



## **Knowledge of Early Childhood Education Teachers Regarding Zero Waste-Based Learning in the Coastal Area of Kamal**

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### **Abstract**

**Purpose** – This article aims to elucidate the knowledge of teachers in early childhood education institutions in the coastal area of Kamal regarding Zero Waste-based learning.

**Design/methods/approach** – The research was conducted using a survey that focused on Zero Waste-based learning. Questionnaires were administered to 118 teachers in early childhood education institutions in the coastal area of Kamal. The data obtained were then analyzed using a one-sample *t*-test.

**Findings** – The research findings indicate that the majority of teachers possess a high level of knowledge regarding Zero Waste-based learning. However, there is a minimal difference in the number of teachers with high and low levels of knowledge. Many teachers utilize recycled materials and natural resources for teaching materials.

**Research implications/limitations** – This study can serve as a basis for providing training to early childhood education institutions, enabling them to improve Zero Waste-based learning and instill environmental consciousness in young children.

**Practical implications** – This research highlights the need for collaboration between all parties involved in environmental sustainability and schools to enhance teachers' knowledge of appropriate environmental education for children. Ultimately, this can help children gain knowledge about the environment through specialized or integrated daily lessons.

**Originality/value** – This study serve as a reminder to teachers in Kamal's coastal area to enhance their knowledge of Zero Waste as a tool for educating future generations of young children.

**Keywords** Teacher knowledge, Zero Waste, Early childhood

**Paper type** Research paper

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## 1. Introduction

Currently, environmental issues in various regions of Indonesia are a matter of concern. Environmental problems remain a challenging issue, both in urban and coastal areas. Madura Island is surrounded by seas and boasts natural beauty along with potential tourist attractions. Bangkalan serves as one of the largest gateways to Madura and should ideally depict the beautiful essence of Madura (Sukandar, 2016). Some coastal areas in Bangkalan that could serve as tourist attractions in Madura include Kamal Beach, Socah, Tanjung Bumi, Arosbaya, and others. One of the issues in these areas is that coastal communities have not been able to manage and sustainably utilize environmental resources (Hur et al., 2016). Additionally, waste management is still lacking in coastal tourist areas in Bangkalan (Yulianto, 2022) which further deteriorates cleanliness and the environmental situation.

The problem of waste has given rise to the Zero Waste movement, aimed at addressing waste issues through environmental education. This aligns with environmental education as defined by Biddle (2014) which focuses on environmental awareness and understanding basic concepts such as water, waste, and plants. Zero Waste is a method to reduce waste and conserve existing resources (Bogusz, M. et al., 2021). One of the key concepts of this type of learning is to minimize waste generation or even avoid discarding materials that cannot be renewed. Literally, Zero Waste means no disposal, which implies minimizing any form of disposal in human life, including waste and energy.

In practice, waste management, although consistently advocated, is often not properly implemented. Waste management is still seen as a challenging task for communities, especially in developing countries. The lack of integrated practical curriculum addressing environmental issues is often cited as a reason for the limited implementation of environmental education in schools (Debra A Miller, 2010). Environmental education should be taught from an early age and continuously to instill environmental consciousness in children and develop it into a societal characteristic expressed in daily activities (Jayawardana, 2016). Given that the fundamental purpose of education is to develop and enlighten individuals to face the future, education must participate in addressing waste problems through activities like Zero Waste.

Preschool education should aim to help children understand how to deal with environmental issues, as it is the first formal education for children and introduces them to their future lives (Bulut, 2020). Educators or teachers who implement their knowledge about waste can serve as examples for children to learn how to manage the materials or tools they use and minimize waste generation (Boyd, 2020). When children become familiar with environmental examples and materials, their knowledge will form, and environmental awareness will become a habit.

The early years provide an ideal opportunity to utilize the existing potential to enhance understanding and appreciation of the environment and gain knowledge about the Earth (Wilson, 2015). Recognizing the importance of instilling habits, such as waste management, in young children, it is essential to understand the concept of Zero Waste-based learning among early childhood educators. These educators play a pivotal role in integrating and promoting an understanding of sustainability or Zero Waste concepts in early childhood education (Bahtić, K., & Višnjić Jevtić, 2020). Teacher knowledge undoubtedly affects their ability to plan and implement learning (Amusan, 2016) which, in turn, influences teachers in designing Zero Waste-based learning and instilling environmental knowledge in children. Thus, through educators' comprehension of effective Zero Waste-based learning, the cultivation of environmental consciousness can ultimately support sustainable tourism and become a significant contributor to coastal tourism in Bangkalan.

