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PROBLEM OF HEALTH SAVING OF SECONDARY SCHOOL STUDENTS IN TERMS OF ICT USE

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The last decade was marked by intensive development and introduction of new information and communication technologies, software and hardware into all spheres of human life. Besides the obvious positive effect (promoting efficiency, intensity, effectiveness, quality of education, etc.) use of these tools in children activities may lead to additional mental, nervous, emotional, physical, visual tension. However, compliance with certain pedagogical conditions can greatly reduce the negative impacts.

In the article the important aspects of health saving of secondary school pupils in conditions of ICT intensive implementation and use are considered. The benefits of these tools use, as well as potential threats to the health of the younger generation are outlined. The results of a survey of students (Kyiv, Poltava, Chervonyi Lutch) on their awareness about the basic requirements and standards of work with ICT, and their compliance are presented.

The purpose of the paper is in defining the main potential adverse effects that may result from using software and hardware on the health of the younger generation; determine the degree of awareness of secondary school pupils about these threats and ways to avoid them; representation of the possible ways to minimize negative impacts on pupils' health.

Key words: *ICT, health saving, secondary school pupil, IC-competence.*

Problem statement. Most of time, school-age children spend in educational institutions. Therefore, it is important for the care about children's health to be provided by all subjects of the educational process. In terms of the educational environment, a person is influenced by the social environment, informational, economic, political, legal, ecological, demographic, cultural, spiritual, ideological, ethical, and other factors. Various socio-economic factors, such as the functioning of society, the ecological situation, low nutrition culture, low health life safety, and valueology knowledge level, physical activity and culture, etc. may adversely affect the health of the younger generation.

Recent decades have seen intensive development and application of new information and communication technologies, software and hardware (computers, laptops, tablets, e-books, smart boards, mobile devices, etc.). Besides the obvious positive effect (promoting efficiency, intensity, potency, quality of education, and others.), use of these tools to work with primary school children can cause additional mental, nervous and emotional, physical, and eye strain. In this case, their use with attention to psycho-pedagogical, hygienic, ergonomic requirements can significantly reduce the negative impacts.

Particular factors lead to the need of solving the correct software and hardware use problems, taking into account the principles of health saving of primary school students.

Analysis of recent research and publications. Various aspects of software and hardware use in the learning process are reflected in the research of leading national and foreign scientists: V.P. Bespal'ko, V.Y. Bykov, A.F. Verlan, I.E. Vostroknutov, M.I. Zhaldak, N.S. Zavizena, A.P. Ershov, P. Lapchik, V.V Lapinski, M.P. Leshchenko, A.F. Manako, V.M. Monakhova, N.V. Morze, E.S. Polat, S.A. Rakov, Y.S. Ramskaya, I.V. Robert, S.A. Semerikov, J.F. Sledzinski, O.M. Spirin et al.

Potential threats, the negative impact of software and hardware on the health of the younger generation, in case of no respect to certain rules and requirements were considered by national and foreign researchers: V.A. Doskin, E.V. Yermolayeva, A.L. Zhurakovskaya, G.P. Lavrentieva, L.V. Makarov, I.S. Mukhametzyanov, I.A. Plohuta, N.S. Polka, N.K. Smirnov, A.B. Chystov and others.

The importance of addressing the health saving problems of secondary school students is outlined in a number of national legal documents: Law of Ukraine "On General Secondary Education"; Standard of basic and upper secondary education; National Doctrine of Education Development; State sanitary rules and norms "Organization and equipment of computer technology cabinets in schools and mode of students' work with personal computers" sanitary regulations 5.5.6.009-98 [11, 9, 14, 8] and others. These documents, in particular, noted the need to develop healthcare competency of students by acquiring skills to preserve, enhance, use of health and respect to it [9], to provide a safe and friendly learning environment, operating mode, the conditions for the physical development and health promotion, the formation of hygienic habits and a healthy lifestyle of students (trainees) [11], the possibility of obtaining knowledge about healthy lifestyles, the methods of achieving high efficiency and a long creative activity [14].

The purpose of this article is to identify the main potential negative impacts that may result from using the software and hardware on the health of the younger generation, and determine the degree of awareness of basic school students of these threats and ways to prevent them.

