



How Much Students in Primary School Know about Waste Sorting? (Pilot Research)

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Abstract

The Croatian education system incorporates sustainable development as one of its seven cross-curricular topics. The cross-curricular theme mentioned above encompasses the three dimensions of sustainable development, namely environmental (reduce and reuse), social (respect, rethink and reflect), and economic (recycle and redistribute) and can be connected to the European competence framework for sustainability GreenComp. The objective of the pilot study was to assess the knowledge level of 60 students of 6th grade primary school. This assessment was conducted after they had completed the waste management activities covered in the second educational cycle, which typically takes place in the 3rd, 4th, and 5th grades of elementary school. The analysis was conducted utilising Jamovi software, and based on the findings of the pilot study, it was ascertained that a majority of the students lack proficiency in waste sorting, hence highlighting the need for additional education in this domain. The majority of responders provided accurate responses regarding the weight of bio-waste. It can be inferred that the assessment of educational objectives, even though brief evaluations, is vital for enhancing knowledge adoption.

Keywords: *primary school, sustainable development, waste sorting*

1. Introduction

The Croatian education system incorporates sustainable development as one of its seven cross-curricular topics. The cross-curricular theme mentioned above encompasses the three dimensions of sustainable development, namely environmental (reduce and reuse), social (respect, rethink and reflect), and economic (recycle and redistribute). These dimensions are interconnected and aim to equip students with the necessary skills to engage in responsible societal behaviour, ultimately leading to personal and overall well-being. Cross-curricular themes are achieved through the integration of educational domains and instructional subjects across all mandatory and elective courses, as well as within the classroom setting, through the implementation of diverse projects, extracurricular or field teaching, and extracurricular activities. Waste management is a compulsory subject in all three dimensions of the 2nd cycle of education, which encompasses the 3rd, 4th, and 5th grades of primary school [1].

The European Framework of Competences for Sustainability operates at the European Union level. The adoption of GreenComp [2] aims to establish a comprehensive framework of competencies for sustainability that ought to be incorporated into educational curricula. This framework seeks to facilitate the cultivation of knowledge, skills, and attitudes among students that foster empathetic thinking, planning, and action, as well as a sense of responsibility and concern for the well-being of our planet and public health. Proficiency in sustainability empowers students to embody the principles of sustainability and embrace intricate systems in order to actively restore and preserve the well-being of the environment and promote fairness, thereby fostering a vision of a sustainable future.

To enhance students' comprehension of sustainable development, it is advisable to employ collaborative learning methods such as outdoor teaching, different creative and dynamic activities, and practical work. In these approaches, the teacher's role is not solely to instruct, but rather to inspire and exemplify the learning process [3-6]. By incorporating instruction on sustainable development into their studies, students gain a comprehensive understanding of the significance of sustainability. This



enables them to comprehend the intricate nature of the environment and make predictions about the future status of the planet depending on human actions.

Certain educational institutions have been branded as eco-schools, with the primary objective of imparting knowledge to the younger generation on environmental concerns and equipping them with the skills to make informed judgements for societal progress in the future. Eco-schools incorporate environmental instruction throughout all facets of the educational system and incorporated into the everyday routines of students. However, the findings of the study [7] indicate that children attending schools with eco-school status do not exhibit a significantly greater degree of waste awareness compared to students attending schools that are not affiliated with the eco-school system.

2. Methodology

The objective of the pilot study was to assess the knowledge level of sixth-grade elementary school students following their completion of the waste management tasks outlined in the second educational cycle, which typically occurs in the third, fourth, and fifth grades of elementary school. The measurement of knowledge acquisition was conducted using a brief online survey questionnaire, which was administered on a voluntary basis, while adhering to the research norms for children. The pilot study had a total of sixty sixth-grade children, with 38 (63.3%) being boys and 22 (36.7%) being girls. The Jamovi software package [8-12] was utilised to analyse the gathered data.

3. Results and Discussion

There are two inquiries pertaining to multi-layer packing and the presence of fruit remnants as a form of trash. The brochure, which was published by the Rovinj utility company as a component of the waste management education initiative in the city of Rovinj-Rovigno and the municipalities of Bale, Kanfanar, and Žminj, outlines the proper disposal of multi-layer packaging waste in a designated container for plastic and metal [13]. Additionally, it is mentioned that fruit peel is classified as a form of biowaste [14].

