



ASSESSING CHANGES IN KNOWLEDGE, ATTITUDES, AND PRACTICES OF VIETNAMESE STUDENTS ABOUT MARINE PLASTIC POLLUTION

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Abstract

Marine plastic waste pollution significantly threatens marine ecosystems and human health, prompting global efforts to address this pressing issue. This study assesses the change in knowledge, attitude, and practice of Vietnamese youth regarding marine plastic waste pollution. Through a comprehensive analysis of survey data collected from 600 Vietnamese students before and after environmental education interventions, this research evaluates the effectiveness of educational initiatives in fostering awareness and behavioral changes among students. The findings reveal notable improvements in students' knowledge and attitudes towards marine plastic waste pollution following educational interventions. Moreover, positive shifts in behavioral practices, such as reduced plastic usage and increased recycling efforts, are observed the most among the primary students. These results underscore the importance of targeted educational interventions in promoting sustainable behaviors and combating marine plastic pollution.

Keywords: Marine plastic pollution; Knowledge, Attitude, and Practice (KAP); Environmental education.

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1. Introduction

Vietnam ranked as the third-largest plastic consumer in Southeast Asia, with a per capita plastic consumption of 41 kg in 2015 - a tenfold increase since 1990 [1, 2]. According to a 2015 study by Jenna Jambeck et al., [3], Vietnam was

identified as one of the top five countries contributing to ocean plastic pollution worldwide. Each year, an estimated 2.8 to 3.1 million tons of plastic waste is generated on land in Vietnam, with at least 10 % of this waste ending up in the ocean [3, 4].

In 2021, Vietnam generated 8,021 tons of solid waste per day, equivalent to 2.93 million tons per year. Urban areas contributed approximately 56 %, while rural areas accounted for 44 %. The volume of municipal solid waste has been steadily increasing in recent years, rising from around 2.7 million tons in 2018 to 2.83 million tons in 2019, and reaching about 2.93 million tons in 2021 [5]. The classification, recovery, recycling, and treatment of plastic waste in Vietnam remain limited [4]. Plastic waste and nylon bags make up roughly 12 % of household solid waste, with only about 11 - 12 % of this being processed and recycled. The rest is primarily buried, burned, or released into the environment. A study on the awareness, attitudes, and practices of plastic consumers in Vietnam, conducted by WWF and the International Union for Conservation of Nature [6], found that many people remain unaware of the harmful effects of plastic waste and single-use plastics on the natural environment. Most consumers view disposable plastic as a free item provided with their purchases. Additionally, according to WWF-Vietnam (2020), fewer than 3 % of those surveyed are aware of government programs and initiatives aimed at combating plastic waste pollution [6].

To address the issue of marine plastic pollution in Vietnam, commonly proposed solutions include raising community awareness, particularly among the younger generation, to foster a shift in knowledge, attitudes, and practices toward a more environmentally friendly and sustainable lifestyle [7, 8, 9, 10]. Numerous studies suggest that changing Vietnamese youth's behaviors, attitudes, and practices concerning sustainable

consumption and daily environmental protection can be effectively achieved through environmental education, particularly for school students [11, 12, 13]. This study aims to assess the changes in awareness, behavior, and practices of students in select schools across Vietnam as a result of participating in experimental environmental education activities.

2. Methodology

Study site and period: The study was conducted at one elementary school, one middle school, and one university. A total of 600 students (200 from each school) were voluntarily selected from all classes to participate in training activities, waste audit classification in schools, and coastal cleanup activities between November 2022 and March 2024. The list of participating students was the same for pre-survey and post-survey.

Questionnaire survey to assess changes in knowledge, attitudes, and practices (KAP): Questionnaires were distributed to students before and after their participation in environmental education and communication activities. The survey content covered: (i) students' understanding of plastic waste issues; (ii) students' attitudes and opinions towards the use of plastic-based products and plastic waste management; and (iii) student practices related to the use of plastic-based products and plastic waste management. The knowledge section consisted of 8 questions assessing students' understanding of plastic waste, with true/false answer options. The attitude assessment section includes 6 questions about students' attitudes and opinions regarding the use of plastic-based products, with response options of

‘disagree’, ‘neutral/unsure’, and ‘agree’. The practical assessment section consists of 7 questions, with the response options ‘practiced’ or ‘not practiced’.

