Znanje in vedenje učencev v povezavi z ravnanjem in odlaganjem nevarnih in strupenih odpadkov

Tatjana Vidic
BC Naklo, Slovenija, tatjana.vidic@gmail.com

Iztok Tomažič
UL, Biotehniška fakulteta, Slovenija, iztok.tomazic@bf.uni-lj.si

Izvleček
Številna gospodinjska čistilna sredstva vsebujejo snovi, ki predstavljajo nevarnost za ljudi in okolje. Z raziskavo smo pri sedmošolcih, osmošolcih in devetošolcih preverili razumevanje pojmov nevarno in strupeno ter, ali pojma pravilno uporabljajo v kontekstu. Poleg znanja smo preverili, kako učenci ocenjujejo svoje okoljsko vedenje. Učence smo vprašali, kje dobijo informacije o ravnanju z odpadki ter nevarnih in strupenih snoveh. Rezultati kažejo, da učenci razumejo pojma nevarno in strupeno. Prav tako pojma pravilno uporabljajo v kontekstu. Sedmošolci in devetošolci so v tem delu vprašalnika v povprečju dosegli 79 %, osmošolci pa 80 % možnih točk. Ugotovili smo še, da med okoljskim vedenjem in znanjem ni korelacij. Učenci so navajali, da največ informacij o nevarnih odpadkih dobijo ali doma ali v šoli. Več deklet (54,5 %) kot fantov (42,9 %) pa je navajalo, da informacije o strupenih snoveh dobijo v šoli. Z raziskavo smo potrdili ugotovitve podobnih raziskav, da so korelacije med znanjem in okoljskim vedenjem majhne, ali pa jih skoraj ni.
Ključne besede: nevarno, strupeno, znanje, pro-okoljsko vedenje

Pupils' knowledge of and reported behaviour regarding treatment and disposal of hazardous and toxic substances

Abstract
Many cleaning products used in households contain chemicals potentially harmful or even toxic to both people and the environment. In this study we address questions how well pupils in 7^{th}, 8^{th} and 9^{th} grade understand the terms (hazardous and toxic) and if they correctly integrate these two terms into a suitable context. In addition to knowledge, we were interested in how pupils evaluate their behaviour concerning environmental issues. We also asked pupils about the primary source of information for waste management and hazardous and toxic substances. The results show that pupils understand the terms hazardous and toxic. We found that pupils correctly integrated terms hazardous and toxic in the text. 7^{th} and 9^{th} graders on average achieved 79 %, and 8th graders 80 % for this item. Results show that pupils' self-reported behaviour does not correlate with their knowledge. We found that pupils gain the most information about hazardous waste from the family or school. More girls (54.5 %) than boys (42.9 %) obtained information about toxic substances in school. In this study, we support the findings of previous research, that there is little or no correlation between knowledge and pro-environmental behaviour.
Key words: hazardous, toxic, knowledge, pro-environmental behaviour

1 Introduction

We have simplified many household tasks. Instead of using a washing bat to scrub laundry, we use washing machines and cleaning agents. Many household cleaning products contain chemicals potentially harmful or even toxic to both people and the environment. Therefore, oven cleaners, floor waxes, furniture polishes, medical leftovers (e. g. unused antibiotics), coatings, as well as some glues have to be treated as hazardous waste. It has been shown that the average US household generates more than 10 kg of HHW (hazardous household waste) per year. As much as 50 kg of hazardous items can be accumulated in the house, and often remain there until the residents move out or undertake an extensive cleanout (EPA/530-86-038).

In order to improve understanding of HHW issues and reduce environmental and health risks, in his article, Malandrakis (2008) stressed the importance of environmental education programs. These programs, which are relevant to formal education (Ernst and Monroe, 2004), promote environmental values, behaviours and management. Therefore, they have become a part of many national curricula (in: Ernst, 2007). It has been shown that increasing an individual's environmental knowledge results in more pro-environmental attitudes and more environmentally responsible behaviour (Hsu, 2004; Fielding and Head, 2012), although some authors argue that knowledge is not a sufficient precondition leading to a behavioral change (Kollmus and Agyeman, 2002). Overall, the value of education, interpretation and awareness-oriented activities, is reflected in promoting environmental values and behaviours (Bamberg and Möser, 2007). Teachers are key to effective environmental education in the classroom (Yavetz et al., 2009).