Table 1. What type of waste does a tetrapack of milk belong to?

Drink milk at school?		Tetrapack - type of waste?		
		paper	plastic	Total
Yes	Observed	37	13	50
	% within row	74.0 %	26.0 %	100.0 %
No	Observed	8	2	10
	% within row	80.0 %	20.0 %	100.0 %
Total	Observed	45	15	60
	% within row	75.0 %	25.0 %	100.0 %

Based on the responses obtained (Table 1), it is apparent that a significant proportion of participants (75.0 %) hold the belief that multi-layer packaging ought to be disposed of in a paper container, whilst a minority of respondents (25.0 %) advocate for the disposal of such trash in a plastic container. No statistically significant differences were found ($\chi^2 = 0.160$, $df = 1$, $p = 0.689$).



Table 2. What type of waste do peels of bananas belong to?

Gender		Type of waste		Total
		bio-waste	mixed municipal waste	
Female	Observed	20	2	22
	% within row	90.9 %	9.1 %	100.0 %
Male	Observed	32	6	38
	% within row	84.2 %	15.8 %	100.0 %
Total	Observed	52	8	60
	% within row	86.7 %	13.3 %	100.0 %

When queried about the categorization of the banana peel (Table 2), a significant proportion of participants (86.7 %) accurately identified it as bio-waste, although a minority (13.3 %) held the belief that it constituted mixed municipal waste. No statistically significant differences were found ($\chi^2 = 0.117$, $df = 1$, $p = 0.733$).

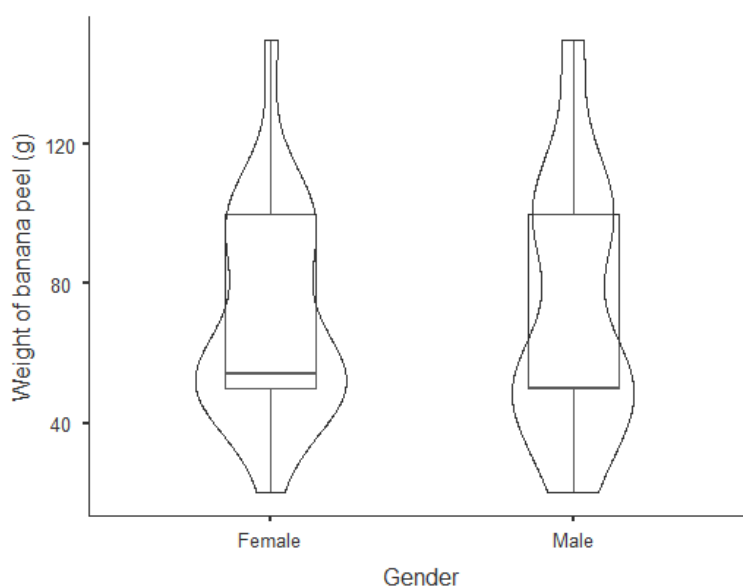


Figure 3. Weight of banana peel

According to the research [15-18], it has been reported that the peel of a banana typically constitutes approximately 30-40 % of the overall weight of the fruit. Hence, in the case of a banana with a weight of 200 grammes, the accurate response would fall between the range of 60 to 80 grammes. Based on the findings of the pilot study (Figure 3), it is evident that, on average, female participants perceive the weight of a banana peel to be 70.7 grammes ($M = 70.7$, $Me = 54.0$, $SD = 29.8$), whereas male participants perceive it to be 72.04 grammes ($M = 72.4$, $Me = 50.0$, $SD = 36.4$). These results align with the existing literature on the weight of banana peels. There is no statistically significant difference between the two groups (Mann–Whitney $U = 417$, $p = 0.987$).

4. Conclusion

Based on the findings of the pilot study, it was ascertained that a majority of students lack proficiency in waste sorting, hence highlighting the imperative for more educational initiatives in this domain. The



pilot study additionally shown that students possess the ability to assess the quantity of waste generated by banana peels, constituting approximately 30-40% of the overall weight. Hence, it is imperative to provide students with further information regarding the proportion of biowaste derived from non-consumable fruit components. The aforementioned information will also prove beneficial to individuals in their future roles as consumers, enabling them to make more educated purchasing decisions. It can be inferred that the assessment of educational objectives, even through brief evaluations, is vital for enhancing knowledge adoption.

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