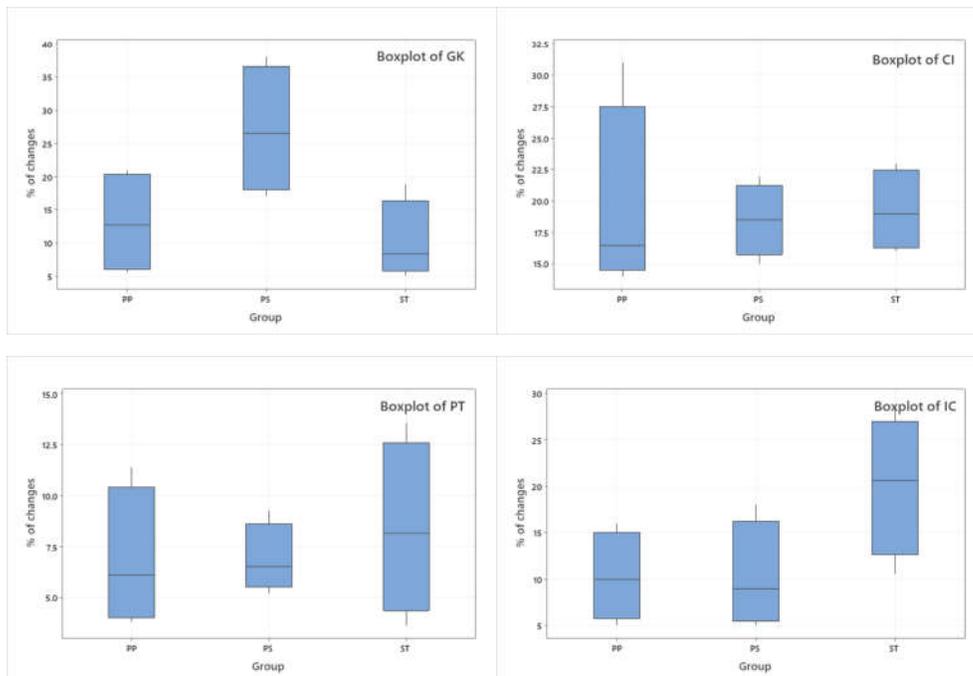
Data synthesis, processing, and analysis: The participants’ responses were compiled, statistically analyzed using box plots, and compared to evaluate the current status of Knowledge, Attitudes, and Practices (KAP) related to plastic waste among staff and students, as well as the changes observed after participating in the environmental communication activities. Box plots present the data distribution: Dispersion, shape, tail length, unusual values. The statistical values include position, lower quartile and upper quartile, maximum and minimum observed values, observe outliers [14].

3. Results and discussion

3.1. Change in knowledge of students about plastic pollution

The study surveyed the changes in the knowledge of students from universities, high schools, and elementary schools

who participated in the project before and after receiving training aimed at raising awareness about plastic waste. The questions assessed participants’ general knowledge of plastics (origin, production, use), causes and harmful effects of plastic waste, plastic decomposition time, information about countries affected by marine plastic pollution, the current state of marine plastic pollution, recycling possibilities, knowledge of single-use plastics, and plastic waste treatment methods. In this group of issues, eight key areas showing clear changes were highlighted as examples: general knowledge about plastic (origin, production, use) (GK), causes and harmful effects of plastic waste (CI), plastic decomposition time (PT), information about countries affected by marine plastic pollution (IC), knowledge of the current situation of marine plastic pollution (KP), information about plastic recyclability (IR), knowledge of single-use plastics (KS), and knowledge of plastic waste treatment (KT) (Figure 1).