## 2. Methods

This study is a descriptive research, which aims to depict the condition or status of a phenomenon (Arikunto, 2014) Bangkalan, being a coastal area where the majority of early childhood education institutions are located, is an area that needs to maintain cleanliness for sustainability. Therefore,

understanding the knowledge of teachers related to environmental education is crucial to support the sustainability of coastal regions. The method used in this research is a survey method. According to Arikunto (2014), the survey method is commonly employed when dealing with a large number of subjects, with the purpose of collecting opinions or information about the status of phenomena during the research period. This descriptive survey research was conducted at early childhood education institutions in the coastal area of Bangkalan.

A total of 118 teachers who teach at early childhood education institutions in the Kamal Subdistrict, Bangkalan, Madura, participated in the survey. Respondents completed a questionnaire consisting of 27 questions related to Zero Waste-based learning. The survey was conducted through the completion of questionnaires to gather data regarding teachers' understanding of Zero Waste-based learning. This understanding was assessed through three aspects: knowledge, attitude, and behavior. The data obtained were then analyzed using a one-sample *t*-test, with a descriptive approach to explaining the results.

### 3. Result

Learning is one of the components in early childhood education institutions. It serves as one of the ways to transfer knowledge from teachers to children. The content in learning must be tailored to the students' needs, including those of early childhood. The purpose of learning is to provide material that can be applied by children in their lives.

The material in learning should consider the child's environment, making it contextual and practically useful for the child. One of the materials that need to be imparted to children today is about the environment. The changing and deteriorating environment makes it essential to teach and cultivate the ability of children to coexist with the environment. Currently, the concept related to living while considering the environment is also introduced under the term "Zero Waste lifestyle." The importance of introducing and providing knowledge about the environment highlights the need for teachers to understand environmental education.

Considering the significance of knowing teachers' knowledge about Zero Waste-based learning, this research is conducted to assess teachers' knowledge in this regard. Based on the analysis of descriptive data, the mean score of the questionnaire data is 16.413 out of a maximum score of 24. Meanwhile, the median score, or the middle value, is 17 out of a maximum of 24. Therefore, to determine teachers' knowledge about Zero Waste-based learning, the data is assessed based on the median score. When looking at this median score, it is found that 56 respondents scored below 17, while 62 respondents scored above 17. This implies that there is no significant difference in the number of teachers with high and low knowledge about Zero Waste.

Based on the calculation of the available data, 52.5% possess a good understanding out of the total number of respondents. This indicates that a greater number of teachers are familiar with Zero Waste-based learning through the seven indicators of instructional components, including objectives, materials, methods, media, evaluation, students, and educators. In detail, it can be seen in figure 1.

Referring to figure 1 above, it is observed that item 16, which pertains to learner evaluation regarding waste reduction, received the lowest scores compared to other items, both in terms of median and mean. This suggests that evaluation is not actively conducted by teachers. Furthermore, item 23, which deals with waste management activity planning, also received low scores. Children do not engage in waste management activity planning. For items 4, 22, and 27, they all received the same score, with an average of 0.3 and a median of 0. Item 4 addresses teacher activities related to Zero Waste learning materials. Item 22 discusses children's learning activities related to recycling waste. Meanwhile, item 27 addresses the opportunity given to children to design waste management activities they enjoy, guided by teachers. Item 12 has an average score of 0.4 and a median of 0. This indicates that teachers require assistance in determining methods for waste management activities.

