

Knowledge and Experiences of Safety and Health Occupation Risks among Students

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Ivana Tureková (✉), Terézia Bagalová
Constantine the Philosopher University, Nitra, Slovakia
iturekova@ukf.sk

Abstract—Occupational safety and health (OSH) should be the subject of education, as it prepares students for their future occupation, and further adult education, including retraining. Nowadays, as society supports technical education via dual learning, this issue is becoming particularly necessary. Schools ensure students' safety and health in education, training and other related activities as well as in the provision of school services. In order to secure this task the schools adopt preventive measures based on risk assessment associated with the school activities and environment. When establishing specific measures the school takes into account predominantly the possible threat to students in education of individual subjects, movement within school, and the participation of students in various school-organized events. Subsequently, the educational institution provides continuous education in this area for its students and employees and requires the observance of relevant legal standards by systematic control. It takes into account the age of students, their abilities, and their physical and mental maturity. The aim of this article was to find out how students at different age levels (students of secondary school and elementary schools) understand and observe the principles of safety and health, which is a central prerequisite in preparedness for future occupation. In the conclusion part of this paper, we present some solution suggestions; highlight the importance of suitable curricula at schools and educational institutions. Education methods must reflect current, valid and enforceable safety and health regulations at work. It is therefore essential that risk assessment is included in the education process.

Keywords—risk assessment, questionnaire, safety, risk, teaching

1 Introduction

Young people of our society are quite a threatened group in terms of occupational safety and health. Their work conditions often do not eliminate or minimize hazard. One of the reasons this happens is because the young are not aware of the existing risks and often they do not know how to push practical solutions for themselves and their surroundings.

In Europe, young workers' risk of occupational accidents is 25–40 % higher than those of other age groups [1]. These findings are supported by other studies examining occupational health and safety among youths [2, 3, 4]. Injuries and health damage

become extremely unfortunate, especially, if the injury carries some persistent effect. The worst is a premature death of a young person, as a result of a usually avoidable occupational accident. However, occupational accidents happen every day, presenting danger to 58 million young people within EU [5].

The acronym OSH is the standard term for some countries including the United States. Their goals and purpose are to secure the health and safety of workers and workplaces the world over. All educational institutions have two basic obligations in regards to hygiene and OSH:

- To educate learners about the occupational safety and hygiene.
- Ensure conditions for safe and healthy performance of learners, teachers and other staff of the educational establishment [6, 7, 8].

Educational organizers must ensure occupational safety and hygiene, since this has an economic impact and educational attainment in addition to humanistic nature [9]. The learning environment itself is a vehicle for educational goals [10]. Experience, habits for safe work and prudent and diligent conduct are extremely positive in terms of both the learning process and the professional inclusion of graduates in practical life [11].

The most essential principles for meeting OSH requirements in school facilities include:

- Risk Assessment,
- Teaching OSH,
- First Aid Provision,
- Injury Documentation,
- OSH Testing,
- Facility Inspections,
- OSH Documentation,
- Reminders of Rights and Obligations of all concerned
- Work with Biological and Chemical Factors
- Cleanness and Hygiene,
- Smoking Prohibition,
- Fire Protection,
- Performance of Women and Adolescents,
- Ergonomics [11, 12].

2 Methods

The objective of our research was to compare the perception of the risk prevention amongst elementary and secondary school students, as well as to find out their attitude towards OSH, depending on mental thinking. As a research tool, we used a questionnaire survey. The questionnaire was non-standardized, scaled, and the range of questions aimed for findings within the topics that are arranged as questionnaire items as follows:

| | |
|---------|--|
| Item 1: | early recognition of dangerous substances and objects, |
| Item 2: | keeping the place clean and orderly, |
| Item 3: | health protection, |
| Item 4: | violation of the school regulations, |
| Item 5: | school noise, |
| Item 6: | first aid. |

The basis of Likert scale is that possible answers to items are arranged according to the intensity - in our case from left to right [13]. Two answers have been added to the scale: ‘rather yes’ and ‘rather no’. This is in order to be able to more detailed differentiation of responses and attitudes. The questions were formulated so that they are comprehensive and at the same time able to identify the intensity of agreement/disagreement (Table 1).

