

## **ENVIRONMENT AND OCCUPATIONAL HEALTH COURSE FOR SECONDARY SCHOOL AS AN EXAMPLE FOR ENLARGED SCIENCE TEACHING**

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**Abstract.** One of the problems of Latvian educational system is teaching students to take care of their health themselves in the view of their professional career. It is necessary to choose a profession that is not only interesting, but also correspond to the person's state of health. The factors of a harmful job can create a risk to the person's health. In Latvia young people actually aren't acquainted with the problems and harmful professional factors which can arise in the professional life in the future. This is why it is so important to include the course of *Environment and occupational health* in the secondary school teaching programs.

The results of the students' questionnaire indicated their knowledge of professional health being incomplete. Individual discussions with students have shown that students don't pay much attention to the issue of work environment of their future profession and that their attitude to the problem is not serious. At the same time it was ascertained that the state of health of a number of students may restrict their professional choice.

It was worked out the course *Environment and occupational health* and analysed a possibility of including the topics of the course in other science subjects such as biology, chemistry and physics. Such a course is a good example for enlarged science education at Upper secondary school level that makes science education more attractive.

**Key words:** science education, environment, occupational health

### **Introduction**

We are familiar with one of the aims of mastering science subjects, that is to give students elementary knowledge discussing the questions which deal with pupil's health as well as with nearer or farther placed environment that is the basis of educational period. In the recent period to a large extent it was done by the biology course, which was supplemented with the health education course within the last decade. It would be wrong to consider it is enough to understand the current situation in the process of studying. The aim of education in the process of pupil's socialisation, as a matter of fact, is the training of a child – adolescent – young adult to the activities of life that is preparation for further education in a higher school as well as for the practical action in work environment. Therefore, more and more attention to these issues is being paid introducing social sciences. Thus, the questions are the following: to what extent today's pupils are ready for the future life activities; to what extent they are prepared for work in the environment after having got education that has been favoured by the natural science cycle in contemporary school?

One of the factors that helps us when answering this question is students' knowledge and understanding about their health and surrounding environment from one side, and students' ability to generally understand the health problems connected with the labour life from the other. A choice of a profession that is suitable for their state of health could be one of the examples. The problem has become extremely relevant within the period of the last decade when significant economic and social

changes have been observed in the society. Unfortunately, these problems have gained relevancy because of insufficient students' knowledge in the area of work life.

For example, harmful risk factors are often faced in many branches of economics. They influence a large number of people. The recent investigations show that approximately 30 – 50% of workers in Latvia have some kind of physical, chemical or economical factors which may influence their health or capacity for work; many workers have physiological overload which leads to the stress. Recently, every year approximately 300 occupational health incidents have been registered in Latvia (Eglīte, 2000). These data unfortunately don't reflect the real situation, because in terms of unemployment patients themselves consciously conceal their sickness. People are afraid of losing their work. Because of the increasing prices of the medical service, workers are often late to see the doctor that negatively influences the work capacity of workers. Therefore, the problems of occupational health are very relevant for Latvia, and it is necessary to speak about them with students who are the future employees. The main risk factors which lead people to the occupational diseases are harmful chemical substances, physical factors (vibration, sound, electromagnetic field etc.) biological factors, overload, computers, psychosocial factors and mental overload (Eglīte, 2000; Leibowitz, 1994; Raipulis, 1999; Sowa, 1994).

Statistic data indicate, that there is a tendency to increase a number of health disorders with every next year among students. Morbidity among the students of classes 10 to 12 is higher than that in other age groups (Pandere, 2001). In central Riga's schools as well as in schools in the suburbs many children are marked by nervousness as a health problem (Smirnova, 2002). From school's health politics depends how much attention is turned to children's health and health education. The pupil's health is directly or indirectly (education impression) influenced by school's physical environment and psychosocial climate.