When discussing the formation of the pupils' pro-environmental moral norms and attitudes the roles of the parents and the media should also be considered. Little research exists on transmission of environmental attitudes within families. To some extent environmental concern and commitments are transferred from parents to children (Peer et al., 2007; Leppänen et al., 2012) and vice versa (Vaughan et al., 2003; Tomažič and Vidic, 2010).

In addition to the school programme, the world wide web provides a type of free-choice-learning opportunity, and presents a unique enticement opportunity for the public to engage in free-choice learning about environmental topics. Because information on the web may be misleading, users should employ critical thinking, a necessary component of understanding and selecting high quality information (Paris, 2002).

1.1 Purpose of the study and research questions

While all European countries highlight the need to develop ethical values, some countries (e.g. France), give priority to the development of environmental knowledge, while others (following the example of England) give priority to environmental skills (Rioux, 2011). According to the Slovenian national curriculum both knowledge and skills concerning environmental issues are important. Environmental topics are included in the curricula for the 6^{th}, 7^{th} and 9^{th} grade.

In this study we address following questions.

RQ 1: The first is how well pupils in 7^{th}, 8^{th} and 9^{th} grade understand the terms (hazardous and toxic).

RQ 2: The second is, if they correctly integrate these two terms into a suitable context.

For above questions, we assumed that 8^{th} and 9^{th} graders will achieve better test scores than 7^{th} graders, since these topics are discussed from 4^{th} to 9^{th} grade of primary school.

RQ 3: The third question is if pupils have knowledge of treatment and disposal of household hazardous substances (waste).

We assumed that pupils have knowledge about how to treat and dispose of household hazardous substances (e.g. detergents, varnishes, batteries, thermometers, insecticides, medicines…), since they learned about this topic in 4^{th}, 5^{th}, 6^{th} and 7^{th} grade and they have handle such substances (waste) at home daily.

RQ 4: In addition to knowledge, we were interested in how pupils evaluate their behaviour concerning environmental issues. Their evaluations were used to find out (4^{th} question) if a correlation between knowledge and behaviour exists.

We expected strong correlation between knowledge and behaviour, since environmental issues described in the test text concern pupils' daily life.

RQ 5: We also asked pupils about (5th question) the primary source of information for waste management and hazardous and toxic substances.

We assumed that teachers in school would be mentioned as the primary source of information, since they talk about hazardous and toxic substances during classes.

2 Materials and methods

2.1 Participants

A total of 133 pupils (aged 12–14) participated in the study, which was conducted in the academic year 2013/14. They attended the 7th (33.1%), 8th (34.6%), and 9th (32.3%) grade. Overall there were 54.3% male and 45.7% female pupils.

2.2 Instrument

Leeming et al. (1995) stress that there is no single and widely recognized scale for measuring children's attitudes toward and knowledge of a broad range of environmental issues. In the mid-1990s, meaningful comparisons across studies about environmental attitude and knowledge were impossible due to a lack of suitable instruments. For this reason, some instruments were developed such as CHEAKS and NEP (Leeming et al., 1995; Dunlap et al., 2000). In this study we did not use any of the above-mentioned scales, since we focused on the pupils' reported behaviour and their knowledge about certain concepts and topics: *hazardous, toxic, waste management*. We therefore designed our own questionnaire composed of four parts. The first part assessed students' knowledge about hazardous and toxic substances, and how they dispose of such waste. For this, we used 11 items, all in a multiple-choice format each having between 4 to 5 possible answers. The second part of the questionnaire consisted of 10 true/false statements, which examined the pupils' correct usage of terms such as toxic, hazardous, and dangerous within a suitable context. The third part of the questionnaire consisted of three items and was used to assess student's reported behaviour concerning their use of household cleaning products containing toxic ingredients and expired medicines. Pupils had to rate statements describing their behaviour using a 4-point scale, with the items rated as follows: *0 – never, 1 – occasionally, 2 – often, 3 - always*. In the fourth part of the questionnaire, we established the sources of information about hazardous and toxic substances and waste management.