Table 1. Answers of the five-step scaled questionnaire

| Answer | Expression of the attitude or the knowledge | Expression of the time intensity |
|------------|---|----------------------------------|
| Yes | I strongly agree | Very often |
| Rather yes | I agree | Often |
| Maybe | I do not know with certainty | Sometimes |
| Rather no | I do not agree | Very rarely |
| No | I strongly do not agree | Never |

The survey questions for elementary schools students (19 questions) and secondary school students (23 questions) were based on their rights and obligations on which they are lectured at school year commencement within the frame of general health and safety and risk assessment principles.

For the purposes of our research, we worked with respondents of different age categories. It was a deliberate selection, so that the research sample was representative. Our respondents were secondary school students and vocational school students (193 students) and respondents of elementary school. The survey for secondary students was partially different from the one for elementary students, with respect to age and mental maturity. The elementary school research sample consisted of 5th, 7th and 9th grade amounting to 406 students. The presented results are averaged [15].

3 Questionnaire Results

During education process students are contacted with potentially hazardous materials of chemical, physical or biological nature [15]. Early recognition of these materials and determination of the most suitable next steps to avoid injuries is the basis of successful prevention. Therefore, the first question aims towards timely risk assessment, in regards to objects, products and substances. The comparison of responses to „Do you think it is good to know which substances and objects are dangerous for you? “is shown in Fig. 1.

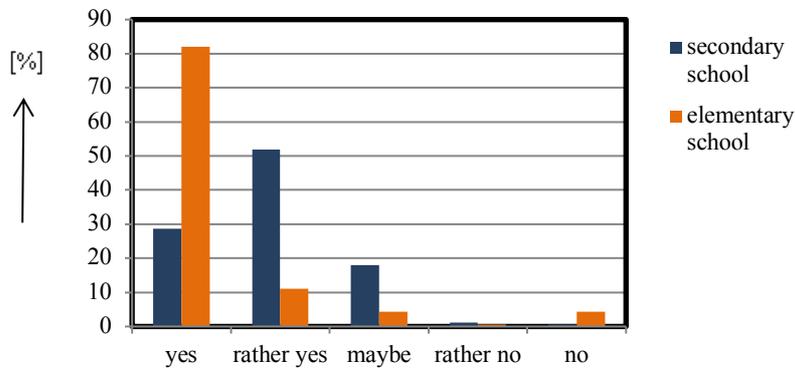


Fig. 1. Responses to “Do you think it is good to know which substances and objects are dangerous for you?”

Elementary schools students tend to have greater respect for the dangers related to objects and substances that surround us every day. The age difference amongst the respondents has affected the results.

We assume that there is a relation between the kind of school (elementary and secondary) and the answer to „Do you think it is good to know which substances and objects are dangerous for you?“ In order to determine this relation, we used a Pearson's chi-squared test (χ^2) (Table 2) [17]. The test was applied because we have two categorical variables from a single population. Test determined whether there is a significant association between the two variables. The significance level (alpha) was determined to be 0.05. Values lower than this number point out the relation.

Table 2. Chi-squared test of correlation between school type and responses to „Do you think it is good to know which substances and objects are dangerous for you? “

| Item „Do you think it is good to know which substances and objects are dangerous for you? “ | | | |
|---|--|--------------------|-------|
| School | Choices | | Total |
| | Correct response | Incorrect response | |
| Secondary School | 172.3789649 | 20.62103506 | 193 |
| Elementary School | 362.6210351 | 43.37896494 | 406 |
| total | 535 | 64 | 599 |
| H0 | There is no correlation between school type and responses. | | |
| H1 | There is correlation between school type and responses. | | |
| chi | 0.000805 | | |
| alpha | 0.05 | | |
| Value 0.000805 verifies H1: There is correlation between school type and responses. | | | |

There are statistically significant differences in the responses in relation to type of attended school. Up to 30.1% more elementary school students consider it good to know what objects and substances are dangerous to them.

In working as well as school environment, the processes are under human control in a clean and organized workplace. Such a workplace is a basic requirement of a

modern, efficient company and a safe school. Therefore, the following question aimed to find compliance with these principles in pupils and students (Fig. 2).

