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## Kaj osnovnošolci vedo o nevarnosti odpadkov?

### Izvleček

Informacij o tem, kaj osnovnošolci (od 6 do 15 let) vedo o nevarnosti odpadkov, ni dosti. V ta namen smo pripravili vprašalnik. Učenci so najprej s pomočjo 5-stopenjske Likertove lestvice odpadke ocenili kot (ne)nevarne, nato pa so zapisali, kako z odpadki ravnaajo doma in kaj naredijo, če odpadek vidijo v naravi. Rezultati raziskave so pokazali, da kljub temu da učenci vedo, kateri odpadki so nevarni, z njimi redko ravnaajo tako, kot narekujejo priporočila o ravnanju z odpadki. Ugotovili smo še, da le redki učenci odstranijo odpadek, ki ga opazijo ležati v naravi. Glede na rezultate raziskave menimo, da bi morali biti učenci vključeni v različne dejavnosti, v sklopu katerih bi nadgradili znanje glede odpadkov in sočasno razvijali pozitiven odnos do okolja.

Ključne besede: prookoljsko delovanje, ravnanje z odpadki, odpadki, osnovna šola

## How primary school pupils perceive waste hazardousness?

### Summary

*There exists little information about how primary school pupils (aged 6–15) perceive waste hazardousness. We therefore designed the questionnaire. First, the pupils were required to rate waste as predominantly hazardous or non-hazardous on a 5-point Likert scale. Then they were instructed to indicate how they usually dispose of waste at home, and they wrote what they did if they saw discarded waste outdoors. Results of the study show that although pupils know which waste is hazardous they seldom act in accordance with the recommendations for waste treatment and disposal. We also found that when pupils come across litter in the nature only some of them adopt a proactive approach to environmental protection.*

*According to the results we believe that pupils need to be engaged in activities that would help them to improve their knowledge on the matter and at the same time develop positive attitudes toward the environment.*

*Key words: pro-environmental action, waste management, waste, compulsory education.*

### 1 Introduction

Topics involving waste management and other environmental issues featured scarcely in Slovenian compulsory education science and biology curricula which were used until 2011. Since pupils were rarely actively involved in classroom lessons about environmental issues, we can speculate that their knowledge about waste management is weak, too. Moreover, it is highly unlikely that they have managed to develop strong environmental awareness and recognised that they, too, are responsible for the environment. If we seek to improve pupils

knowledge and behaviour about the environment, we need to ensure that they become familiar with different environmental issues. Pupils should be educated in a way that would raise their environmental awareness and improve their knowledge so that they could make informed and responsible decisions as adults (Fernández-Manzanal et al., 2007; Littledyke, 2008). They should also be made aware that environmental problems mainly result from human behaviour, and that solving them requires a profound change in the behavioural paradigm (Zelezny and Schultz, 2000).

If pupils are to acquire the competences that will help them to develop pro-environmental behaviour (which also includes sound waste management practices) they need a solid knowledge base (Jensen, 2002) and a positive attitude toward the environment (Kraus, 1995). In addition, environmental education should also encourage active role-taking in the protection, rather than the 'use', of nature and the environment (Bogner, 1999).

In the present study we investigated how pupils in Slovenia, aged 12–15 (second and third cycles of the compulsory school), perceive waste hazardousness, what they know about waste management, and whether or not they adapt their behaviour accordingly.

Studies about waste management behaviour of children provide useful knowledge for policy development regarding waste management in the future.

The study addressed following questions:

- (1) Do Slovenian primary school pupils correctly rate waste as hazardous to the environment and organisms if disposed of in the nature?
- (2) Do pupils follow the recommendation of (non)hazardous household waste disposal (Official Gazette of the RS, No. 45/2009)?
- (3) How do pupils behave when they come across waste outdoors?

## 2 Method

### *Participants*

A total of 215 pupils (aged 10–15) from one school participated in the study, which was conducted in the 2009/10 academic year. They attended the 5<sup>th</sup> (14.9%), 6<sup>th</sup> (24.7%), 7<sup>th</sup> (19.1%), 8<sup>th</sup> (18.6%), and 9<sup>th</sup> (22.81%) grade, respectively. There were 49.8% male and 50.2% female pupils.

### *Instrument*

The study focused on the pupils' knowledge and behaviour regarding waste management. We designed our own questionnaire.