2.3 Statistical analysis

Raw data, obtained from the questionnaires was input into Microsoft Excel and later transferred to the SPSS program. We used basic descriptive and inference statistics for comparing the students' knowledge and reported behaviour according to grade and gender.

The Chi^2 test was used to compare the frequencies of students' correct and wrong answers according to school grade. Point-Biserial correlations were calculated in order to assess relations between knowledge and reported behaviour.

3 Results

3.1 The meaning and contextualization of terms hazardous and toxic according to grade

In this section, the results for first two research questions are presented: (1st) how well pupils in different grades (7th, 8th and 9th) understand the terms (**hazardous and toxic**), and (2nd) whether they correctly integrate these two terms into a reasonable context.

The following paragraph offers a detailed description of the results, presented in Table 1. For the question that assessed the knowledge about different symptoms arising after consumption of a toxic substance (**Item 1**), about 65% of respondents provided the correct answer. However, about 35% of respondents thought that symptoms (*nausea, vomiting, dizziness, and vertigo*) are normal for a healthy person, and are not a consequence of a toxic substance consumption. There was no statistically significant difference among results for different grade levels. **Item 2** listed several items (namely, an

apple, a cleaning agent for removing lime scale, nettle tea, a piece of walnut cake, a fist of paracetamol, 2.5 decilitres of brandy, a piece of bread with pâté, milk) for which the pupils were asked what is toxic if consumed in the given amount. Of the 133 pupils, 55% provided the correct answer (cleaning agent for removing lime scale, a fist of paracetamol, and 2.5 decilitres of brandy). There is a statistically significant difference among the results for different grade levels, as the number of correct answers stood out for 9th graders. Less than 50% of 8th and 7th graders answered correctly, as these pupils didn't consider the consumed amount of alcohol as toxic. **Item 3** asked pupils how to find out whether a substance causes negative effects on human health (whether it is toxic) by ingestion, skin contact or inhalation. The correct choice among 5 offered options was that the package is labelled toxic if it contains toxic substances. On average 93.2% pupils' selected the correct option for this item. Although no statistical difference was observed among the results of 9th, 8th and 7th graders, the latter more frequently selected the wrong choices. A high percentage of 9th (83.7%) and 8th (73.9%) graders chose the correct choice for **item 4**, which described that specific toxicity tests are used to assess toxicity of a given substance. 52.3% of 7th graders thought that toxicity of a substance can be assessed from periodic table, which is incorrect. Some 7th graders (10%) thought that toxicity cannot be assessed. Some pupils also thought there is no need to assess the toxicity of a substance, since a small quantity is not harmful. The results are not surprising. According to the Slovenian curricula, pupils learn about toxic substances in biology and chemistry in the 8th and 9th grade. There is a statistically significant difference among results for different grade levels. **Item 5** stated that inhalation of gas vapours is (a) recommended, (b) can be detrimental to health, (c) has no effect on health, and (d) is not recommended only for pregnant women and children up to 3 years of age, while others can inhale gas vapours. Results indicate that 97.7% of the pupils know that inhalation of gas vapours is detrimental to health. All 8th and 9th grade students answered correctly. **Item 8** contained 3 tasks. The first task (**8A**) is discussed in this section, while items 8B and 8C are discussed in the next section. This task required pupils to recognize a special GHS label (corrosive). 85% of pupils recognized the label for a corrosive substance. However, 7th graders did not prove as successful as 8th and 9th graders, since 13.6% of them decided the label means toxic and not corrosive. The latter could be due to the fact that GHS labels are revised during courses of chemistry in 8th and 9th grades. There was a statistically significant difference between the results for different grade levels. **Item 9** asked pupils to recognize hazardous wastes. They had to pick out nail polish, acetone, batteries and drain cleaner as hazardous. 62% of pupils recognized these items as hazardous.

