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Unveiling The Importance of Plastic Waste Education for Children in Islamic Religion

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Abstract

Plastic waste around us has been increasing year by year, yet public awareness of its harmful impacts remains relatively low. Environmental damage caused by plastic is already evident across oceans, land, and even the air. Education about plastic waste is important, especially for children, considering that they are the future generation who will inherit today's environmental impact. In this context, environmental education using an Islamic perspective is interesting to study because it combines spiritual values, ethics, and moral responsibility with sustainable practices, thereby providing a more holistic approach to shaping environmentally friendly behavior. However, research on plastic education remains limited, particularly from the perspective of educating children through the lens of Islamic studies. In response to this gap, this study aims to explore research trends related to plastic waste education for children within the framework of Islamic discourse. The study employs a qualitative approach through bibliometric analysis using VOSviewer. Data were collected from the Scopus database, comprising 83 publications from 2015 to 2025, using the keywords "plastic" and "waste education". The findings are expected to map and visualize trends in publication years, authors, and emerging keywords. By identifying these trends, the study seeks to offer recommendations on how to effectively educate children to adopt more environmentally friendly lifestyles, grounded in current research developments. These findings are particularly important in addressing environmental challenges through a more theoretical and analytical approach to keyword mapping. The results of this study explain that children can also become solutions or key actors for existing problems as individuals who have a more environmentally friendly and sustainable lifestyle as in the guideline of Islam.

Keywords: *Bibliometrics, Children, Islamic Religion, Plastic Waste Education*

1. INTRODUCTION

The consumption of plastic in the world has exceeded safe limits. The trade and industrialization of plastic began to spread during World War II and rapidly expanded throughout the world. Plastic production has reached more than 359 million tons per year. It is also evident that plastic waste continues to be a problem around us today. The use of plastic does make our daily lives easier because it is cheap and readily available everywhere, leading many people to use plastic as an instant choice in their daily lives.

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However, the nature of plastic, which is difficult to decompose even after hundreds to thousands of years, causes many problems, both in the environment and in health. In fact, plastic cannot completely disappear; it only breaks down into smaller particles, commonly known as microplastics (Nayanathara Thathsarani Pilapitiya & Ratnayake, 2024).

The problem of plastic, which takes a very long time to decompose, has even more complex impacts. The smallest form of plastic decomposition, microplastics is very dangerous for the environment, animals, and humans. Its tiny size means that microplastics can easily enter the food chain and to this day, remain very difficult to deal with. Microplastics also have the potential to contaminate the air, as they have been found in human lungs. If this plastic problem is not responded to quickly, it will continue to develop into a more serious issue (Rhodes, 2018). Based on research, it is predicted that by 2060 there will be a major problem if plastic waste production is poorly managed, with plastic waste production threatening to triple from 2015 levels. However, if waste management is improved and combined with a reduction in plastic use, the quantity of plastic waste can be reduced. Therefore, educating the public about plastic waste is necessary as part of the waste management process (Lebreton & Andrady, 2019).

The character values extensively discussed in Ihya' Ulumuddin make Imam Al-Ghazali's character education very interesting. According to Imam Al-Ghazali, character education is based on two main aspects: the soul, demonstrated by genuine worship of God and the physical, reflected in good ethics and the acquisition useful knowledge (Salaeh et al., 2023). The basic principle of character education provides the foundation that the formation of good morals and habits needs to be instilled early on in various aspects of life, including education on plastic waste management. Education on plastic waste management that starts as early as possible is an initial step that can be implemented.

Early childhood (0-6 years old) is the best time to lay the foundation and mindset. Therefore, educating children on the importance of plastic waste management is something that needs to be implemented (Haryono et al., 2021). According to studies, children who are educated about waste management show significant improvement compared to those who are not educated. Education provided to children both at home and at school has a significant impact on creating good habits for protecting the environment (Arslan & Sisman, 2025).

