Cooperation of future automated machinery specialists in informational context as a means of communication during vocational training process

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Abstract. The article proves the significance of the issue of academic interaction and cybersecurity in information society. Subject-to-subject relations are examined as a form of relationship humanization when using computer technologies during the vocational training of future automated machinery specialists, which results in their personal advancement and transformation. It is necessary to take into account that in the context of social development over the last years we all witness the aggravating problem with the security of computers, mobile phones and other different devices representing items that are most often subjected to the attack. In order to resist the new kind of attacks effectively every member of information society must possess a certain minimum level of knowledge, be familiar with the respective “cybersecurity culture” and willing to participate in the active struggle for the freedom of information and communication technologies from various cyber fraudsters, criminals, etc.

1. Introduction
Academic interaction process is diverse and addresses the problems of personality formation and development, gaining social experience and enhancement of both the teacher and the student. At the same time, there is a main attribute that can be used as a basis to clearly distinguish between the types of interaction and build their models. This attribute constitutes the discrepancy between the goals and objectives set by a higher education institution and those pursued by students at this given moment.

We support the position of V.G. Maralov [1] who believes that academic interaction involves such an interplay between teachers and students that results in their personal advancement and transformation.

2. Materials and methods
Methodological foundation of the study is based on the vocational training theory, reflexive activity approach, system approach, modular training theory, contextual education training, society informatization theory, theory of computer technologies [2,3,4,5,6,7]. The issues of cybersecurity culture development, software classification for educational purposes and academic requirements for tool funds were addressed by S.M. Kalanova, V.P. Linkova, G.A. Lisiyev, S.V. Panyukova, M.I. Potev and others [8,9].

Subject, hypothesis and objectives of the study determined the selected set of research methods including theoretical analysis; examination and generalization of advanced academic experience;
academic observation; comprehensive diagnostics using questionnaires and testing; conversations with students and teachers; monitoring; experiment; description; analysis; generalization and systematization of empirical data; methods of electronic data processing and visual representation of findings and simulation, methods of mathematical statistics, qualitative and quantitative analysis of results, mathematical and statistical data processing, analysis and generalization of theoretical conclusions.

3. Results and Discussion
Being the constituents of this trend, personal needs and interests – in our case, these include advanced training and self-organization of a mining production specialist’s personality - acquire personal value for him through realizing his mission.

We shall turn our attention to interaction based on subject-to-subject relations where the principle of parity (equality) is realized.

Pedagogics that is built on the system of subject-to-subject relations is referred to as cooperative pedagogics, polysubjective approach, person-centered model of interaction and pedagogics of non-violence. Here, both a teacher and a student are equally recognized as subjects of pedagogical process and have a certain level of freedom in organizing their activities, which is characterized by the ability to make a choice and develop their own personality through that. The main discrepancy is addressed by means of cooperation rather than enforcement. Therefore, such personal qualities as the ability for self-actualization and creative development, capability to create relations based on mutual acceptance and understanding as well as active approach and initiative as the form of its expression take on particular importance. That way both the teacher and the student acquire the right for individuality.

Special research and practices based on subject-to-subject relations showed that the democratic management style was prevailing and the consistently positive type of relationship was central in this case.

The communication methods including personality apprehension, recognition and acceptance are based on the teacher's developing capability to accept the student’s position, consider his point of view and not to ignore his feelings and emotions.

Cooperation is the tactics of communication. An example of such cooperation are the successful practices of using information and communication technologies during the vocational training of future automated machinery specialists.

Using a computer and information technologies in class can address the following tasks:
- educational: studying the computer as an object of cognition; using the computer and application software in academic and professional activities rationally, competently and effectively;
- pedagogical: mastering the studied course content in a quick and qualitative way; visualizing the content; providing for individual learning paths for students;
- organizational: computer testing, record-keeping and planning.

As demonstrated by empirical practice with students, the formation of relationship humanization will be effective if the use of computer technologies during the interaction involved with vocational training of future automated machinery specialists is subject-to-subject.

Therefore, the above represents the model built on the system of subject-to-subject relations and creates favorable conditions to address the main discrepancy between the goals and objectives set by the teacher and those defined by the student.

As proved by the experience gained in the course of activities involving future automated machinery specialists, the following applications of computer technologies in vocational student training had strong potential for relationship humanization:
- studying the informatics module of the “Information science and information and communication technologies” course;
- computer-aided classes of the course;
- computer testing;
- referring to the resources of the educational institution's information center;
- visiting the educational institution's website;
- Internet activities;
- organizing and conducting extracurricular activities;
- publishing topical bulletins;
- publishing wall newspapers and designing stands;
- management (keeping an electronic journal);
- preparing documentation.