Table 1: Frequency distribution of correct answers according to grade level

Item	**7th grade f (%)**	**8th grade f (%)**	**9th grade f (%)**	**χ^2 - test**	
				χ^2	p
I1: *Symptoms that arise after consuming toxic substance.*	54.5	73.9	67.4	3.844	0.146
I2: *What is toxic if consumed?*	47.7	45.7	72.1	7.636	0.022*
I3: *Is a substance detrimental to health?*	90.9	93.5	95.3	0.687	0.709
I4: *Which procedure is used in the laboratory to assess whether a given quantity of a substance is toxic to the organism when ingested?*	36.4	73.9	83.7	23.978	<0.001*
I5: *Inhalation of gas vapours.*	93.2	100.0	100.0	NC	NC
8A: *Recognize special GHS label*.	70.5	97.8	86.0	13.246	0.001*
I9: *Recognize hazardous wastes*.	61.4	60.9	62.8	0.037	0.982
Average	**64.9**	**78.0**	**81.0**		

Note: df = 2; statistically significant differences are labelled with *;
NC – not calculated; Items 6, 7, 8B and 8C are presented in table 3.

Item 10 contained 10 statements where pupils had to correctly integrate terms hazardous and toxic into a reasonable context (Table 2). Pupils had to decide whether each statement is correct or incorrect.

More than 90% pupils found statement (**no. 1**) incorrect. 75% 9th graders found statement (**no. 2**) correct, while 8th and 7th graders were not as successful. Pupils learn about this topic in biology in the 8th grade. Surprisingly, 7th graders found statement (**no. 3**) incorrect, whereas the 8th and 9th graders did not share their opinion. Namely, more than 60% of 9th graders found this statement correct, which is incorrect. There is a statistically significant difference among results for different grade levels. More than 70% of pupils consider fruit peelings treated with insecticide to be toxic (statement **no. 4**). 93% 9th graders correctly assessed statement (**no. 5**) as incorrect. 8th and 7th graders shared this opinion as well. More than 90% pupils know that rat poison is dangerous to human health (statement **no. 6**). More than 90% pupils know that consumption of alcoholic beverages (statement **no. 7**) is harmful to human health. Pupils consider statement (**no. 8**) incorrect, however, the percentage of those who have such an opinion is not as high as we expected. Although we didn't find statistically significant differences for test scores, results for this statement should be discussed. 50% of pupils didn't find excessive intake of fluids dangerous to health. We believe that this result is a reflection of advertising the drinking of lots of non-alcoholic beverages as healthy. More than 80% pupils found statement (**no. 9**) incorrect. More than 90% 9th and 8th and 82% 7th graders found statement (**no. 9**) incorrect. More than 90% 8th and 9th graders and 82% 7th graders found the last statement (**no. 10**) to be correct.

Table 2: Frequency distribution of correct answers according to grade level for items 10_1 to 10_10

Statements	**Grade**			χ^2 - test		
	7th f (%)	**8th f (%)**	**9th f (%)**	χ^2	df	p
10_1: *Driving a motorcycle without proper protection is not dangerous.*	90.9	97.8	97.7	2.966	2	0.227
10_2: *The HIV virus is dangerous because it causes infection with AIDS.*	68.2	65.2	74.7	0.913	2	0.634
10_3: *Canned food in tin may be contaminated with botulinum toxin, and is therefore not toxic.*	70.5	54.3	37.2	9.682	2	0.008*
10_4: *When the fruit is treated with insecticides, unwashed fruit peelings are toxic.*	75.0	78.3	72.1	0.454	2	0.797
10_5: *Skiing on unsecured ski slopes has the possibility of triggering an avalanche, and is therefore toxic.*	84.1	84.8	93.0	1.931	2	0.381
10_6: *Rat poison is not toxic and therefore not dangerous to human health.*	95.5	91.3	95.3	0.853	2	0.653
10_7: *Regular consumption of alcoholic beverages is harmful (hazardous) to health.*	93.2	91.3	90.7	0.198	2	0.906
10_8: *Excessive intake of fluids is not dangerous to health.*	50.0	56.5	51.2	0.439	2	0.803
10_9: *Everything that is hazardous is also toxic.*	81.8	89.1	86.0	0.988	2	0.610
10_10: *Everything toxic is also hazardous.*	81.8	95.7	93.0	5.207	2	0.074
Average	**79.1**	**80.4**	**79.1**			

Note: statistically significant differences are labelled with *

3.2 Pupils' knowledge of treatment and disposal of hazardous substances (waste)

In this section, the results for the third batch of research questions are presented (Table 3): knowledge about treatment and disposal of household hazardous substances (waste).