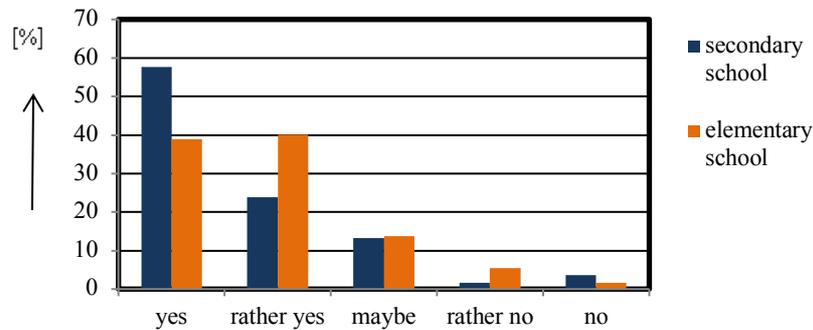


Fig. 2. Students’ responses to “Do you keep the classroom and your desk clean and orderly?”

Secondary school students expressed a strong consent, while elementary school students expressed only a partial agreement that they maintain cleanliness and order in their classroom and at their desk. Due to the great subjectivity, this item was also verified by teachers in the next question. We believe teachers' responses more objectively reflect the true attitude of the pupils to maintaining classroom order. To confirm or refute the assertions of elementary school students we have included a question for teachers: „Are students able to keep their space clean and orderly?“. Fig. 3 reflects the responses.

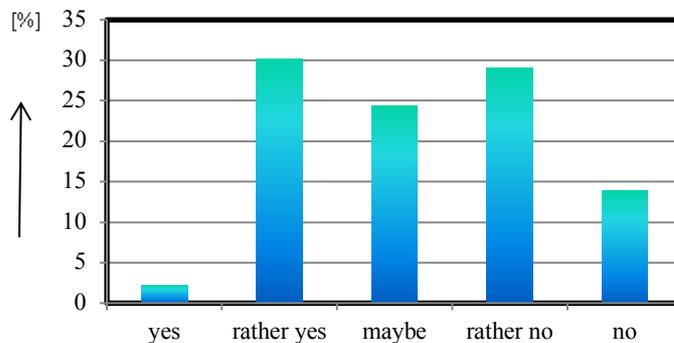


Fig. 3. Teachers’ responses to “Are students able to keep their space clean and orderly?”

Teachers’ responses were as follows: rather yes – 30,2%, rather no – 29,1 %, maybe – 24,4%, no – 14%, yes – 2,3%.

The education laws in Slovakia stipulate the school obligation to provide the necessary information in order to ensure health protection and safety of the students. It

means educating the students to predict the negative impact of their activities and draw attention to emerging dangers leading to health hazard. This is the objective of item 3 (Fig. 4).

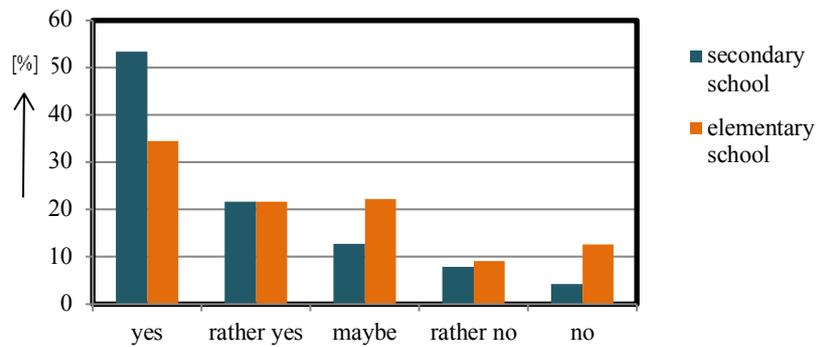


Fig. 4. Students' responses to 3 "Did you warn your classmate if their actions are a risk to their health or the health of their classmates?"

Results show that communication amongst students reaches a higher level at secondary schools. This results in a better ability to draw attention to health danger.

Smoking is prohibited by law in Slovakia. We researched the compliance with this regulation through item 4. The results are shown in Fig.5.