Especially in Islam, there is a guideline for humans to become caliphs on earth. It is written in the Qur'an, Surah Al-Baqarah verse 30 which means, "Remember when your Lord said to the angels, "I am going to put a khalifahs on earth..." (Al-Qur'an, Al-Baqarah 2:30). In addition, it is also explained in Surah Al-An'am verse 165, which means "It is He who has made you khalifahs on earth and has raised some of you above others in degrees, to test you in what He has given you..." (Al-Qur'an, Al-An'am 6:165). The two verses above form the principle for a Muslim to become a khalifah, meaning a leader and also a guardian. A leader for themselves and others, as well as a guardian of the earth as a home and place of residence for humanity. This khalifah is a trust and also a test, whether humans can take good care of the earth or instead destroy it. This includes matters related to waste; as a

good Muslim one must actively participate in efforts to manage plastic waste (Suhartanto et al., 2023).

Based on these issues, this study aims to provide recommendations for educating children in order to shape a more environmentally friendly lifestyle. This is done by analyzing research trends, or bibliometric analysis, related to the keywords "plastic" and "waste education." This study is important so that environmental problems can be addressed effectively through more theoretical analysis via keyword mapping. Moreover, there has been no previous research on this topic. The results of this study will also serve as a reference for future studies (Lamanauskas, 2023).

2. RESEARCH METHOD

The method used in this study was bibliometrics to obtain comprehensive results in line with the research objectives. The research flow can be seen in Figure 1. Scopus was chosen as the database because compared to other databases, Scopus provides high-quality scientific publications (Singh et al., 2021). The data were collected in 2025 from the Scopus database comprising 83 publications from 2015 to 2025. When retrieving data from Scopus, the keywords used were "plastic" and "waste education" with a search across all types. This study also filtered out research that only used English. From Scopus, the data obtained consisted of the number of documents by year, documents by country or territory, documents by author, and documents by subject area. These categories were selected so that the analysis could be conducted broadly and deeply. The number of publications per year helps assess research developments over time. The distribution of documents by country or region shows global contributions and collaboration. Author information reveals the most active and influential researchers. The classification by field of study explains the scope of the disciplines involved. With these additions, the explanation of the procedure becomes stronger and more comprehensive.

After that, all completed research was filtered, downloaded from Scopus, and mapped using bibliometrics. Bibliometrics is a quantitative method used to process scientific publications by measuring, analyzing, or mapping requested items such as keyword trends, number of publications, and citations (Donthu et al., 2021). In this study, the types of documents used were book chapters, articles, books, reviews, and conference papers. Using the bibliometrics method, this study used VOSviewer version 1.6.20 software to create maps based on the data and to visualize it. This application is easy to understand because it contains interactive and informative graphics (Smyrnova-Trybulska et al., 2018). Therefore, research trends can be identified through the results of this mapping, such as author clusters, institution clusters, keyword clusters, and citation clusters. The findings generated by Scopus and VOSviewer were then analyzed using descriptive methods to discuss the importance of educating children about plastic waste from an Islamic perspective based on research trends.

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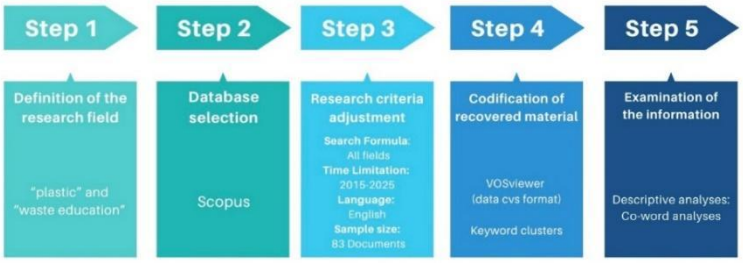

Figure 1. Bibliometrics Diagram Flow
Source: Author (2025)

3. RESULT AND DISCUSSION

This section shows the results of bibliometric analysis using the keywords "plastic" and "waste education." Through the data presented, keyword trends were identified to determine the results of this study. Analysis of term development and thematic maps also provide a more comprehensive picture of the progress of this study (Rahmat et al., 2025). As shown in Figure 2, the frequency of publications on plastic waste education between 2015 and 2018 was still low, with only 2-4 publications per year. In fact, there were no publications related to this study in 2019. This shows that this topic has not attracted much interest and has not become a priority in global academic forums. However, from 2020 to 2024, the number of publications increased significantly, with 7 publications in 2020 and 18 publications in 2024. This fact shows that this issue has become an international concern, coupled with calls for SDGs or Sustainable Development Goals (Fonseca et al., 2020).