Here we can see one of the latest problems, which is short of necessary attention turned towards the aspect of professional orientation. All content of knowledge and organisation of the teaching process were mainly turned to the mastering the knowledge about the prospective profession, as well as gaining skills in this field. At the same time, correspondence about the young people's health level to the possible professional career choice is actually left to the conscience of people themselves. The specialists of the professional choice career centre affirm that young people really have only an approximate notion about conformity of their own health level to the chosen profession. According to the information obtained from those centres, about 10% of young people suffer from various chronic diseases which may constitute a serious obstacle to the professional career (Porozova, 2001). This situation must be changed by including several new courses such as *Environment and occupational health* in the curriculum of Upper secondary school or by incorporating topics of this course in the subjects of natural sciences. Environment and occupational health course has the closest contact with such subjects as biology, chemistry and physics. Physiology deals with the problems of functions of the organism and explains how harmful environmental factors may change normal functioning of organism or what health disorders may appear as a result may be learned in this subject. Genetics is connected with the problems of harmful environment factors which may influence heredity, chemistry must introduce students toxic substances, physics is acquainted with harmful physical factors (noise, radiation, vibration) and so on.

The aim of this work was to make a study about students' health and knowledge in the field of environment and occupational health, to determine teachers' and some other field specialists' attitudes towards the necessity of teaching the *Environment and occupational health* course in the secondary school, to work out the proposals for the integration of this course in several teaching subjects, particularly those of science.

## Research methods and methodologies

This study included about 300 students (9-12 classes) from several secondary schools of Riga and Jurmala. The schools are marked as R1 (Riga), K1 and J1 (Jurmala) respectively. There are some other schools that have participated in this study only partially, and the results obtained from those schools are included in discussion as an illustration.

The students' questionnaires from various secondary schools were carried out and included information about the status of their own health level following the self-estimation and their opinion about the dangerousness of computer to health. Study of more than 200 students' medical records in one of the Riga's secondary schools was carried out during this investigation. Students' health level was compared with the self-estimation about the status of their own health level. A questionnaire of students in order to clear up the most important factors for choosing their own profession as well as individual discussions with students about their attitude to work environment and their future profession were carried out.

The questionnaire of specialists and teachers was carried out during this investigation in order to clear up their attitude to the problem of including the "Environment and occupational health" course questions in the secondary school teaching programme and to find out the most actual problems of professional health.

It was worked out and realised the *Environment and occupational health* course in one of the forms 12 in Riga secondary school. A questionnaire in order to examine the students' knowledge of environment and occupational health topics was carried out in forms 12 in this school. The problems of integration *Environment and occupational health* topics in the school subjects were analysed.

## Results of the research

### *Students' knowledge about their health*

The study of students' medical records at school R1 indicates that the most frequent students' health disorders are vision (17%), support and movement organ system (9,13%; mainly backbone diseases), allergic diseases (3,8 %; mainly food allergy and dermatitis), blood circulation system (3,4%; mainly heart diseases), respiratory organs (2,9%; mainly bronchial asthma). Some students have various diseases simultaneously, for example, bronchial asthma and nutritive intolerance.

These diseases are allergic reactions to the influence of environment factors. Vision disorders are also registered with about 17% of secondary school students. The study points out students sometimes, yet not too often, catch cold and have acute diseases. The obtained results show that the health status of many students may limit their professional choice. At the same time, the majority of these students estimate their own health level as *good* and *very good*. Nevertheless, many students (87%) consider having a stress at school. As the reason of the stress they note strained relations with teachers and classmates, as well as the large amount of work at school.

Students from other schools also specify similar self-estimation of health level. For example, A. Opmanis has ascertained (Opmanis, 2001) that in one of Riga schools 49% students of the form 9 estimate their health level as *good*, but 51% as *average*. In the rural region a part of students point out having *bad* health. Unfortunately, the author hasn't analysed the health level of students in a more detailed way.

**Table 1. Students' health self-estimation in percent from the total amount of respondents**

<b>Health characteristic</b>	<b>R1</b>	<b>K1</b>	<b>J1</b>	<b>Class 9</b>	<b>Class 12</b>	<b>boys</b>	<b>girls</b>
Poor health	4,8	0	1,3	2,4	1,0	1,3	2,2
Sooner poor health than good	8,1	12,2	12,8	7,2	16,5	9,1	12,2
Sooner good health than poor	38,7	28,0	35,9	31,2	37,1	26,0	37,4
Good health	46,8	54,9	47,4	56,0	42,3	61,0	44,6
No opinion	1,6	4,9	2,6	3,2	3,1	2,6	3,6
<i>Number of respon-dents</i>	<i>62</i>	<i>82</i>	<i>78</i>	<i>125</i>	<i>97</i>	<i>77</i>	<i>139</i>

In one stage of our study students have showed the level status of their own health by self-estimation as follows (Table 1). Special risk to students health is caused by increasing computerisation of education. Furthermore, even if a pupil doesn't spend much time at a computer at school it must be considered that the accessibility of computers is increasing. About 80% of all students consider working with computer doesn't influence their health, although every pupil in average spends a bit more than six hours a week at computer<sup>5</sup>. It can also be considered that even if a computer is harmful to health, students show comparatively different attitude. The main tendency is that students aren't aware of the essence of the question.