The main material. It is stated in the public document [12] that one of the priorities of secondary school is to preserve and strengthen the moral, physical and mental health of students. Now, general education institution should create optimal conditions for preserving and strengthening the health of children. The following saving priorities in basic school are considered the most important:

- providing and enhancing the knowledge of students about care to their own health and the health of the people that surround them;
- formation of personal ideological position on health culture and positive motivation for a healthy lifestyle, the development of life skills and health, education of safe behavior of children and youth;
- introduction of health-technology to the school system;
- creating a healthy environment and favorable conditions, the creative relationship between management, teachers, parents and students;
- ensuring sanitary conditions of the educational process.

With the rapid development and implementation of software and hardware, in secondary schools, both software and hardware changes considerably. As a result, training equipment is modified, the functions and possibilities of its use are expanding.

It is known that modern software and hardware improve efficiency, intensity, potency and quality of learning. When working with ICT, the possibility of setting educational problems of process control solutions; visualization of the studied phenomena, processes and relationships between objects, modeling different learning situations with the help of video and audio playback, animation, graphics, etc. increases. In turn, this contributes to students' motivation to learn, revives cognitive interest, the formation of key educational competencies, etc. [16].

The researchers found that when using the computer among children:

- awareness about the world increases by 20%;
- awareness of the objective laws of the subject areas and interdisciplinary connections expands and deepens by 25%;
- the results of the various kinds of logical operations performed improve by 15-20%. Simultaneously, the computer helps to create qualities such as accuracy, precision, organization [13].

If until recently, in national secondary school institutions, the use of software and hardware was limited by informatics lessons, teachers now increasingly use technological advances to organize the educational process in different lessons. Our study showed that all the students from

the 5th to 9th grade (246 people) from different regions of Ukraine used software and hardware, in particular, such as a personal computer, laptop, netbook, tablet, e-book, smart board and others in various school lessons. Hardware and software are the most often used in informatics, foreign language, history, mathematics, world literature, biology, geography, and physics lessons.

Students noted the positive effects of the use of hardware and software during the learning process: the lesson becomes more diverse, interesting (41%), educational material is better understood (24%) and better remembered (20%), allows appraising knowledge objectively (10%). Only 5% of the students surveyed believe that the use of new devices does not affect the learning process.

The study showed that the majority of students (83%) have access to the hardware and software after school, at home, using this to prepare essays (32%), presentations development (26%), to solve creative tasks (20%), to develop collective projects (19%0, and for other study purposes (3%) (Fig. 1).

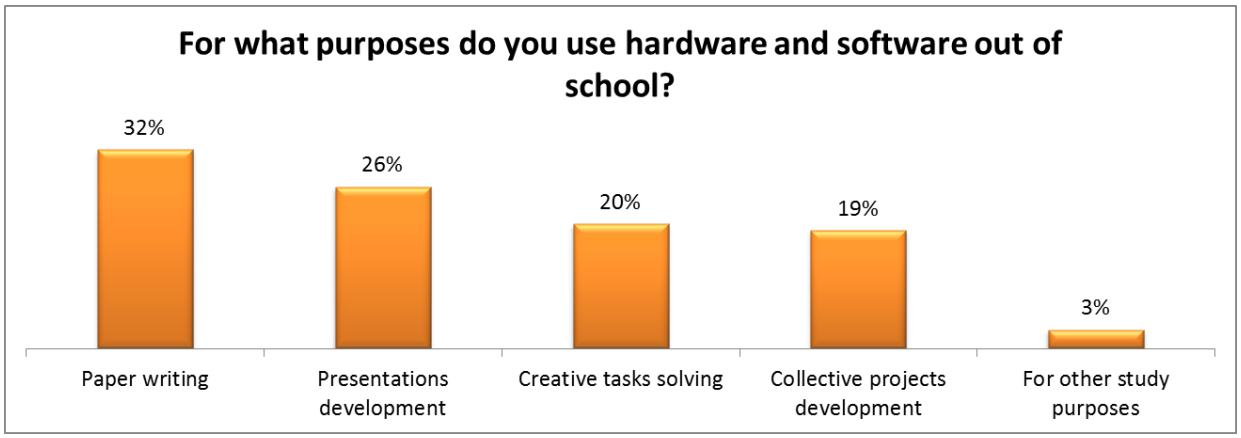

Fig. 1. Using software and hardware by students for study purposes after school

Thus, the use of software and hardware in the educational process, both at school and out of it, enhances learning motivation, development of group interaction skills, creativity and initiative.