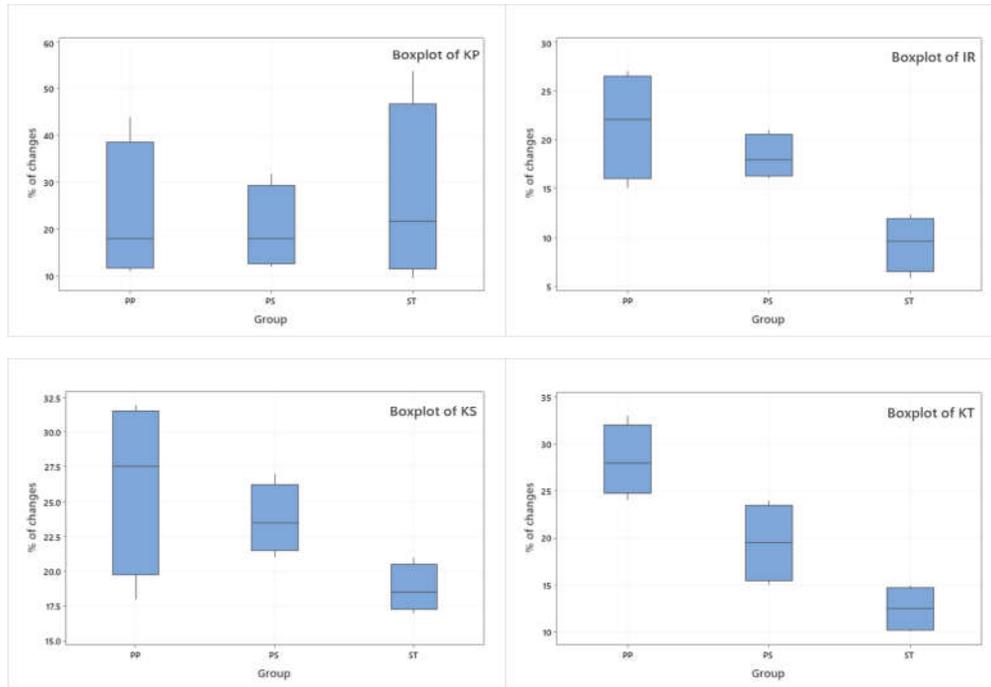


Figure 1: Changes in the knowledge of participants (elementary school students - PP, middle school students - PS, university students - ST) following environmental education and communication activities on plastic waste

The results show that knowledge about plastic, the harmful effects of plastic waste, and the recycling and treatment of plastic among participants in the project activities has significantly increased. This highlights the importance of communication efforts and raising awareness about plastic waste in schools and among younger generations to reduce its harmful impact on the environment, particularly the marine environment. Changes in knowledge have also led to noticeable improvements in behavior towards plastic products and plastic waste. However, for more complex concepts requiring foundational understanding (such as general knowledge about plastic and its decomposition time), the change among elementary students was less significant, as they may not fully grasp more advanced information about plastic products at this age.

The change in knowledge among university students was not significant before and after the environmental education activities, as this group already had a solid foundation of knowledge from previous education and demonstrated initiative in absorbing information from media and earlier lectures on the environment and sustainable development. However, for high school students, there was a notable increase in general knowledge about plastics (an increase of $27.0 \pm 9.7\%$ compared to before the training). Among elementary school students, knowledge about plastic waste treatment increased by $28.3 \pm 3.8\%$. This study highlights the importance of communication efforts in shifting perceptions among young people [11].

3.2. Change in attitudes of students in plastic pollution

Changes in the attitudes of project participants were assessed using the

following indicators: the need to reduce single-use plastic products (SR), views on alternatives to single-use plastics (PA), responsibility for reducing plastic waste pollution (RR), support for a green

and sustainable lifestyle (MG), attitude toward waste segregation and recycling (AS), and contribution to environmental efforts and plastic reduction activities (CE), as shown in Figure 2.