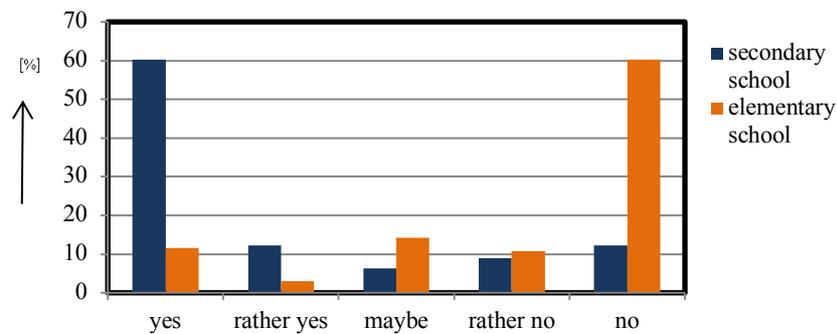


Fig. 5. Students' responses to "Do you know of students secretly smoking on school premises?"

Majority of the elementary students state that their schoolmates do not smoke on school premises. However, two thirds of secondary students claim they are aware secretly smoke and break school regulations. Excessive noise is a dangerous physical factor at school. Fig. 6 presents the comparison of responses to „Do loud noises during breaks disturb you?"

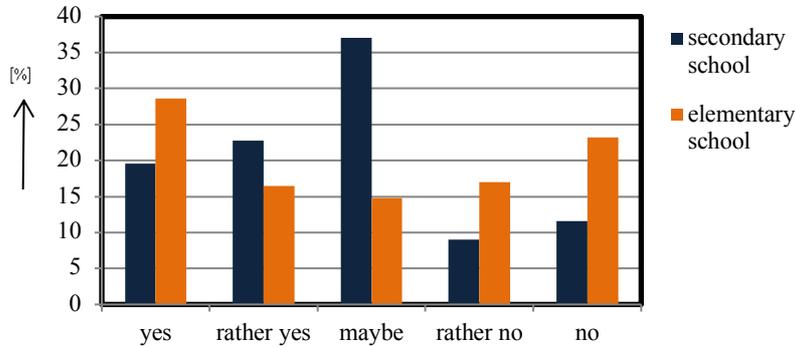


Fig. 6. Students' responses to „Do loud noises during breaks disturb you?“

The final question aimed at first aid. The results are processed in Figures 7 and 8. The questions had different variations, since we assumed that when it comes to first aid, there are differences in knowledge in elementary and secondary students.

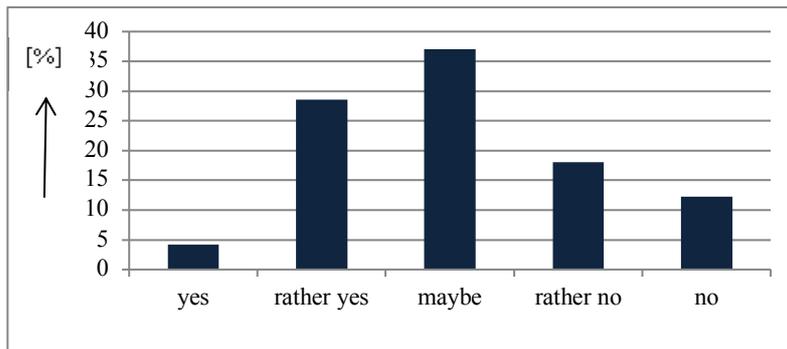


Fig. 7. Secondary Students' responses to “Would you know how to attend to your classmate if they were stricken by electric current?“

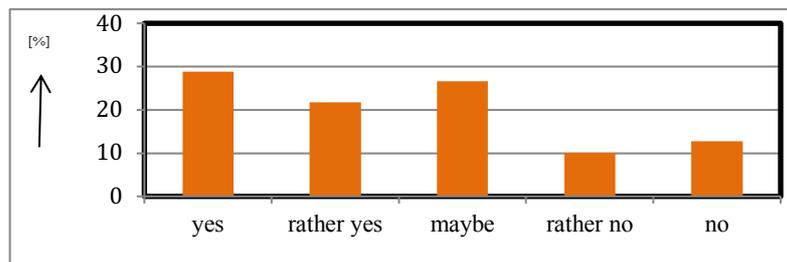


Fig. 8. Elementary Students' responses to „Is cardiac massage necessary at loss of consciousness?“

4 Discussion

Table 3 presents survey results, which are important for formulating the conclusions and recommendations.