**Table 2. Dangerousness of computer to health in percent of the total number of respondents**

<b>Answers</b>	<b>R1</b>	<b>K1</b>	<b>J1</b>	<b>Class 9</b>	<b>Class 12</b>	<b>boys</b>	<b>girls</b>
<i>Respondents</i>	<i>62</i>	<i>82</i>	<i>78</i>	<i>125</i>	<i>97</i>	<i>77</i>	<i>139</i>
Don't agree	6,3	11,1	7,7	12,9	3,1	15,8	5,0
Rather don't agree	19,4	13,6	21,8	22,6	12,4	21,1	17,3
Rather agree	32,3	35,8	28,2	29,8	35,1	18,4	37,4
Agree	32,3	29,6	30,8	22,6	41,2	31,5	30,9
Don't think about it	9,7	9,9	11,5	12,1	8,2	13,2	9,4

Individual discussions with students have shown, that students don't pay much attention to the issue of work environment of their future profession and their attitude to this problem is not serious. The majority of R1-students believe, that work environment of their chosen profession may be good (47%) or normal (33%) for them, although 13% have answered that they don't know while 7 % haven't answered at all.

#### *Students' knowledge about the problems of occupational health*

In the questionnaire hold on April, 2001 one third of students only have showed among 5 of the most important factors for choosing their own profession the health level, while only 3 students have showed it as priority (the most important factor). It seems that majority of students estimate their health level from the point of view of their present mood and do not believe that factors connected with their profession or environment might influence their health essentially. It demonstrates insufficient comprehension of this issue and some part of the fault falls on the whole educational system.

*Place of Environment and occupational health course in the school subjects*

Teachers and specialists consider the knowledge of students being insufficient in the field of environment and occupational health. It is significant to know how substances, dangerous for health, get into human's organism, comprehend the problems of human's reproductive health, understand how environment, including that at home, school and work, may influence human's health. Teachers and specialists admit the necessity of including Environment and occupational health topics in the content of other subjects.

In our opinion, in order to familiarise students with problems of environment and occupational health, the most suitable alternative is the integration of these topics into the course of biology. Some separate topics may be discussed more deeply in the framework of chemistry, physics and some other subjects. (Table 3). Such an approach, first of all, justifies the experience of Latvian schools in the recent 5-6 years – the integrated teaching of environment education problems. It has just to be noted that in the context of environmental education the environment is emphasised rather than an individual while in the context of environment and occupational health the emphasis is put on the individual.

**Table 3. Integration of *Environment and occupational health* topics in the school subjects**

Environment and occupational health	Biology	Chemistry	Physics	Other subjects
Influence of pesticides on the productiveness of organic substance production and their influence on health	+++	+		
Influence of harmful work environment factors on the blood circulation system	++		+	
Influence of work environment factors on the hereditary material. Chemical and physical mutagens	++	+	+	
Abiotic, biotic, antropogenic factors as work environment factors	+		++	++ (social sciences)
Sound, noise and health	+		+++	
Animal, plant and mushroom toxins	++	++		

+ and ++ partially included in subject

+++ the most suitable

On the other hand, it has just to be noted that many questions of environment and occupational health in the form of illustrative examples are discussed in the course of biology. But in our case additional attention is paid to these topics in the extended course of biology that facilitates not only mastering of biology knowledge but also the understanding of environment and occupational health questions as well.

In order to ascertain the effectiveness of the offered course we organised questionnaire of two 12 forms (one of them was as a control unit namely without studies in *Environment and occupational health*) before and after teaching. Some questions were constructed in order to examine the students knowledge of the influence of harmful factors on the body while the other part of questions were connected with occupational health and occupational diseases.