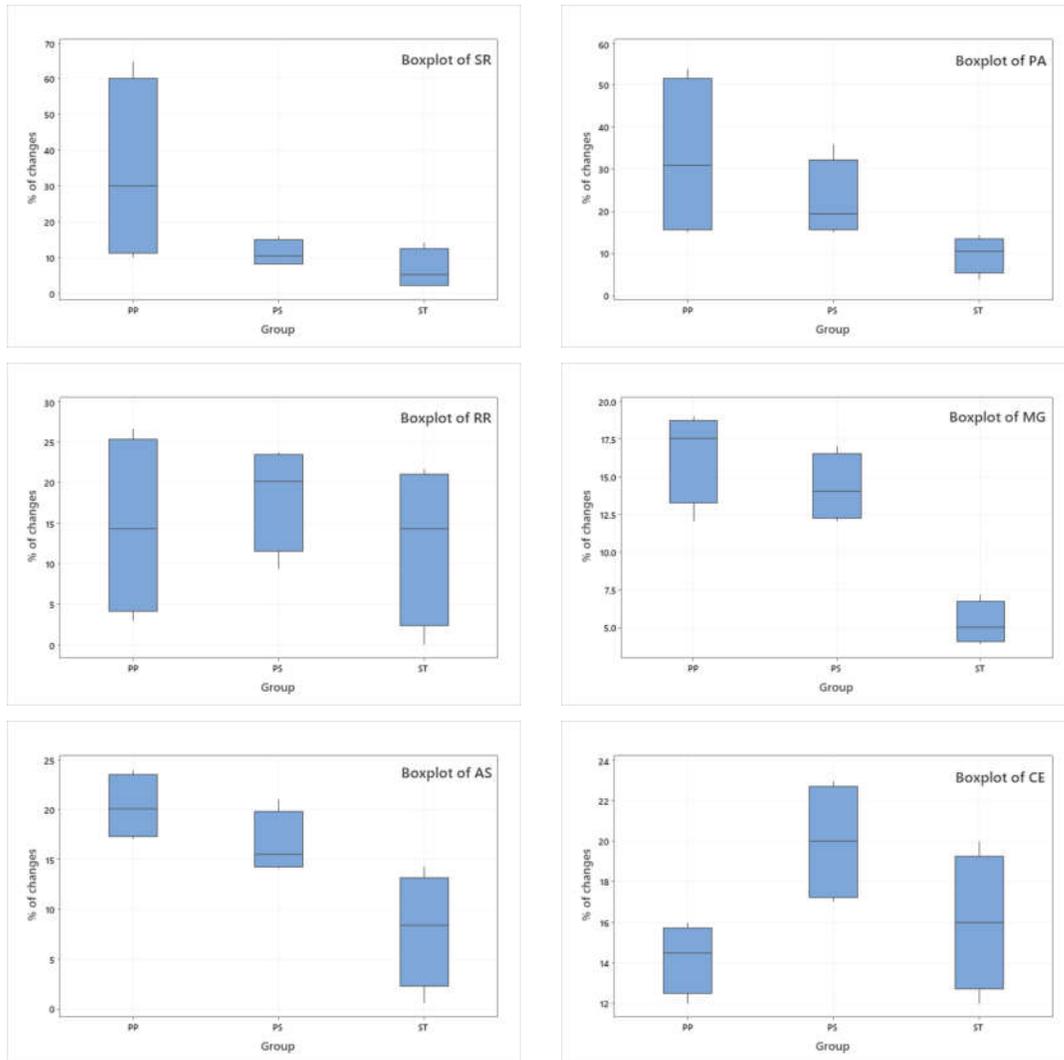


Figure 2: Changes in the attitudes of participants (elementary school students - PP, middle school students - PS, university students - ST) following environmental education and communication activities on plastic waste

After the training course and environmental activities, most of the participating students, especially elementary school students (PP), developed a more positive attitude towards the use of plastic products and plastic waste management. Specifically, more than 65 % of students changed