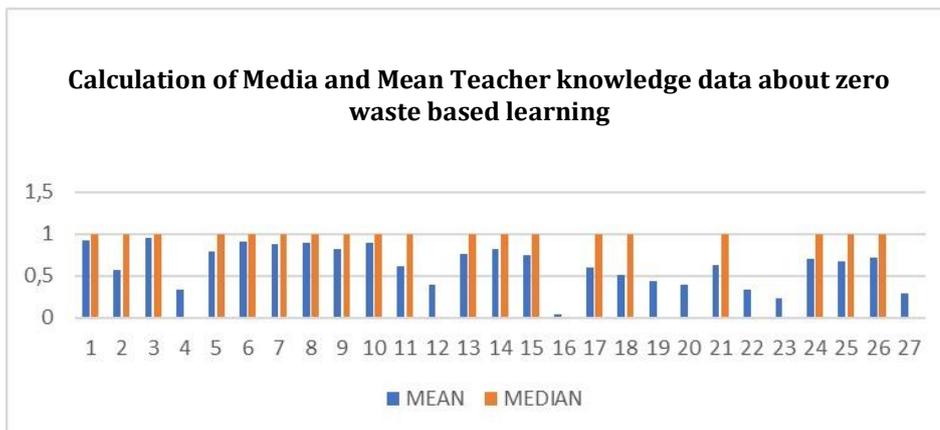


Figure 1. Calculation of Median and Mean

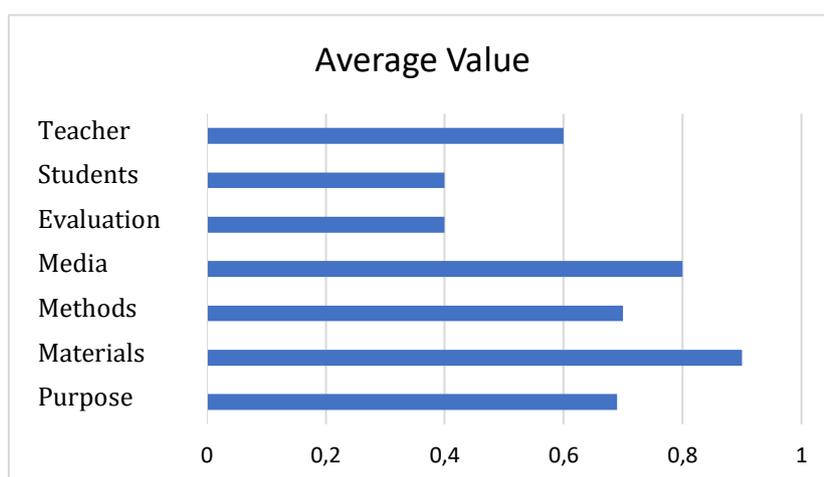


Figure 2. Average Indicator Scores

After analyzing the scores for individual items, the next step is to examine them based on indicator groups. When looking at figure 2, it can be inferred that among the indicators related to Zero Waste-based learning, teachers' knowledge of materials or learning resources for Zero Waste-based education ranks the highest. Teachers possess the ability to determine the materials or resources needed to teach children about Zero Waste-based learning. Furthermore, many teachers are also knowledgeable about the media, methods, and objectives of implementing Zero Waste-based learning. Educators have a fair understanding of activities related to Zero Waste-based learning. However, teachers tend not to provide activities related to Zero Waste-based learning for students. This is supported by the limited involvement of teachers in assessing learning activities related to Zero Waste-based education.

#### 4. Discussion

Learning is one of the essential components in early childhood education institutions. Learning serves as a way for educators and students to acquire knowledge with shared learning objectives (Tiara & Pratiwi, 2020). Learning activities occur when participants have mutually agreed-upon goals. All activities conducted through teaching and learning with shared objectives are encapsulated in the form of learning. Learning is a planned process of instructing students, systematically implemented and evaluated to enable students to achieve learning objectives effectively and efficiently (Faizah & Ulifa, 2017). Its ultimate goal is to shape the expected behavior of students (Hamalik, 2005). Planning is essential to align learning with objectives, making implementation easier and more systematic. Evaluation in learning is crucial to measure the achievement of learning objectives.

In the present day, learning continually evolves to align with contemporary needs, providing contextual knowledge to students. The changing and challenging environmental conditions have become a unique subject of study. Learning objectives that shape behavior must also adapt to current circumstances. Understanding and cultivating behaviors that preserve the environment are vital for individuals to coexist harmoniously with nature, without causing harm to themselves. One of the approaches to instill such behavior is Zero Waste learning. The concept of Zero Waste is considered crucial for imparting to all students, including early childhood education. Early childhood is the ideal time to instill Zero Waste habits, ensuring they become ingrained and contribute to a harmonious coexistence with the environment.