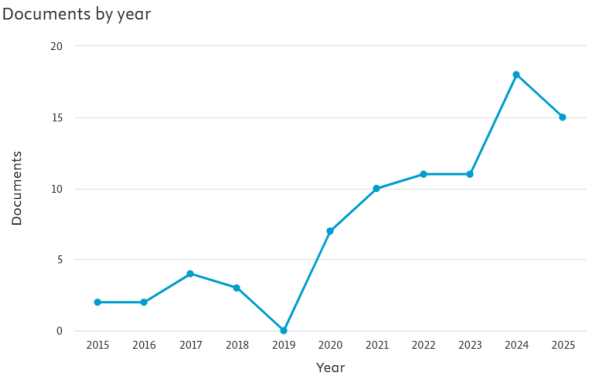

Figure 2. Frequency Publications from 2015-2025
Source: Scopus academic database (2025)

The countries with the highest number of publications as shown in Figure 3 are Australia, India, and Indonesia with 8 publications each. India, which is known for its negative image regarding hygiene (Chaudhary, 2000), becoming one of the countries that publishes the most publications on plastic waste education. India has a vast geography and the world's largest population of approximately 1.46 billion people in 2025 surpassing China, which

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previously ranked first in terms of population (World Population Review, 2025). Given these conditions, India has a major problem with waste, especially in densely populated cities. However in 2014, the Indian government launched the Clean India Mission, a national cleanliness campaign as part of the government's efforts to manage national cleanliness (Wikipedia contributors, 2025). As an example of its success, Indore has been named the cleanest city in India for eight consecutive years (2017-2024) thanks to its well-organized waste management system and the community's concern for cleanliness (8 Years in a Row! Why Indore Is the Cleanest City in India?, 2025). Apart from India, other countries are also actively publishing on plastic waste education. China ranks second with seven publications, while Ghana, Turkey, and the United Kingdom rank third with six publications each. They are followed by Germany, Italy, and Chile.

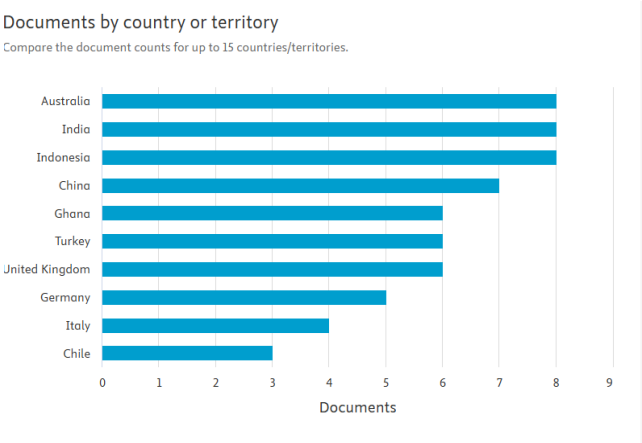

Figure 3. Publications by Country
Source: Scopus academic database (2025)

The author with the highest publication productivity, as shown in Figure 4, is Anokye, K., who has published six scientific papers. Anokye, K. does not come from a developed country, but rather from a small country in West Africa called Ghana. Anokye, K. is an environmental scientist. In Ghana, education about plastic waste has shown rapid development in recent years. Recognizing the significant influence and potential of the younger generation, several programs have been implemented in schools to raise awareness about plastic waste management. One such program is "Plastic-free School: A School-driven Solution to Plastic Pollution," which educates students on sorting waste by type, raising awareness about plastic waste issues, and implementing the 3Rs (Reduce, Reuse, Recycle). This program aligns with Ghana's national policy on plastic waste management and its contribution to sustainable development. Additionally, the primary goal of this program is to cultivate a generation of young people who recognize their role as solutions to the current global environmental crisis and become leaders in building a more environmentally friendly future (GhanaWeb, 2025).