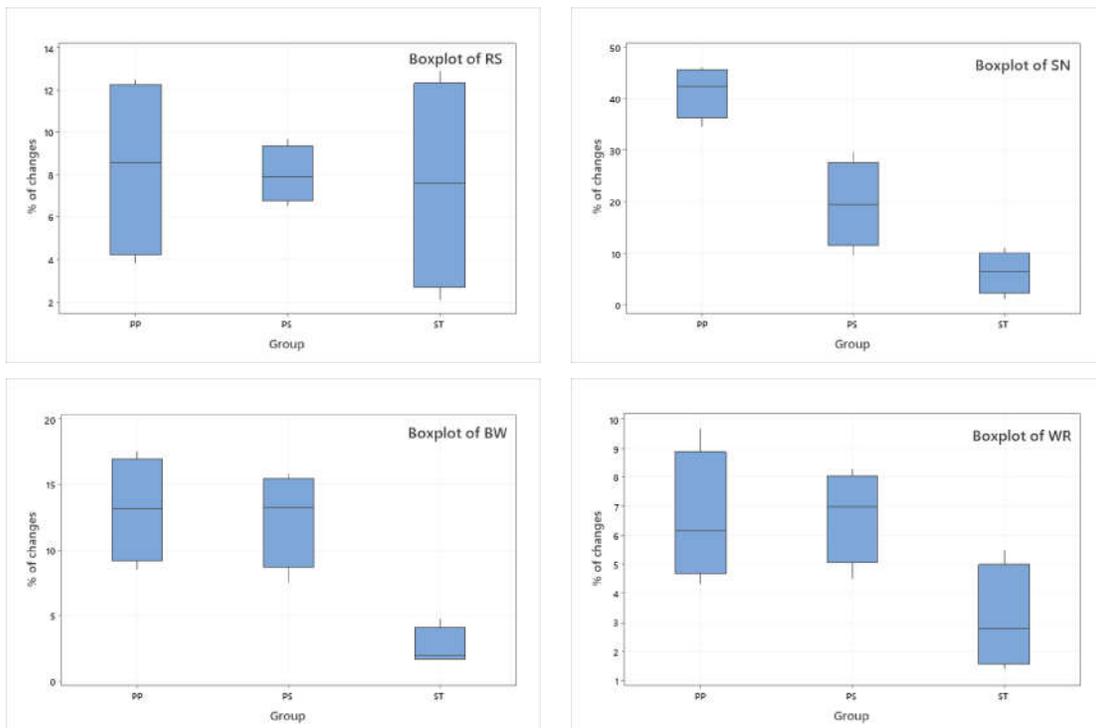
their views, expressing their agreement on replacing single-use plastic products with biodegradable alternatives to reduce plastic waste. Students gained an understanding of decomposition and the environmental persistence of plastic, which led to shifts in their perceptions of plastic products after use. Similarly,

in terms of attitudes towards limiting the use of single-use plastic products (PA), elementary and middle school students showed a significant change, with a 15 - 54 % increase in the number of students who felt this was extremely necessary.

Most students across all grade levels showed positive changes in expressing their views on proactively refusing plastic products (RR) when not necessary, with $15\% \pm 8$ of responses reflecting a shift in opinion. They expressed a growing inclination to refuse single-use plastic products. This study aligns with findings from similar previous research by Eagles and Demare (1999); Shimray (2016) and Soares et al., (2021) [10, 11, 13].

3.3. Changes in practice towards plastic products use and plastic waste

The survey, consisting of seven questions about good practices, was conducted before and after students participated in environmental training and extracurricular activities. The questions evaluated participants' practices related to plastic products, including: reducing the use of single-use plastic bottles (RS), saying no to plastic bags (SN), bringing personal items and reusable water bottles (BW), sorting and recycling waste (WR), sharing ideas and knowledge about plastic waste with others (SI), promoting changes to reduce or eliminate disposable plastic in schools (MR), and becoming an advocate for change (AP). The results of these changes are shown in Figure 3.