At the same time, it should be remembered that any human invention can be used with both positive and negative consequences, depending on the level of competence and values of the user. Thus, positive changes in the organization of adolescents' activities using software and hardware can have negative impact, too. It should be remembered that the use of hardware and software should be made with regard to with psycho-pedagogical, ergonomics, hygiene and sanitation requirements. Otherwise, their use can lead to increased pressure on children's mental and physical health.

Scientists note that after prolonged use of the personal computer monitor, the students have significantly increased concentration and visual load, increased neuro-emotional stress in terms of reduced overall muscle activity during stimulated static body posture [5; 6; 15]. Furthermore, the degree of mental and visual fatigue of students in the lessons using a PC is higher than in the traditional lessons [2; 15].

Assessing the impact of software and hardware on the health of students, the following main factors can be outlined:

- the period of working with display;
- image quality (actually, "display" factors);
- workplace ergonomics;
- environmental conditions (light, microclimate);
- the content and scope of work, determined by the nature and difficulties of educational material;
- teaching methods, the lesson structure [1].

According to the National Academy of Sciences of the USA, as well as the results of research conducted by scientists from Australia, Germany and a number of international centers, a definite link between the periodic work with software and hardware and the identification of the following diseases was founded:

- asthenopia (eye fatigue);
- back and neck pain;
- carpal tunnel syndrome;
- cardiac angina and different stress conditions;
- headaches;
- lowered concentration, sleep disorders and other symptoms, which not only reduce performance, but also have a negative impact on human health [7].

These issues are especially important for basic school students. Based on the analysis of the sources [3; 4; 10], the average adolescence (10-11 to 15 years) that corresponds the average school age (5-9 grades of secondary school), is characterized by the general rise in life and deep restructuring of the whole organism. Students of this age are characterized by: increased nervousness, emotionality, aggressiveness, fatigue, reduced cognitive activity abilities, and others.

At this age, psychological characteristics of adolescents' study change significantly [3]:

- adolescents choose the ways of learning that emphasize their higher independence, adulthood (various forms of independent work);
- new learning motives arise: education, the desire to fulfill oneself in the future (further education, the future professional activity), the need for self-assertion and self-improvement;
- knowledge becomes valuable and allows to occupy a certain status among the peers;
- orientation on an individual search for new knowledge appears;
- the process of learning in the school may be accompanied by intellectual emotions, selective assimilation of knowledge "of interest" when among a number of disciplines, several: more interesting, vivid, unusual, etc., are chosen, and they are the main focuses of a student's cognitive activity;
- a grade serves as a motivational stimulating tool, because it is converted into the determinant of student status;
- adolescents are actively testing their strength in various extracurricular activities: organizing events, public, social activities, etc. [3].

During the transition from primary to secondary school, the volume of academic load for students increases, the intensity of training grows, the amount of stress rises, that, according to medical professionals, is a major cause of worse health of students. Professional psychologists argue that adolescent children are quite vulnerable, due to the restructuring of the psychological and physiological characteristics of the organism. It is important for education staff working with this age group to pay attention to creating awareness of adjustment processes of the adolescent organism, the potential harmful effects of the environment and developing the skills of health saving.

Our study showed the active use of software and hardware among children - primary school students during school hours and after school. Most basic school students acquire the basic skills of working with software and hardware at home. The question: "Where do you most often use a computer?" 83% of children answered that at home, 4% - in the lessons at school, 3% - at school after hours, 3% - in a computer club, 7% - at friends' or relatives' places.

Although the majority of students use of software and hardware for a long time, our study found a rather low level of their healthcare competency, inability to organize their activities according to the basic hygiene requirements because of a lack of relevant knowledge and skills.