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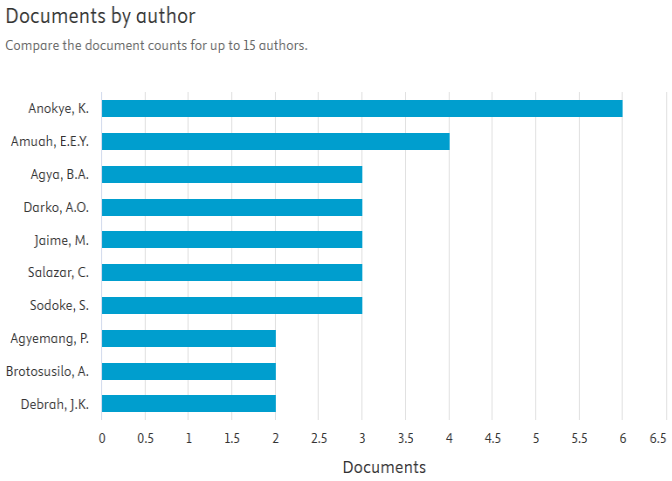

Figure 4. Publications by Author
Source: Scopus academic database (2025)

The topic of plastic waste education, when viewed from the perspective of subject areas as shown in Figure 5, cannot be separated from Environmental Science (27.5%), because plastic waste is an environmental issue that can directly have a negative impact on ecosystems (Kumar et al., 2021). The impact of this problem also disrupts the balance of the environment, including soil, water, and air. In addition, human behavior, commonly referred to as Social Sciences (17.6%) is also included in this topic. Plastic waste itself is inseparable from human lifestyles, such as the habit of using single-use plastics or littering. Government policies to address this issue are also urgently needed. In a study examining how to change human behavior to reduce plastic waste, it was proven that the most efficient efforts are to optimize the environmental structure, provide direct support, and implement effective communication strategies (Allison et al., 2022). Engineering (10.4%) and Computer Science (9.3%) also appeared due to the large number of studies on waste processing innovations, recycling technology, monitoring sensors, and integrated waste management systems. Based on the study results, there is a "Smart Trash Bin" that combines a smart bin (hardware), IoT (Internet of Things) based on a smart waste management system, deep learning, AI (Artificial Intelligence), and data processing, which is a machine that can automatically sort waste according to its type and enable real-time monitoring. This machine can be a solution as a tool that makes human life easier in everyday life (Rahman et al., 2022).

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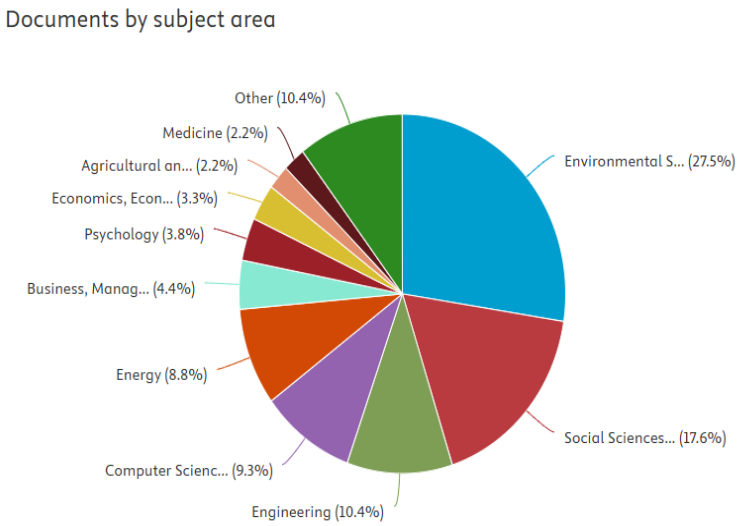

Figure 5. Publications by Subject Area
Source: Scopus academic database (2025)

Findings from a literature analysis on plastic waste education based on the years 2019-2024 show, as seen in Figure 6, that the focus of research is becoming increasingly complex and relevant to current environmental challenges. It is known that in 2022, research on waste management, recycling, and environmental education will also be frequently discussed topics. These topics emphasize the importance of basic public awareness of plastic and waste issues, which are highly relevant to everyday behavior, such as sorting waste at home and reducing the use of single-use plastics. In 2023, the issues discussed were more detailed, such as consumer behavior, climate change, composting, circular economy, and waste characterization. This focus shows waste management practices in the community. For example, research on consumer behavior emphasizes how buying and disposing of products affects plastic waste, while studies on the circular economy encourage innovation in turning waste into resources or new products that can generate income.

In 2024, studies will address more detailed issues regarding environmental management, solid wastes, and the role of high schools. This research emphasizes the need to implement systematic waste management practices, from households to educational institutions. This is highly relevant to today's world, where communities are faced with increasing plastic pollution in urban areas, climate change, and the need to build environmental awareness from an early age. Overall, the development of research from 2019 to 2024 not only shows the evolution of more complex and detailed topics but also reflects the close relationship between academic studies and everyday practices. Education on plastic waste management is no longer limited to theory but is leading to real-world applications.