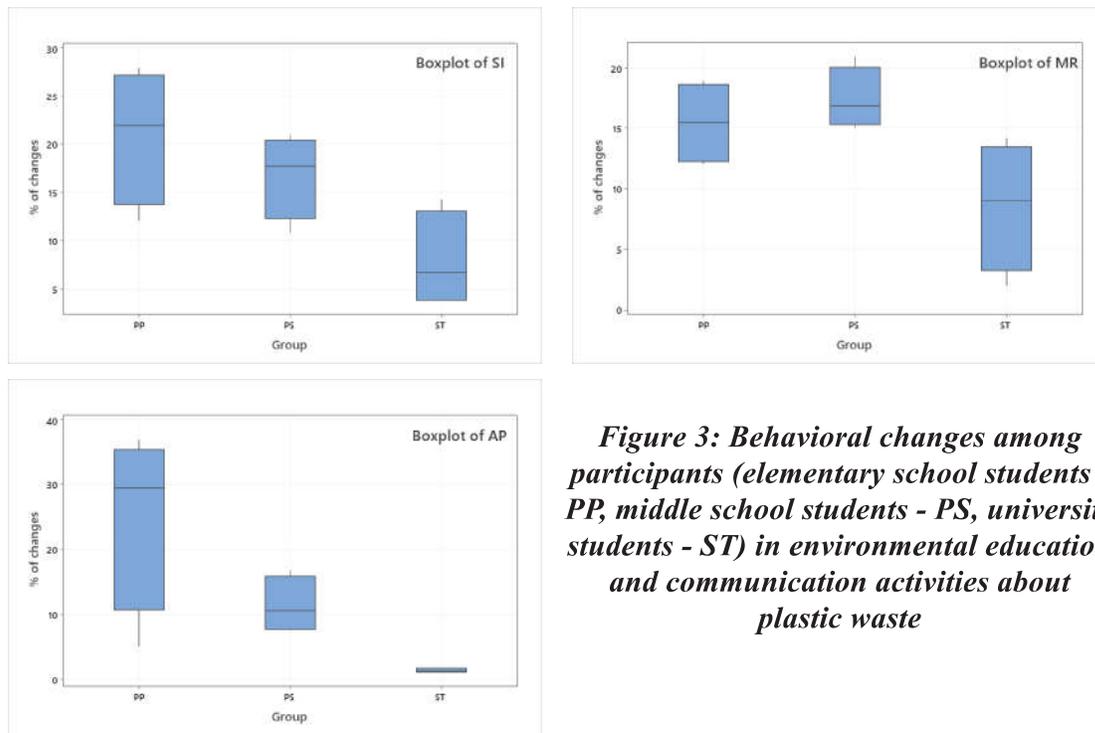


Figure 3: Behavioral changes among participants (elementary school students - PP, middle school students - PS, university students - ST) in environmental education and communication activities about plastic waste

The results show that while most students have reduced their daily use of single-use plastic bottles, the rate of improvement remains modest, averaging between 7.6 % and 8.4 %. This may be because common beverages like water and soft drinks are packaged in plastic bottles, and there is no deposit recovery program from manufacturers for these containers. In contrast, the shift away from plastic bags has been more positive, especially among elementary and middle school students, likely due to the availability of alternatives like cloth bags and reusable containers. For university students, replacing plastic bags with reusable ones has already become a habit, and their high awareness means there was little change in behavior after the training.

After participating in the study, all students demonstrated positive changes in their actions, such as carrying personal water bottles or actively using reusable

cups. Elementary and middle school students showed the most significant improvement, with an increase of approximately 12.5 to 13.1 %.

The action to share personal contributions toward behavior change and plastic waste reduction has significantly increased among primary and secondary school students. Evaluation results indicated that nearly 17 % of 9th-grade students and 21 % of 6th-grade students developed a strong contribution to sorting and recycling plastic waste after the training. Among middle school students, 9th graders exhibited the most significant change, with up to a 21 % increase in promoting activities toward green lifestyles and engaging in advocacy efforts.

4. Conclusions

Through environmental communication efforts to raise awareness about plastic waste and plastic product usage, there has

been a significant increase in awareness, attitudes, and practices among the participants. Notably, the training for elementary school students has been particularly effective, equipping them with essential skills and knowledge. These students are very eager and understand well all the key information, including the history and persistence of plastic waste, its environmental and ecosystem impacts, and proper waste classification. The active involvement of all students in awareness raising activities could lead to impact on the broader community including their parents and people surrounding toward greener lifestyle preventing and mitigating the harmful effects of plastic waste. Most students participating in the project have shown an increasing interest in environmental issues and a desire to learn more about plastic waste and ways to reduce it. The research findings indicate that effectively addressing environmental pollution, particularly plastic pollution in Vietnam, requires regular training activities to change the knowledge, attitudes, and practices, promote sustainable consumption and encourage daily environmental-friendly actions of young people, especially students.

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