Thus, the question: "Do you know about the threats of computer devices to your health?" we received the following answers: 66% know and I try to avoid this, 25% - know, but do not pay much attention to it, 4% - do not know but would like to learn; 5% - do not know and do not want to know (Fig. 2).

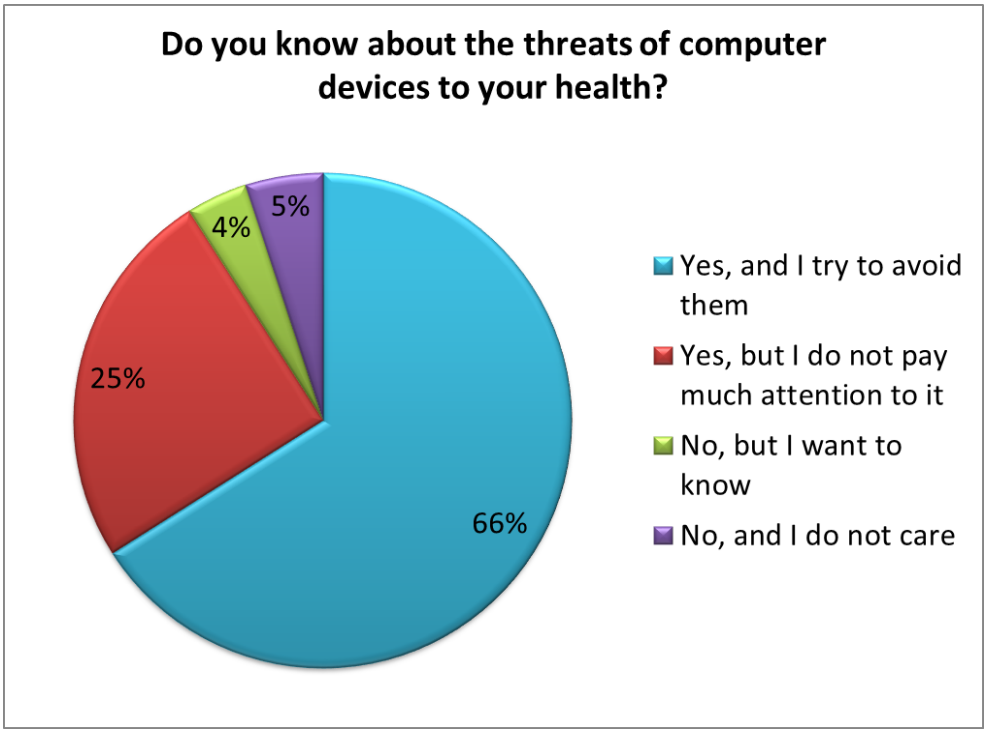

Fig. 2. Knowing about threats that computer hardware can cause among primary school students

Despite the fact that most of respondents (68%) says that they are aware of the possible negative consequences of working with hardware and software, the amount of less knowledgeable tuned to be greater. Thus, to the question: "What you think are the threats of computer use to health?" students chose these answers: 48% believe that it is high eye strain, 21% believe in the threat of computer devices for mental health, 20% consider monitor radiation dangerous, 9% note possible load on the bone and muscle systems, and only 2% - the influence of computer devices on the respiratory system. Therefore, most students know only about three potential threats from the proposed list (Fig. 3).