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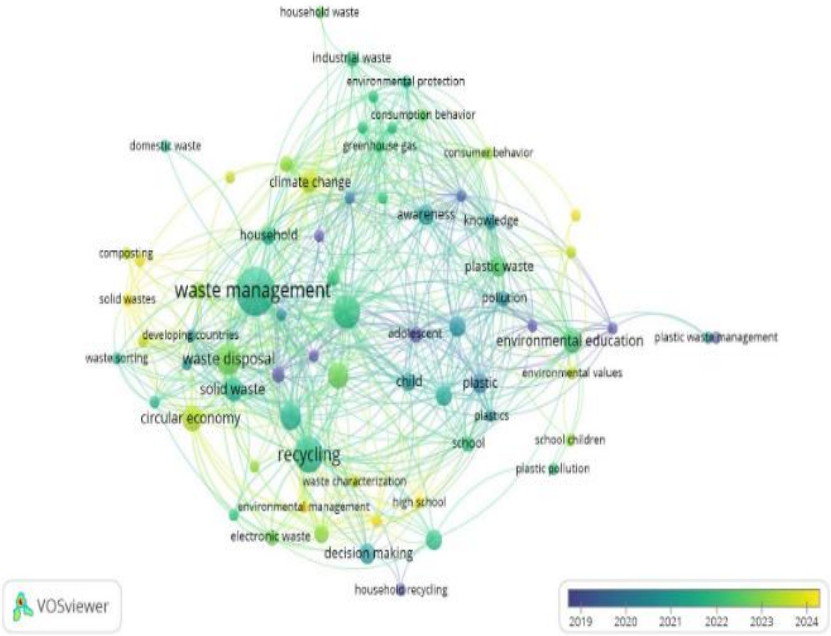

Figure 6. Terms of Plastic Waste Education Networks Visualization by Years
Source: Processed by the authors via VOSViewer (2025)

The results of the literature analysis on plastic waste education show, as indicated in Figure 7, that there is one main focus of the identified keywords. The results of the literature analysis also show the interrelationship between the existing terms and form interconnections in this study. "Waste management," which is the central point or main topic often discussed in this issue, is related to "waste disposal," which should be implemented through "waste sorting" between "solid waste," which includes non-biodegradable and biodegradable waste, either manually or automatically (Zhao & Li, 2022) so that "composting" can be carried out for biodegradable waste (Ansar et al., 2025), Unfortunately, waste sorting is still not widely implemented in "developing countries" (Rousta et al., 2020). Therefore, "environmental education" is necessary to instill "environmental values" in "children"(van de Wetering et al., 2022). At "school" teachers can provide "waste education" to "students" to raise "awareness" of "environmental management" and "consumer behavior" related to the use of "plastic" (Fischbach & Yauney, 2023). One effort that can be implemented is to "recycling" "plastic waste" or "electronic waste" (Damayanti et al., 2022), Because if the right "decision making" is not taken, it can lead to "pollution", "climate change", and "greenhouse gas" which are very dangerous for the "environment" (Kabir et al., 2023). All keywords are interconnected, reflecting the complexity, challenges, and guidelines related to this research.

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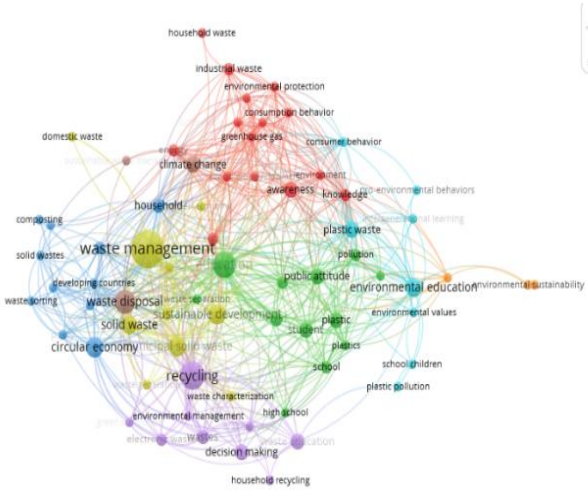

Figure 7. Networks Visualization by Terms of Plastic Waste Education
Source: Processed by the authors via VOSViewer (2025)