Table 3. Summary Survey Results

| Item | Item Reading | School | Results [%] | | | | |
|------|--|--------|-------------|------|------|------|------|
| | | | Y | RY | M | RN | N |
| 1 | „Do you think it is good to know which substances and objects are dangerous for you?“ | S | 28.6 | 51.8 | 18.0 | 1.1 | 0.5 |
| | | E | 82.0 | 11.1 | 4.4 | 0.5 | 2.0 |
| 2 | „Do you keep the classroom and your desk clean and orderly?“ | S | 57.7 | 23.8 | 13.2 | 1.6 | 3.7 |
| | | E | 38.9 | 40.1 | 13.8 | 5.4 | 1.8 |
| | „Are students able to keep their space clean and orderly? “ | T | 2.3 | 30.2 | 24.4 | 29.1 | 14.0 |
| 3 | „Did you alert your classmate if their actions are a risk to their health or the health of their classmates? “ | S | 57.7 | 23.8 | 13.2 | 1.6 | 3.7 |
| | | E | 34.5 | 21.7 | 22.2 | 9.1 | 12.5 |
| 4 | „Do you know of students secretly smoking on school premises? “ | S | 60.3 | 12.2 | 6.3 | 9.0 | 12.2 |
| | | E | 11.6 | 3.0 | 14.3 | 10.8 | 60.3 |
| 5 | “Do loud noises during breaks disturb you?” | S | 20.6 | 11.6 | 22.8 | 38.6 | 6.4 |
| | | E | 28.6 | 16.5 | 14.7 | 17.0 | 23.2 |
| 6 | “Would you know how to attend to your classmate if they were stricken by electric current? “ | S | 4.2 | 28.6 | 37.0 | 18.0 | 12.2 |
| | | E | 28.8 | 21.7 | 26.6 | 10.1 | 12.8 |

S – Secondary school; E – elementary school; T-teachers, Y- yes; RY- rather yes, M-maybe; RN – rather no; N-no

4.1 Discussion to Item 1

Early recognition of hazard in materials, substances or products is a basic prerequisite for correct and safe handling. Awareness, respect and risk anticipation reached higher values amongst elementary students. This is summarized in Table 3.

82 % of elementary students state it is necessary to acquaint oneself with potential risks and hazard prior to handling certain objects, substances and objects. Only 28.6 % of secondary students responded in the same manner. Age gap between elementary and secondary students is one of the reasons for this contrast. At the age of 15 students enter the puberty phase which disrupts the traditional customs acquired from family environment and school. Violating regulation and adherence to the rules of the peer group, attempting to excel from established rules and loss of vigilance are a few characteristics of this development period. Therefore, this group is more vulnerable as regards to school injuries.

The CHI quadratic test of the correlation between the school type and the responses to the particular items, $\alpha = 0.05$, has verified that responses are greatly affected by the type of school (elementary or secondary).

4.2 Discussion to Item 2

According to school regulations students are obliged to keep their place orderly and clean. A number of safety management systems are based on systemization and order. For instance, 5S principle (Fig. 9) is a system for creating and maintaining a clean and efficient workplace – which is the base for minimizing occupational injury rate [18].



Fig. 9. The 5S principle [19]

In item 2: „Do you keep the classroom and your desk clean and orderly?“, the students’ responses are confronted with teacher’s responses to „Are students able to keep their space clean and orderly? “. It is no surprise that students’ self-assessment does not correspond with teachers’ responses. Students are required to keep their order and cleanliness in place according to the school regulations they are familiar with at the beginning of the year. This habit is the basic attribute in lifelong learning, as well as, future occupation.

4.3 Discussion to Item 3

In the next question we addressed the issue of life saving and health protection. We asked: „Did you alert your classmate if their actions are a risk to their health or the health of their classmates?“. Result comparison is summarized in Table 3.

It appears from the questionnaire that secondary students are able to recognize the consequences of the thread and possible risk. However, up to 13 % of secondary school students do not alert their classmates to possible consequences of their behaviour. This may be due to fear of mockery, disinterest, etc.

