-life situations through activities like plant care.

This study highlights the value of contextualising moral and character education through local culture from a pedagogical perspective. By creating reflective, tradition-based, and experiential learning activities that enable students to make connections between the past, present, and future, teachers play a critical role in supporting this kind of value construction.

However, the scope of this study was restricted to a small group of participants in a particular region and one cultural context (the Tengger community). Furthermore, it was not entirely determined how this approach would affect students' conservation behaviour outside of the classroom in the long run. It is recommended that future studies use this model in a variety of cultural contexts, include larger participant groups, and investigate how conservation character endures over time. Longitudinal studies and comparative analyses across indigenous communities would further enrich the understanding of how local wisdom can be systematically integrated into environmental education.

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6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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