The goal of educating children is to promote their personal, emotional, physical, and social well-being, aligning with the objectives of sustainable development (Beattie, 2015). Those working with children bear the responsibility of fostering sustainable development, starting with early childhood education (Bahtić, K., & Višnjić Jevtić, 2020). Educators in early childhood education play a vital role in integrating and promoting an understanding of sustainability concepts in early childhood education (Jevtic et al., 2022). Teachers serve as both examples and facilitators in providing environmental education, including Zero Waste education.

Environmental education is considered most effective when introduced during early childhood, as it is the opportune time to develop knowledge, attitudes, and environmental awareness (Merrick & Braus, 2013). Familiarity with and affection for the environment is a means for educators to contribute to the future well-being of Indonesia's environment (Rohinah, 2017). Based on this, it is essential to introduce and teach Zero Waste learning to young children. This way, positive habits from Zero Waste learning can persist into adulthood, supporting sustainable development for a conducive environment for future generations.

Based on the data obtained, it is evident that most early childhood educators in coastal areas are aware of environmentally related learning content, media, and assessments. In general, 62 out of 188 educators are aware of and have engaged in environmentally related or Zero Waste learning activities, although this number remains relatively low. This is consistent with research indicating that educators have limited knowledge of waste management (Darmawati & Purnomo, 2020). Although the number of educators familiar with Zero Waste-based learning is not significantly high, some aspects of this learning approach are better understood by teachers. Teachers are particularly knowledgeable about the content that should be delivered to children regarding the environment. They recognize the importance of teaching children to sort waste before disposal, reduce waste production, and reuse items. Teachers also believe that Zero Waste education and recycling require visually presented content that is specific to early childhood education (Bulut, 2020). Environmental education should start within the family and extend to kindergarten and higher education (Maria-Sabo & Gavrilă, 2011). This education aims to equip students with the knowledge to think and behave positively toward the environment, making it an integral part of their lives (Murtadho, 2011). This material must be delivered to students so that it can be applied in their daily lives.

Teachers' knowledge about recycling activities in Zero Waste-based learning is among the highest. Educators frequently use recycling activities as part of their teaching practices. Activities that stimulate artistic aspects, such as recycling used bottles, can provide opportunities for teachers to teach recycling. This not only educates students about waste management by reusing bottles but also stimulates students' artistic and motor skills (Putri, 2021). Therefore, it is not surprising that teachers have the highest knowledge about recycling activities compared to other aspects.

Following teachers' extensive knowledge of recycling activities, their knowledge about waste reduction assessment is relatively low. Teachers are unsure of how to assess waste reduction capabilities. This contrasts with their understanding of the purpose of Zero Waste-based learning, which is to reduce waste. Early childhood educators face difficulties in assessing waste reduction due to the absence of assessment planning (Gomes, 2019). To address this issue, teachers need to develop assessment indicators.

In general, teachers have the highest knowledge regarding learning materials. They understand that the materials used in Zero Waste-based learning are related to waste sorting, waste reduction, and waste management. This aligns with the character education associated with valuing the environment. Considering the data, it is evident that comprehensive training is required to enhance teachers' knowledge of environmental learning, particularly in coastal areas. This knowledge should include ways to utilize the surrounding environment to provide environmental education to students. Such knowledge can assist teachers in imparting environmental knowledge indirectly, eventually becoming ingrained in students' daily lives.

## 5. Conclusion

The current state of the environment is a crucial subject of learning for all students at any educational level, including early childhood education. Teachers must provide learning experiences that support environmental improvement among students. Therefore, it is essential for teachers to be knowledgeable about environmentally-focused or Zero Waste-based learning components. While teachers' knowledge of Zero Waste-based learning is still relatively low, there are instances where educators have provided environmentally-related learning, such as recycling used materials or using recycled items as learning media. This highlights the need for collaboration among all parties concerned with environmental sustainability and schools to enhance teachers' knowledge of appropriate environmental education for children. Ultimately, this knowledge will shape children's understanding of the environment through specific or integrated daily learning materials.

## Declarations

### Author contribution statement

Dinda Rizki Tiara the presented idea and data taker. Eriqa Pratiwi developed the theory of learning on early childhood education. Ajeng Rizki Safira developed the theory of zero waste. All authors discussed the results and contributed to the final manuscript.

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### Data availability statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

### Declaration of interests statement

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

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