Comparing the results obtained before and after teaching we have concluded that the number of right answers has increased to large extent. For example, before teaching 23% of students only knew right answers and 77% of those did not. After teaching 29% of students were absolutely right, 42% of

those answered right and partially and 29% - incorrectly. 29% is not a small number but the results of the first year experience can be considered as satisfactory and the chosen strategy as a correct one.

The results of the study face, that the integration of the course *Environment and occupational health* in biology and partially in other subjects increase students' knowledge and understanding of these problems. Obviously, for the students seriously interested in choice of their profession and accordance of their health level to the chosen profession, it was a good opportunity to get better notion about the positive and negative features of the future speciality (profession), as well as the harmful environment factors which can negatively influence their health level.

Through mastering the course *Environment and occupational health* students estimate the accordance of their health to the chosen profession and forecast prospective on their career development. In our interviews some students have marked that they start analysing their own health problems according to the future job only after this study, and therefore we draw conclusions that the attitude to the environment quality is forming. Knowledge about work environment risk factors provide possibility to be aware of the risk factors at school, home etc. In the result of mastering the course *Environment and occupational health* students estimate the environment health in its diverse interaction with their own health, as well as being and stableness, which is a guarantee of sound life.

The work results indicate usefulness of giving information about the problems of environment and occupational health to all students of secondary school.

## Conclusions

1. Students do not pay much attention to the issue of work environment of their own future profession, although the health status of many students limits their professional choice. Students' knowledge about the influence of harmful environment factors on the body as well as the topic of occupational diseases is not sufficient.

2. It is useful to give information about the problems of environment and occupational health to all students of secondary school. Mastering the course *Environment and occupational health* makes students to estimate the accordance of their health to the chosen profession and forecast perspectives on their career development. They estimate the environment health in its diverse interaction with their own health.

3. It is recommended to integrate the *Environment and occupational health* course content in biology, chemistry, physics and other subjects. This is an acceptable way to accentuate the importance of science education in everyone's life.

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## Резюме

# ОКРУЖАЮЩАЯ СРЕДА И ПРОФЕССИОНАЛЬНОЕ ЗДОРОВЬЕ КАК ПРИМЕР УГЛУБЛЁННОГО ИЗУЧЕНИЯ ЕСТЕСТВОЗНАНИЯ В СРЕДНЕЙ ШКОЛЕ

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После окончания средней школы перед выпускниками встает проблема выбора будущей профессии. В настоящее время вся система образования в школах Латвии направлена на освоение знаний и приобретение навыков в области будущей профессии. В то же время на соответствие состояния здоровья выбранной профессии обращается недостаточное внимание.

Анкетирование и индивидуальные беседы с учениками средних школ городов Риги и Юрмалы показали, что их знания в области профессионального здоровья и факторов, вызывающих профессиональные заболевания, весьма поверхностны. Отношение учеников к выбору будущей профессии несерьезно. Большинство опрошенных учеников средних школ считают, что состояние их здоровье хорошее или очень хорошее. 80% учеников считают, что работа с компьютером не может повлиять на их здоровье. В то же время изучение индивидуальных карточек здоровья учеников и беседы с ними показали, что состояние здоровья многих учеников ограничивает их выбор будущей профессии.

В одной из средних школ Риги в выпускном классе был проведен курс *Окружающая среда и профессиональное здоровье*. Анкетирование показало, что знание учеников после прослушивания курса в области профессиональных заболеваний и факторов, их вызывающих, значительно возросло. Полученные результаты дают повод считать, что темы курса *Окружающая среда и профессиональное здоровье* необходимо включить в программу средних школ. Интервью с учителями и специалистами в области профессионального здоровья, а также профориентации подтвердили этот вывод.

В работе рассмотрены возможности включить отдельные темы курса *Окружающая среда и профессиональное здоровье* в содержание предметов естественнонаучного цикла. Наиболее подходящими для этого являются биология, химия и физика, а также недавно введенный частично интегрированный предмет естествознание. Таким путем удастся и в некоторой степени дать учащимся более ясное представление о значении изучения предметов естественнонаучного цикла для их же собственной пользы.

**Ключевые слова:** естественнонаучное образование, окружающая среда, профессиональное здоровье.

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