First, the pupils were required to rate waste as predominantly hazardous or non-hazardous on a 5-point Likert scale, with the items rated as follows: 1 – *not at all hazardous*, 2 – *not hazardous*, 3 – *not sure if hazardous*, 4 – *hazardous*, and 5 – *very hazardous*.

Then they were instructed to indicate how they usually dispose of waste (e.g. packaging, fruit skins, used vegetable oil, motor oil, batteries, tins containing lacquers, varnishes or similar agents, bottles of aggressive detergents, and antibiotics) at home. They were asked to select the most appropriate of the six offered possibilities: "*We put waste in a bin for mixed waste.*", "*We separate waste, and then put each fraction in an appropriate waste bin.*", "*We dispose of waste when the waste collection company collects hazardous waste.*", "*We do nothing, we leave the waste in the basement.*" "*We put waste in a compost bin.*", "*We take waste to a waste collection and treatment centre.*" The pupils were also given the option of describing an alternative way of waste disposal.

In the third part the pupils wrote what they did if they saw discarded waste (candy wrappers, old tyres, paper handkerchiefs, skin fruits or puddles of motor oil) outdoors. They were asked to select one of the following five answers that best described their behaviour: "*I do nothing, I just walk on.*", "*I pick up the waste and put it in a bin. I also contact the waste disposal company and tell them about the waste.*", "*I feel shocked to see what people do.*", "*I do nothing, it will eventually decompose.*", and "*I have never seen such things being disposed of in the nature.*"

### 3 Results

#### *Pupils' evaluations of waste hazardousness*

Pupils found fruit skins, stable litter, and decomposing wood as nonhazardous to the environment and organisms (figure 1). They correctly rated candy wrappers, tins, plastic bags, damaged detergent bottles, antibiotics, batteries and motor oil as hazardous if disposed of outdoors. They could not decide, however, whether paper handkerchiefs and paper bags are hazardous or not.

Statistically significant differences were found in the evaluations of waste hazardousness for fruit skins, batteries and antibiotics between pupils of different grades. 5<sup>th</sup> grade pupils rated fruit skins higher, 6<sup>th</sup> and 7<sup>th</sup> graders rated batteries, and 9<sup>th</sup> graders rated antibiotics lower in comparison to other pupils (figure 1).