Item 6 asked how the invasive cleaning agent for removing lime scale should be handled. Pupils on average (91.7%) know that such a cleaning agent should be handled with caution (e.g. wearing gloves, and letting fresh air into a room). Less than 10% of pupils believe that precaution is not necessary when handling invasive cleaning agents, which is incorrect. There are no statistically significant differences among the results for different grade levels. **Item 7** asked how to treat expired medicines. The majority of pupils chose the answer stating that medicine should be taken to a household hazardous waste centre where the collection takes place. Some pupils answered that medicine can be thrown in the container for mixed waste or in the container for organic waste. Both answers represent statements of incorrect waste management. **Item 8**, tasks **8B** asked pupils how to handle a cleaning agent labelled as corrosive, and **8C** how to dispose of a container that contained such a cleaning agent. Distribution of the correct choice for task **8B**, stating that before the use of a cleaning agent we should read the instructions and follow them, was rather similar for 7th, 8th and 9th graders. Pupils also decided for the choice stating that no special handling is necessary, which is an incorrect choice. Task **8C** was how to dispose of the container that contained this cleaning agent. The majority of pupils (83.3%) decided on the answer stating that waste of this sort should be taken to a household hazardous waste centre where collection takes place. There was no statistically significant difference among results for **8B** and **8C** task for different grade levels.

Table 3: Frequency distribution of correct answers according to grade level for items stating treatment and disposal of hazardous substances

Item	**7th grade f (%)**	**8th grade f (%)**	**9th grade f (%)**	**χ^2 - test**	
				χ^2	**p**
I6: *Handling of invasive cleaning agent for removing lime scale.*	88.6	93.5	93.0	0.800	0.670
I7: *How to treat the medicines that have expired?*	81.8	91.3	88.4	1.891	0.388
I8B: *How to handle a cleaning agent labelled as corrosive?*	86.4	84.8	90.7	0.741	0.691
I8C: *How to dispose of a package containing a corrosive cleaning agent?*	81.8	91.3	76.7	3.541	0.170
Average	**84.7**	**90.2**	**87.2**		

Note: df = 2

3.3 Correlations between knowledge and behaviour

We were also interested if there is correlation between the pupils' knowledge and behaviour. Pupils evaluated their behaviour in certain situations (described below), using a 4-point scale.

Behaviour no. 1

Be1: *We do not put unused medicines into the mixed waste bin.*

Item 7 (Table 3) asked how to handle expired medicines.

Data (r_{pb} = 0.133; $p < 0.05$) indicate that there is no correlation between knowledge and behaviour. Although 87% pupils provided correct answers to the question on how to treat expired medicines, 51.5% stated that they always put unused medicines into the mixed waste bin, and 40.2% that they never do this.

Behaviour no. 2

Be2: *I use gloves when I clean the bathroom or flooring with invasive cleaning agents.*

Item 6 (Table 3) asked how an invasive cleaning agent for removing lime scale should be handled.

Data (r_{pb} = 0.119; $p < 0.05$) indicate that there is no correlation between knowledge and behaviour. Pupils (89%) provided correct answer for this item. However, only 43% of pupils use gloves when handling invasive cleaning agents

Item 8B (Table 3) asked pupils to choose the correct statement describing proper handling of cleaning agent labelled corrosive. Combination (*Be2* and item 8B) were similar to the former one (*Be2* and item

6). However, item 8B asked how to handle cleaning agent labelled corrosive. Data (r_{pb} = 0.101; p < 0.05) indicate that there is no correlation between knowledge and behaviour.

Behaviour no. 3

Be3: *I enjoy fruit treated with pesticides without hesitation.*

Item 10_4 (Table 2): When the fruit is treated with pesticides, unwashed fruit peelings are toxic.