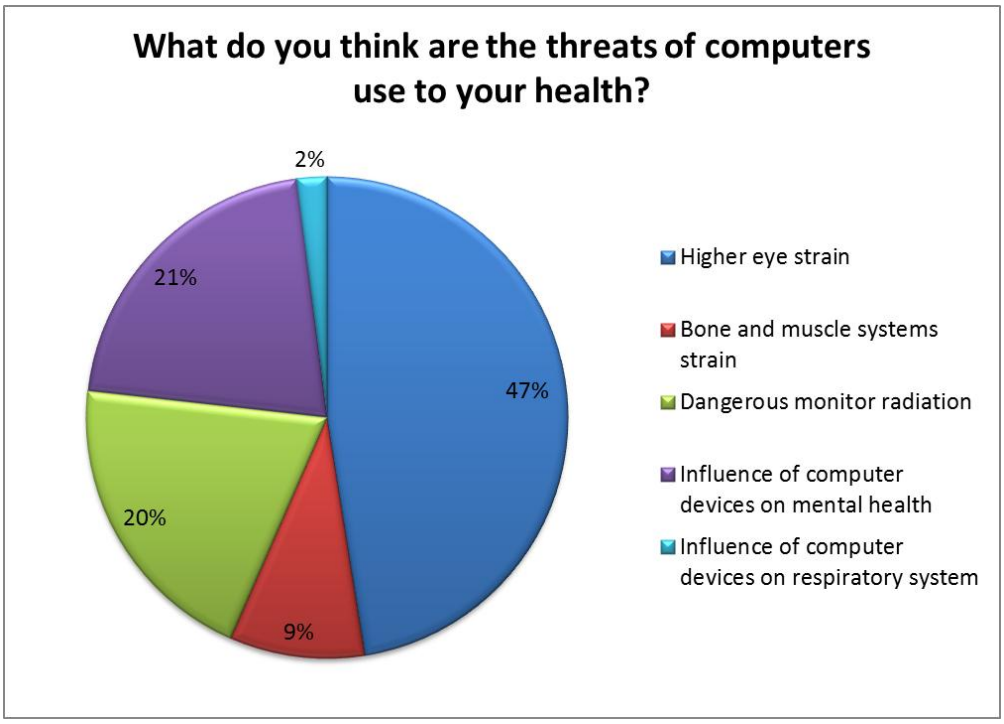

Fig. 3. Basic school students' awareness of the potential threats from using computer

Therefore, as we see, the students are not fully aware of the major potential negative impacts and threats of ICT.

When asked "How many minutes / hours a day the people of your age should spend at the computer without any harm to health?", we have received the following answers: 53% know and try to limit themselves; 27% know how, but they do not address this issue; 14% do not know how, but they want to learn it; 7% do not know it, and are not interested in it anyhow.

Although 80% (53% and 27%) of the respondents said they are aware of the temporary regulations to work with ICT, when we asked: "How much time exactly?", we have received the contrary answers: 40% believe that the work with a computer " must not exceed 30 min a day, 20% - less than 1 hour a day, 20% - 3 hours a day, and 20% consider it acceptable to sit at the computer from 2.5 hours to 8 hours per day.

In addition, the survey has showed that students usually spend at the computer quite a significant portion of their free time: 66% of students use ICT every day, 26% use ICT several times a week, 5% - once a week, 3% - a few times in a month.

If the students have had the freedom to use a computer, they normally hold it for more than three hours per day (21%), three hours per day (13%), two hours per day (28%), and about 1 hour per day (26%), or do not have such an opportunity (3%). Only 9% have chosen the answer "less than 30 minutes." This conforms to this age group features entirely.