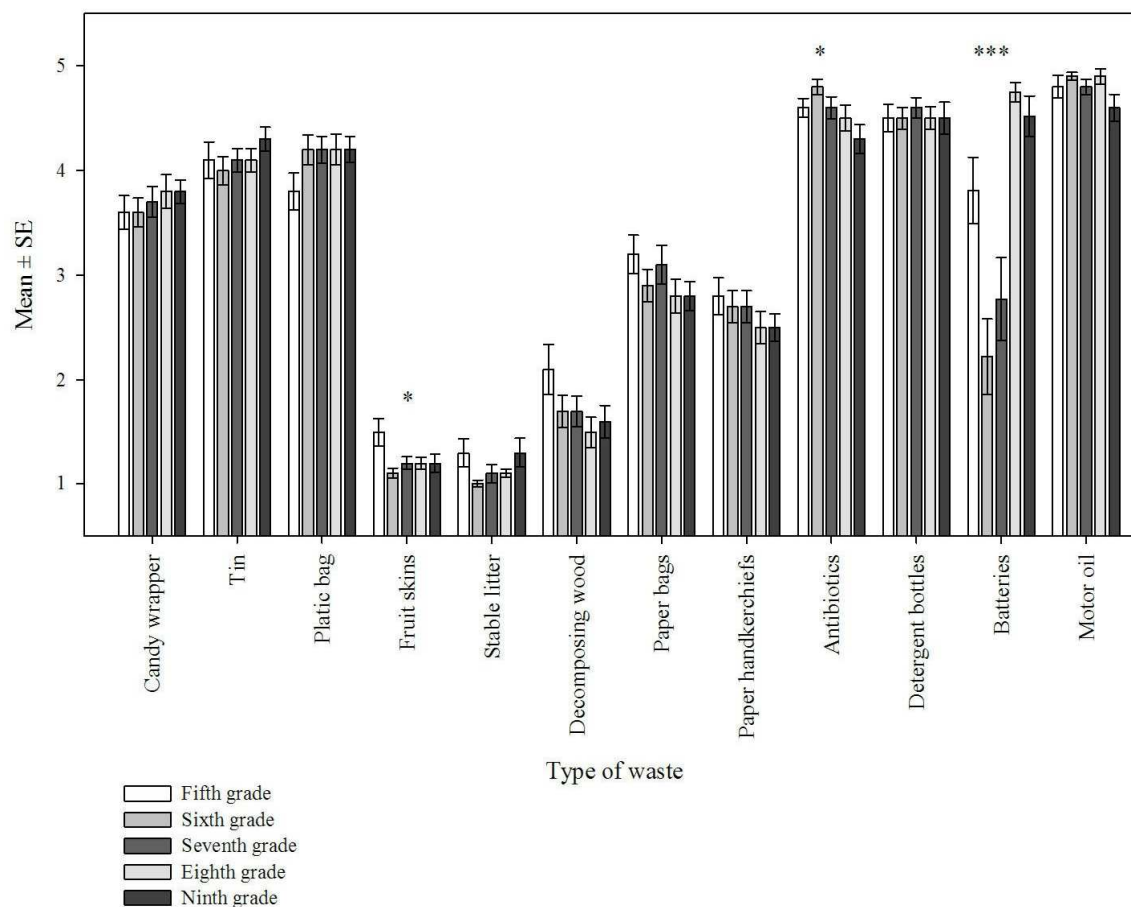


Figure 1: Pupils' ratings of waste hazardousness

#### *Pupils' reports about how they dispose of various waste at home*

We categorised pupils' answers about how they disposed of particular kind of household waste in 2 groups: Proper and Improper waste disposal according to the Official Gazette of the RS, No. 45/2009 recommendation. We found that pupils from 5<sup>th</sup> to 9<sup>th</sup> grades generally comply with the recommendation about nonhazardous waste disposal. The same is true for certain hazardous waste. 50% of the pupils from 5<sup>th</sup> to 9<sup>th</sup> grades would normally observe the rules for the disposal of motor oil and batteries. However, data about the disposal of vegetable oil show that only 14.4% pupils observe disposal recommendations. Many pupils improperly dispose of tins containing lacquers and varnishes (57%), and bottles of aggressive detergents (61%). This waste often ends up in a bin for mixed waste or in a plastic fraction bin. With regard to antibiotics, the pupils reported that they put them in a bin for mixed waste (which they should be discouraged from doing), dispose of them when their

local waste collection company collects hazardous waste, or even take them to a waste collection and treatment centre (behaviour which should be encouraged).

#### *Pupils' role in the environmental protection*

We asked the pupils what they do when they come across litter (candy wrappers, paper handkerchiefs, fruit skins, old car tyres, and motor oil) in the nature.

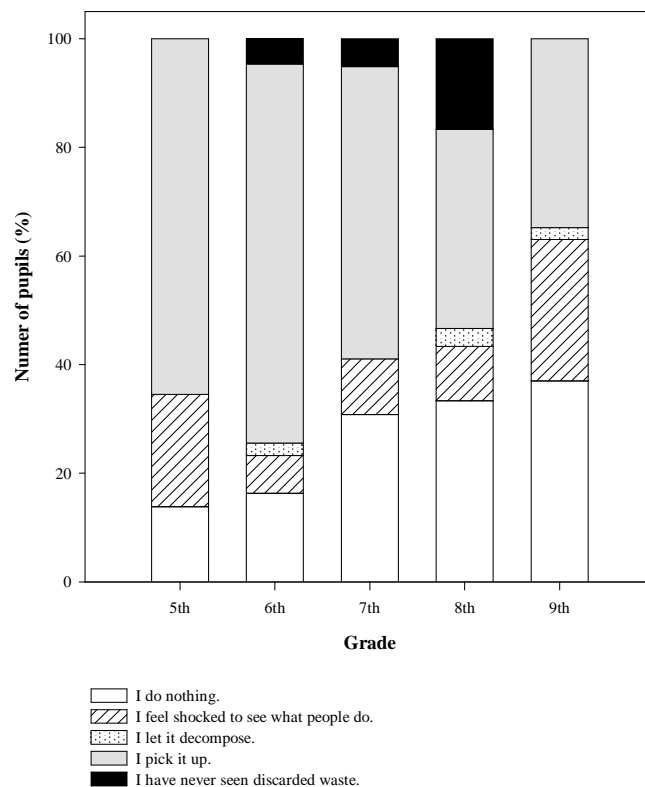


Figure 2: What do children do when they see a discarded candy wrapper outdoors?