75% of pupils provided correct answer that peelings of fruit treated with pesticides are toxic and 51% pupils stated that they never eat fruit treated with pesticide. We found a statistically significant correlation between knowledge and behaviour for this task (r_{pb} = -0.221; p < 0.011). Students who answered correctly to Item 10_4 more strongly disagreed with statement *Be3*.

3.4 The main sources of information about waste management and hazardous and toxic substances according to gender

Pupils gain the most information about hazardous waste management from the family or school (Figure 1a). Girls (38.6%) stated that the family is the primary source of information about hazardous waste management, while boys (31.3%) picked the school. In addition, pupils obtain information about hazardous waste management online (14%) and in the media (13.2%).

On the other hand, pupils gain the most information about hazardous and toxic substances in school (Figure 1b). In school, girls (54.5%) obtained more information of interest about toxic substances than boys (42.9%) did. In addition, pupils obtain information online (16.1%) and in the media (12.7%). Less than 10% of pupils stated that family is also a source of information about toxic substances.

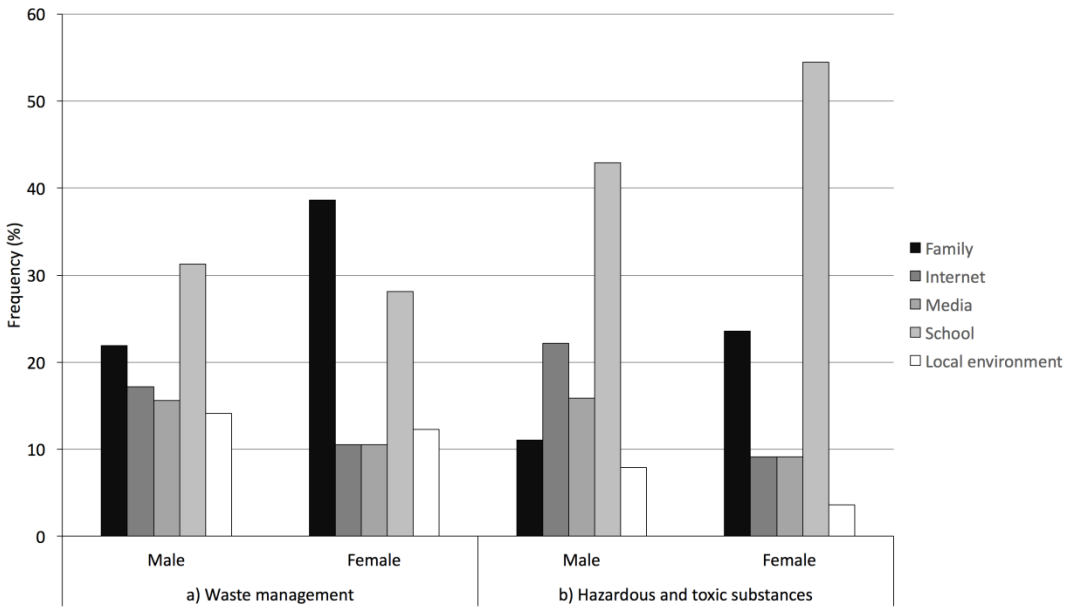

Figure 1: The main source of information about waste management and hazardous and toxic substances according to gender

4 Discussion

The average knowledge test score achievement is 74.5% for 7th, 81.5% for 8th, and 81.3% for 9th graders. The results show that pupils understand the terms hazardous and toxic, since 7th graders in this part of questionnaire on average achieved 65%, 8th 78% and 9th graders 81% test scores. We assumed that 8th and 9th graders would achieve better test results than 7th graders, as certain topics are covered in the 9th grade. The results supported our assumption (Tables 1 and 3). Statistically significant differences among test results according to grade were found for items 2, 4, and 8A (Table 1). For item 2 less than 50% of 7th and 8th graders provided the correct answer. Listing substances which are toxic if consumed in the amount given, results show that 7th and 8th graders missed the toxicity of alcohol. This result was not in line with our assumptions, considering that alcohol, the effects of