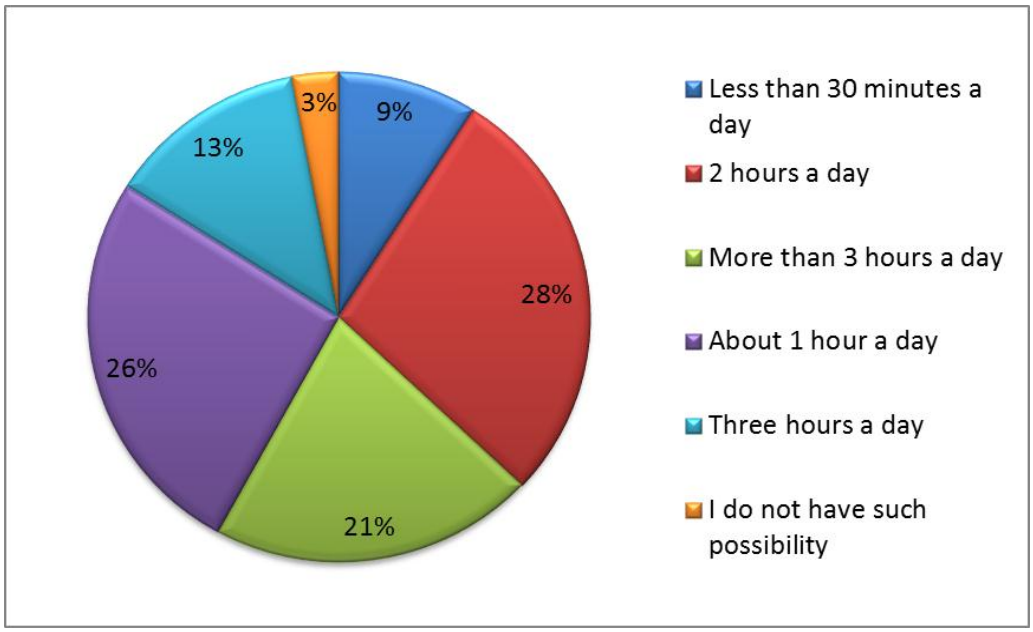

Fig. 4. Actual clock-hour mode for primary school students using software and hardware in spare time

As you can see, the actual time limit, which is recommended by public health and hygiene standards, is unknown or disregarded by the majority of students. First, it shows a lack of appropriate monitoring by adults, and, second, the low level of health care competence among the adolescents surveyed.

As to how adolescents use rationally their time spent at the computer, it can be concluded on the basis of the response to the following question: "For what purpose do you usually use a computer in your free time?". The students' answers were distributed as follows: preparing for lessons in school - 35%, listening to music and watching videos - 23%, playing computer games - 20%, studying various computer programs - 8%, for self-education - 7%, for creative self-actualization - 7%, to kill time - 4%, to escape from daily routine problems - 2%, other purpose- 1%.

Although the body's response to a long-term work at a computer is clear for many students (22% experience pain in the eyes, headaches, 18% - fatigue, drowsiness, 12% - back pain, wrists

pain, 8% - irritation, nervousness, 41% - do not feel anything special (Fig. 5), yet, the motivation setting to learn how you can protect yourself from the negative effects of ICT is quite low (63% of students would like to know, 11% - would not want to know, 26 % - difficult to answer).