Most pupils will pick up the candy wrapper and put it in a bin (figure 2), however, this behaviour decreases with age. In general, pupils from the second cycle (grades 5–6) will more readily pick up a discarded wrapper than their colleagues from the third cycle (grades 7–9), with pupils of the 7<sup>th</sup> grade being an exception. Also, the highest percentage of children who would do nothing comes from the last cycle (grades 8–9).

Result for the discarded paper handkerchief can be compared to the results for the candy wrapper. 5<sup>th</sup> grade pupils are most likely to pick it up and put it in a bin, while 9<sup>th</sup> and 8<sup>th</sup> graders are the most likely to ignore it. As many as 33% of 9<sup>th</sup> and 31% of 6<sup>th</sup> graders reported that they would do nothing with a discarded handkerchief because it would decompose anyway. The answers of 7<sup>th</sup> grade pupils are almost equally distributed between "I do nothing.", "I pick it up." and "I feel bad about it."

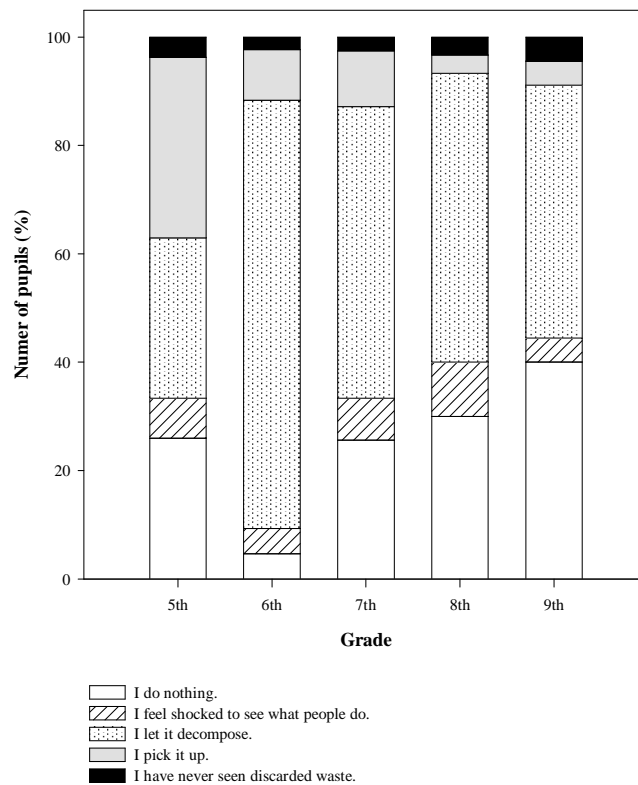


Figure 3. What do children do when they see discarded fruit skins outdoors?

Figure 3 shows how children react when they come across discarded fruit skins in the street or in the nature. Almost 80% of the 6<sup>th</sup> graders do nothing, since they correctly assume that the fruit skin will decompose. 9<sup>th</sup> and 8<sup>th</sup> graders dominate in that they would do nothing if they saw discarded fruit skins, while 5<sup>th</sup> graders are the most likely to clean up the mess.

The data for car tyres show that pupils are aware that disused car tyres should be removed and disposed of properly (figure 4). Data shows that there is a considerable percentage of pupils from the 8<sup>th</sup> and 9<sup>th</sup> grades who would not take action to protect the environment. These pupils usually just feel disgusted at what other people do, or simply do nothing.