This study shows that education about plastic waste can increase children's knowledge and change their behavior, as seen from their increased awareness of maintaining cleanliness and reducing the use of single-use plastics. These empirical findings are in line with the concept of khalifah in Islam as mentioned in the Qur'an, Surah Al-Baqarah verse 30 which means, "Remember when your Lord said to the angels, "I am going to put a khalifahs on earth..." (Al-Qur'an, Al-Baqarah 2:30) and also explained in Surah Al-An'am verse 165, which means "It is He who has made you khalifahs on earth and has raised some of you above others in degrees, to test you in what He has given you..." (Al-Qur'an, Al-An'am 6:165), which emphasizes the role of humans as leaders and guardians of the earth. Children's awareness of caring for the environment shows that the values of khalifah and amanah can be understood from an early age if given the right education (Ahmad et al., 2025). This study confirms that Islamic-based environmental education not only increases understanding of environmental issues but also instills moral responsibility that encourages pro-environmental behavior in children.

The results of this analysis are also in line with one of the hadiths narrated by Muslim which states "Cleanliness is part of faith" (Muslim, n.d., Hadith no.223). As good Muslims are supposed to maintain cleanliness (Solihin & Lisalam, 2025), because cleanliness is part of faith. Starting from the small sphere of home and family, such as maintaining bedroom cleanliness, finishing food, sorting trash, not following fast fashion, being wise in purchasing items so they are not wasted, repairing broken items, bringing shopping bags when shopping, bringing drinking bottles from home so as not to buy disposable bottled water, and planting trees are part of faith (Larasati et al., 2023). In schools, this can be done by bringing lunch from home, taking turns cleaning the classroom, using public transportation, and working together to clean the school (Anastya Zalfa et al., 2022). In addition, you can also educate those closest to you about plastic waste, such as neighbors who still burn trash or friends who are consumptive when shopping (Riyana et al., 2022). In today's digital world, issues related to plastic waste can also be raised from the causes and impacts to the

solutions that can be implemented. Small actions can inspire others to join in reducing, reusing, and recycling which will bring about positive impacts and changes for the earth (Macheca et al., 2024).

This finding has deeper meaning when interpreted through the lens of Islamic education and character building. The increase in children's awareness and behavior towards plastic waste management not only demonstrates the effectiveness of environmental education, but also the internalization of Islamic moral values such as trustworthiness, responsibility, and the role of humans as khalifahs of the earth. This shows that environmental stewardship serves as an early character-building practice that shapes children's spiritual and ethical identities. When viewed in relation to global trends in Education for Sustainable Development (ESD), these results highlight that Islamic values-based education can serve as a culturally rooted framework for integrating sustainability principles in schools. By combining the global ESD approach with the teachings of the Qur'an and Sunnah, Islamic education has the potential to foster environmentally responsible behavior while nurturing holistic moral development (Muzakki et al., 2025). Therefore, the empirical findings of this study indicate that education about plastic waste within an Islamic framework not only reinforces sustainable habits, but also contributes to the broader mission of shaping environmentally conscious and ethically grounded Muslim children.

4. CONCLUSION

This study uses a bibliometric approach to examine plastic waste education. From the literature analysis, we can understand how plastic waste education studies have developed, both in terms of country or territory, authors, and subject areas that are currently being researched. Moreover, with the mapping and interconnection of keywords presented, the upward trend, although still fluctuating, consistently confirms that this topic is receiving considerable attention. The results of this study explain that implementing the importance of plastic waste education for children in the Islamic religion can make children who are the future of the world, become individuals who have a more environmentally friendly and sustainable lifestyle. In addition, they can also become solutions or agents of change for existing problems as outlined in the guideline of Islam. The findings from this study can also be used as a reference for further research. However, this study also has several limitations. Even though it uses fairly broad keywords, there is still the possibility that other relevant terms are not included. The data sources used in this study only come from Scopus, as it is believed to have publications of guaranteed quality. Even so, the use of a single data source does not rule out the possibility of missing relevant publications that are only found in other sources. This study also only focuses on publications from 2015-2025 using VOSviewer software with bibliometric analysis, meaning that long-term trends may not be fully represented. The use of literature reviews in this research also limits the results of the study to descriptive and conceptual analysis, rather than being based on direct observation in the field.

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