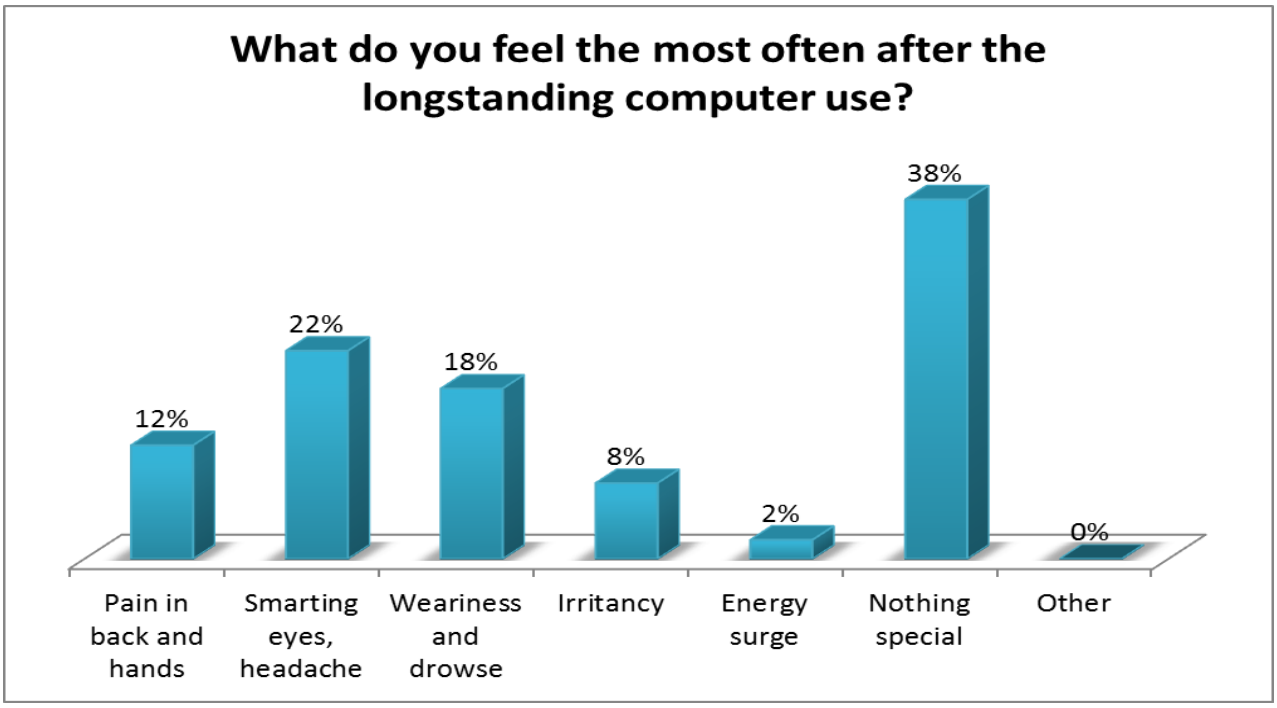

Fig. 5. Sensations of the basic school students after long work with a computer

A natural question arises here: what is the reason for such a low level of awareness, and setting of pupils on health maintenance and prevention of negative impacts of using software and hardware? The survey has showed that the main sources, from which students usually receive information about the threats to health from ICT are the parents (29%), mass media (26%), computer science teachers of (14%), a form-master (13%), other teachers (8%), and health care workers (10%).

The main reason that most students don't receive enough information about the dangerous impact of software and hardware, and how to avoid them, the teaching staff due to the fact that in the basic schools curriculum (particularly in the "Computer Science", and in the "Health Care Basics") there is not provided to study these subjects. The only source of information in this context is "Rules of Conduct and Safety in the Computer Lab," [9].

In this regard, we consider it expedient to introduce in the basic school education process the activities aimed at educating students, and to form their health saving competence.

To this end, we have developed the education and training cycle, which consists of a series of training sessions for pupils of 5-9 classes (based on the Lyceum № 157, Kyiv). The subject of sessions is covered in the following main areas:

- Availability to use modern software and hardware for training and using in daily life;
- Risk factors when working with computers;
- Terms and ways to prevent health hazards when working with software and hardware.

As a result of the training sessions cycle, there were revealed improving of health saving component in information and communication competence of students under 16 criteria.

Without a doubt, the preservation of children's health, prevention and minimization of negative external influences, the increased health care competence, strengthening of attitudes to maintain their own health should be implemented at the expense of complex systemic measures.

This is important to consider the psychological and pedagogical, hygienic, ergonomic requirements for use of software and hardware, both during development, and during and use.

It is a prerequisite to formation health care competence for all educational process subjects:

- For heads of educational institutions -it is the ability to create the conditions for an integrated approach to health maintenance of the educational process, to control over execution of the relevant rules and regulations;
- For teachers - to improve the educational process with the aim of improving health care competence;
- For students - self-regulation, self-control, self-reflection in the context of health care, both during school hours and at home;
- For parents - organizing the health saving domestic and educational space for children at home. [16]

Conclusions

Thus, we can summarize that teaching using software and hardware definitely has a set of advantages compared to the traditional: efficiency and quality of earning increases, the idea of individualization and differentiation of study is implemented, the opportunity to intensify the educational process arises.

After analyzing the literature on valueology, health culture, pedagogy, and psychology, we can conclude that one of the major problems of our times is the need for targeting the entire education system on health saving education and training. With the development of information and communication technologies and the intensification of their unbridled use, pressure on the mental and physical health of children increases. Therefore, considering the process of learning in primary school, it is important to focus on the health saving aspects of software and hardware use. For an effective learning process that uses hardware and software, a number of psycho-pedagogical, hygienic, ergonomic requirements should be complied, that would prevent the development of fatigue and reduce the potential negative impacts.

As the survey of students in Kiev, Poltava and Krasny Luch showed, all students from the 5th to 9th grade use software and hardware in the lessons, and most of them use hardware and software at home every day. All of the surveyed students said that they use a computer at home for homework, but often enough - for entertainment (music, video, games, etc.). At the same time, students almost do not keep to the time mode of computer use. Moreover, they do not know the time regulations, as well as the potential negative consequences that may result from the unlimited use of hardware and software.

Organism's response to long-term work with a computer is clear for many students (fatigue, feeling of physical discomfort, pain in the eyes, etc.). However, motivational setting to learn how to protect yourself from the negative influences of software and hardware is relatively low.