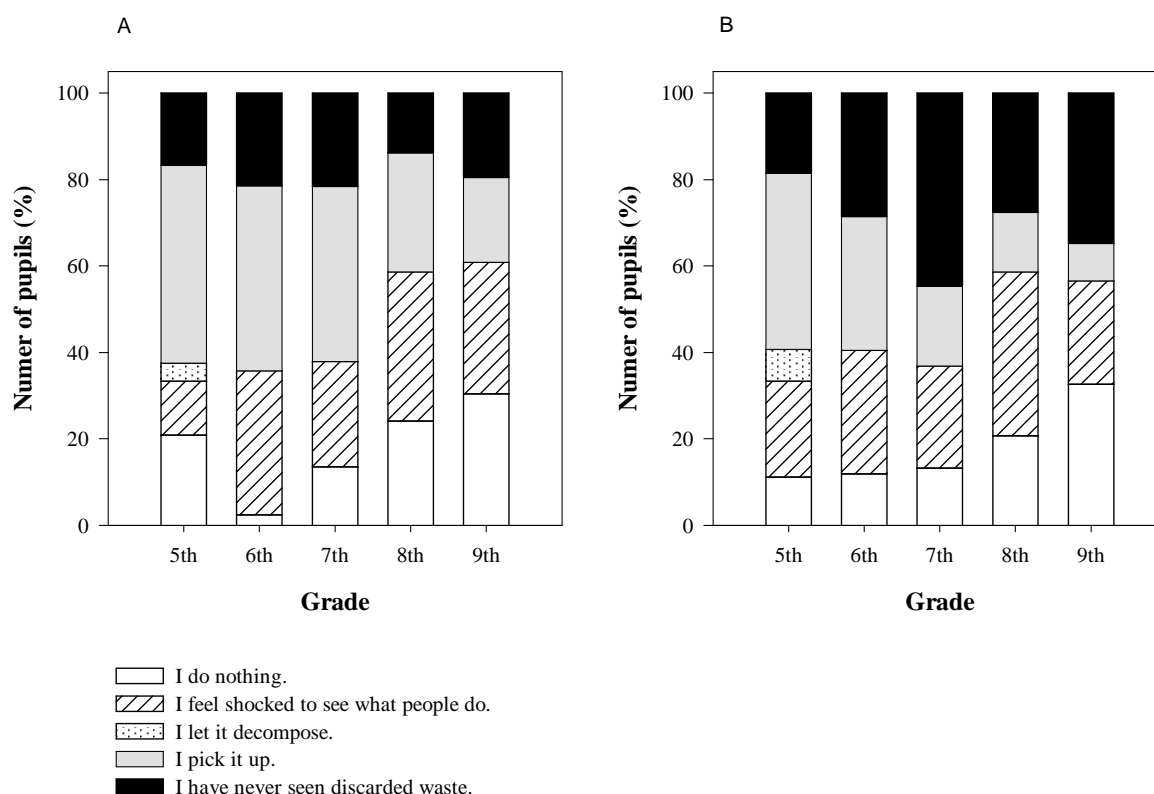


Figure 4. What do children do when they notice discarded car tyres (A) and/or spilt motor oil (B) outdoors?

A – car tyres, B – spilt motor oil

#### 4 Discussion

Results of the study show that although pupils know which waste is hazardous (figure 1) their behaviour about the disposal of certain hazardous household waste is limited. Lacquer and varnish tins and detergent bottles are not disposed of accordingly. They frequently end up either in the mixed-waste container or in a bin for waste fractions. Results about the disposal of antibiotics are also rather discouraging, since 26% pupils replied that they put antibiotics in a bin for mixed waste. Furthermore, children treat vegetable oil as nonhazardous waste, and for this reason it is frequently discarded in mixed-waste containers or simply poured down the drain. Few pupils reported that they take used vegetable oil to a waste collection centre, even though this would be the proper thing to do.

On the other hand, data shows that pupils dispose of used motor oil and batteries as recommended.

When we asked the pupils what they do when they see litter outdoors we found that pupils from the second cycle (grades 5–6) will more readily pick up a discarded waste than their colleagues from the third cycle (grades 7–9). Also, the highest percentage of children who would do nothing comes from the last cycle (grades 8–9; figures 2-4).

According to the results of the study we believe that if pupils learned about waste management in different grades of compulsory education they would perhaps be more likely to manage waste properly when older.

It should be noted that pupils' knowledge alone does not necessarily promote pro-environmental behaviour. Kobińska et al. (2007) demonstrate in a study that good environmental knowledge is not always accompanied by pro-environmental behaviour. This study showed that pupils could correctly rate waste as hazardous or non-hazardous. However, when asked what they do when they see discarded waste in the street or in the nature, pupils from the last cycle responded that they mostly did nothing or merely felt disgusted at the actions of others. Pupils from the second cycle frequently reported that they

would pick up such waste themselves or notify a waste collection company or a waste treatment centre (figs. 2-4). We can speculate that pupils from the second cycle, at least to some extent, provided the answers that they thought were expected from them.

Kellert (1996) reports that pupils aged 12–15, are the most receptive to learning about environmental issues. They should therefore be engaged in a learning process through which they would improve their knowledge about waste management, and become more willing to take pro-environmental action. In order to facilitate a change in pupils' behaviour and raise their environmental awareness, we propose that environmental education become an integral part of the curriculum throughout all three cycles of compulsory education. A belief that waste and other environmental issues pose a significant problem to society and the self can change intentions toward acting (Barr, 2007).

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