alcohol abuse, and alcoholism are issues discussed in school and in the media. We assumed that item 4 (*Which procedure is used in the laboratory to assess whether a given quantity of a substance…*) will be difficult for 7th graders, since this topic is discussed in 8th and 9th grade. The results supported our assumption. Only 36.4% of 7th graders provided the correct answer (Table 1). Item 8A was about the GHS label meaning corrosive, where we expected that all respondents would achieve good test results, since they learn about GHS labels in the 6th grade. 70% of 7th graders answered correctly, but a much better result was achieved by 8th and 9th graders (Table 1). The latter could be because 8th grade pupils revise GHS labels in chemistry, and therefore they better remember their meaning.

Item 10 included 10 statements that contained terms hazardous and toxic in the text. Pupils had to decide whether the terms hazardous and toxic were correctly used in the text. Pupils achieved good test results. 7th and 9th graders on average achieved 79%, and 8th graders 80% for this item (Table 2). For item 10_3 there was a statistically significant difference among results according to grade (Table 2). As 70% of 7th graders found this statement to be incorrect, which was the correct answer. It is difficult to find a sound explanation for this result. It is possible that 7th graders assumed that botulin is toxic since it is produced by certain bacteria species. 7th graders discussed bacteria during science courses, while 8th and 9th graders did not remember this topic.

Our speculation that pupils follow the rules on how to treat household hazardous substances and dispose of household hazardous waste proved to be correct.

85% of 7th, 90% of 8th, and 87% of 9th graders provided correct answers for items 6, 7, 8B and 8C (Table 3). According to the Slovenian national curricula, these topics are to be discussed in different school subjects from 4th to 8th grade.

In addition to knowledge, we were interested if a correlation between knowledge and behaviour exists. Results show that pupils' self-reported behaviour does not correlate with their knowledge. This finding is not surprising since authors (Kollmus and Agyeman, 2002; Bamberg and Möser, 2007) argue that knowledge is not a sufficient precondition to behaviour change. At this point we offer a comparison for extensive knowledge and behaviour that do not correlate. A doctor, a pulmonologist, has extensive knowledge about lungs, about what causes lung diseases, deleterious health effects of tobacco smoking, etc. However, despite all the knowledge he or she possesses, it is possible that he or she is a smoker. The point that should be questioned is, are we willing to use the knowledge about a certain topic we possess in order to change our behaviour?

We also asked pupils about their primary source of information. Pupils gain the most information about hazardous waste from the family or school (Figure 1a). Girls (38.6%) stated that the family is the primary source of information about hazardous waste. Boys (31.3%) stated that this is true for school. The study of Tomažič and Vidic (2011) for the academic year 2009/10 found that the children rarely mentioned their parents as a significant source of information about the impact of waste on the environment. As from 2009 onwards households were obligated to collect and dispose of household waste properly, the had to inform oneself about waste treatment and disposal, and passed the information to children. Leppänen et al. (2012) suggests that environmental attitudes might be transferred between family members to some extent. Since girls express greater pro-environmental attitudes than boys (Zelezny et al., 2000), we speculate that girls included in our study participate in household waste treatment more often than boys. Therefore, girls stated that family is the primary source of information for waste management.

More girls (54.5%) than boys (42.9%) obtained information about toxic substances in school (Figure 1b). We assume that households are still lacking in knowledge about treatment and disposal of toxic substances, therefore the school is selected as the primary source of information. This assumption is supported by the evaluation of behaviour '*We do not throw unused medicines in the trash for mixed waste.*', where 51.5% of respondents stated that they always throw unused medicine in the trash for mixed waste. We speculate that many households, despite regulations, do not follow the rules for collection and disposal of unused medicines.

In this study we supported the findings of authors who stated that there is little or no correlation between knowledge and pro-environmental behaviour (Kollmus and Agyeman, 2002). However, we should not diminish the value of knowledge. Bamberg and Möser (2007) stated that knowledge is a necessary, however not a sufficient precondition for developing pro-environmental moral norms and

attitudes. It is significantly more likely that someone with knowledge and pro-environmental values will engage in a set of pro-environmental activities (Morrone et al., 2001).

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