One way to solve the above problems is the organization of systematic, consistent, concerted action by school administrators, teachers, students and their parents, aimed at creating an effective learning environment for health saving. Concentration of efforts of all subjects of the environment will enable to explore and solve the problem in a comprehensive, relying on the achievements of psychology, pedagogy and medicine.

Formation of students' IR competence, their internal mindsets to preserve their health is important. Now, the possibilities for this are not provided in training programs for primary school, neither in the "Informatics" nor in the "Foundations of health" programs.

The cycle training sessions developed by the author showed the effectiveness of this approach and improved competence of students on 16 criteria. Since neither in the "Informatics" nor in the "Foundations of health" study programs for primary school relevant topic is not provided, it can be recommended to include such classes to the variative component.

This study does not cover all aspects of the problem and requires further scientific research.

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ПРОБЛЕМА ЗДОРОВ'ЯЗБЕРЕЖЕННЯ УЧНІВ ОСНОВНОЇ ШКОЛИ В УМОВАХ ВИКОРИСТАННЯ ПРОГРАМНО-АПАРАТНИХ ЗАСОБІВ

Останні десятиріччя ознаменувались інтенсивним розвитком і впровадженням новітніх інформаційно-комунікаційних технологій, програмно-апаратних засобів. Окрім очевидного позитивного ефекту (сприяння підвищенню ефективності, інтенсивності, результативності, якості навчання та ін.), використання цих засобів в роботі з дітьми основної школи може зумовити додаткове розумове, нервово-емоційне, фізичне, зорове напруження. При цьому, дотримання ряду педагогічних умов може значно знизити негативні впливи.

У статті розглянуто важливі аспекти проблеми здоров'язбереження учнів основної школи в умовах інтенсивного впровадження і використання програмно-апаратних засобів.

Окреслено переваги застосування цих засобів, а також потенційні загрози для здоров'я підростаючого покоління. Наведено результати опитування учнів (Київ, Полтава, Червоний Луч) щодо їх обізнаності про основні вимоги й норми роботи з програмно-апаратними засобами та їх дотримання.

Мета статті полягає в окресленні основних потенційних негативних впливів, що може спричинити використання програмно-апаратних засобів на здоров'я підростаючого покоління; визначення ступеня обізнаності учнів основної школи щодо цих загроз і способів їх уникнення; представленні можливих шляхів мінімізації негативних впливів на здоров'я підлітків.

Ключові слова: програмно-апаратний засіб, здоров'язбереження, учень основної школи, ІК-компетентність.

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ПРОБЛЕМА ЗДОРОВЬЕСБЕРЕЖЕНИЯ УЧЕНИКОВ ОСНОВНОЙ ШКОЛЫ В УСЛОВИЯХ ИСПОЛЬЗОВАНИЯ ПРОГРАММНО-АППАРАТНЫХ СРЕДСТВ

Последние десятилетия ознаменовались интенсивным развитием и внедрением новейших информационно-коммуникационных технологий, программно-аппаратных средств. Кроме очевидного положительного эффекта (содействие повышению эффективности, интенсивности, результативности, качества обучения и др.). Использование этих средств в работе с детьми основной школы может вызвать дополнительное умственное, нервно-эмоциональное, физическое, зрительное напряжение. При этом, соблюдение ряда педагогических условий может значительно снизить негативные воздействия.

В статье рассмотрены важные аспекты проблемы здоровьесбережения учеников основной школы в условиях интенсивного внедрения и использования программно-аппаратных средств. Очерчены преимущества использования этих средств, а также потенциальные угрозы для здоровья подрастающего поколения. Наведены результаты опроса учеников (Киев, Полтава, Красный Луч) на предмет их осведомленности об основных требованиях и нормах работы с программно-аппаратными средствами и их соблюдения.

Цель статьи заключается в определение основных потенциальных негативных воздействий программно-аппаратных средств на здоровье подрастающего поколения; определения степени осведомленности учащихся основной школы относительно этих угроз и способов их предотвращения; представлении возможных путей минимизации негативных воздействий на здоровье подростков.

Ключевые слова: программно-аппаратное средство, здоровьесбережение, ученик основной школы, ИК-компетентность.