4.4 Discussion to Item 4

According to statistics [20] amongst the most common reasons that children start smoking are the fact that they wish to be independent, they are forbidden to do so by their parents, they idolize a smoker, etc. There is never just one reason for this. Children often experiment with smoking and believe they can stop at any time. However,

smoking is highly addictive and a number of students are later unable to quit. More than 80% smokers took up smoking in childhood or early adolescence. Our survey results have also shown that secondary students are the most critical group where this habit usually originates.

4.5 Discussion to Item 5

The development of each individual occurs in accordance with maturation rules and patterns on a biological, mental and social level. Therefore, sensibility to excessive noise varies according to the age group. [21]. Stansfeld (2003) states that the excessive noise affects cognitive performance and behavior [22]. Excessive noise in the workplace is also linked to high blood pressure values. It may also be link to development of various mental and physical diseases. Noise influences the performance, social behavior and productivity of the students. The main sources of excessive noise are spontaneous expressions of the students, screaming and shouting, noises related to movement. These noises are ineffective to school purposes, however, the institution must calculate with them and try to prevent their occurrence by creating optimal conditions and acoustic comfort. The results of the questionnaire survey confirmed that elementary students are less sensitive to noise [23].

4.6 Discussion Item 6

The last question for elementary students aimed at realizing what it actually means to lose your consciousness. 12.8% of elementary answered correctly that cardiac massage is not necessary for unconscious classmates. However ½ of the respondents state it is necessary. A similar question was asked of secondary students: “Would you know how to attend to your classmate if they were stricken by electric current?”. 37 % of secondary students responded “maybe” [24, 25,26].

Norway is the leading country in Europe among the countries with 95 % of its population trained in first aid, followed by Germany and Austria (80 %). In Czech Republic is it only 4 %. 27% of teachers, pedagogical staff and 16% of pupils - pupils, students from European countries provide compulsory first aid training [27]. Because it increases the awareness of hazards that cause accidents at school, at home, at the workplace and in the streets, first aid is also a major prevention tool.

5 Conclusion

Human development is marked by learning, discovering and differentiating right from wrong. These habits are usually acquired through family environment and school education. Therefore, it is necessary to implement OHS into education in such a way so as to enable the students to avoid hazard. Our survey has shown that although students are familiarized with school safety regulations annually, its observance is far from obvious. This is a call for innovation in the methods and forms that students get acquainted with their rights and obligations. Practical examples from

everyday life, model situations and application of computer technology would surely enrich the students' OSH knowledge.

The internal environment surrounding the lessons as well as break time affects not only the students' mental state, but also their physical health and performance. Amongst the most prominent issues at schools tend to be high noise levels. There are a few ways to deal with excessive noise levels, e.g. organizational changes or acoustic adjustment of objects.

There are still some gaps in students' knowledge regarding life-saving. This is also an area where all resources should be put to use in order to make the education effective. Furthermore, this area has been researched by a number of articles and there is a need for effective implementation in education practice and in lifelong engineering education.

All issues need to be part of the curriculum, educational process in preparing young people for future permission. Can be found linear coherence between education safety and technical training, as any technical solution must meet the security attributes particularly in the school environment.

Our survey has confirmed that awareness and pupils education at primary and secondary schools in the field of OSH is of good quality, but problematic moments that are more important in secondary schools (eg smoking, classroom order) continue to exist in the education process. These findings do not correspond, for example, to accident statistics in the Slovak Republic. It has been statistically confirmed that the educational level on dangerous substances and subjects is increasing proportionally to the degree of education. The low level of education in pre-primary first aid was found not only in primary and secondary school pupils but also in primary school teachers. Therefore, OSH education should be included in the training of future teachers in such a way as to be able to identify the dangers arising in the educational process and to know the tools of their elimination.

6 Acknowledgments

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8 Authors

Ivana Tureková is an Associate professor at OSH. She works at the Department of Technology and Information Technologies at the Faculty of Education, Constantine the Philosopher University in Nitra. Her primary interests are management of risks in different activities, including the education process. She guarantees the bachelor degree of Safety and Health at Work. At present, she is engaged in technical education aimed at the safety of both students and adults.

Terézia Bagalová is a PhD student at the Faculty of Education of the University of Constantine the Philosopher in Nitra, Slovakia. Professionally deals with job safety.

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