The computer allows changing the control over the activities of future automated machinery specialists in a quality manner and ensure flexible management of academic and professional activities by doing so. The teacher’s role is equally important here. He selects software for the class along with the learning material and individual tasks, assists students in the course of their activities and evaluates their knowledge and development. The application of computer equipment makes and allows choosing the optimum form of training. Personality traits of both the student and the teacher are developed within the scope of this model and the activities take the form of independent action and enhanced by own personal experience.

When using a computer, verbal communicative activities can be regarded in terms of three aspects:
- firstly, as casual online communication between students by using electronic mail and information networks, i.e. as an authentic written dialogue between communication partners;
- secondly, as an interactive conversation between future automated machinery specialists and the computer, which pursues the real goals of communication, i.e. as a man-machine dialogue;
- thirdly, as communication between students during their work with education software that functions as a means of simulating the conditions of communicative situation.

Yet, it is necessary to take into account that in the context of social development over the last years we all witness the aggravating problem with the security of computers, mobile phones and other different devices representing items that are most often subjected to the attack. We can state without exaggeration that the intensive expansion in the number of the global Internet subscribers implies an increased number of Internet attacks (“cyberattacks”) and the use of the modern personal computer provides the attackers with a tool for spying and different destructive activities, which is unique in terms of its features. New related terms such as cybercrime, cyberterrorism and cybersecurity have come into existence these days.

Cyberattacks involve unintended or unauthorized access to, using, handling and interrupting or destroying through the use of electronic means of information or electronic devices, processes and physical infrastructure used for information processing [10]. We can see that cyberattacks can cause serious, and sometimes also irrecoverable, damage to the society within informational context.

In order to resist the new kind of attacks effectively every member of information society must possess a certain minimum level of knowledge, be familiar with the respective “cybersecurity culture” and willing to participate in the active struggle for the freedom of information and communication technologies from various cyber fraudsters, criminals, etc.

Definition of the term “cybersecurity” states that it refers to the conditions of protection against physical, mental, financial, political, emotional, professional, psychological, educational or other types of influences existing in the cyberspace, which could be considered undesired [11]. In other words, cybersecurity refers to protection against intentional and targeted cyberattacks.

When analyzing the general definition of the term “culture”, it refers to a set of knowledge, beliefs and behaviors based on symbolic thinking and social learning [12,13].

Therefore, by the term “cybersecurity culture” we understand a dedicated set of knowledge and behaviors focused on the protection against intentional and targeted cyberattacks within informational context.

According to statistics and social research, with the rapidly increasing level of using global information and communication networks (for example, in 2017 the number of Internet users in Russia reached 70 million people) the maturity of cybersecurity culture appears to be at an extremely low level (only about 10 per cent of Internet users in Russia have at least the minimum idea about the
threats that they are subjected to themselves or expose others to while working with the Internet).

The number of various threats existing in the Internet these days is growing. At the same time, the number of those subjected to the attacks, which includes teenagers, students and schoolchildren, is not getting lower.

Due to the increasing need for creating the conditions to develop the cybersecurity culture, the Concept of the cybersecurity strategy in the Russian Federation was drafted, which included the following:

- providing for the improvement in the skill level of Russian citizens with regard to ensuring cybersecurity by way of developing new and expanding the existing educational programs and organizing awareness-raising campaigns;
- suggesting improvement, approval and implementation of educational standards for specialist training and retraining relating to cybersecurity;
- ensuring the tasks of developing and introducing the course on information security into the learning process offered by educational organizations of various levels, which includes modules on providing cybersecurity or supplementing the existing courses with the above modules;
- arranging for the organization of measures on stimulating public-private partnership with regard to supplementary vocational education in the field of cybersecurity [14,15,16,17].

Based on the above mentioned, we can see that the government is certainly interested in developing cybersecurity culture in the society overall and particularly among students.

Efforts are made today to teach this culture both at secondary schools and higher education institutions. However, according to the practical experience, this constitutes just a small part of what is necessary for the development of cybersecurity culture in information-oriented society. The students' vision of cybersecurity is not enough developed due to the lack of targeted systematic measures on cybersecurity culture development in the students' educational environment.

The main goal of the methodological service is to ensure accessibility and improve the quality of educational services through the modernization of education, aimed at ensuring compliance of state educational standards with available financial resources [18,19,20,21]. At all levels of the educational system, the improvement of the quality and innovative nature of education should be ensured by:

- introduction of new educational technologies,
- development of interactive forms of learning,
- wide use of design methods and methods that allow simulating real situations,
- modern training programs.

4. Conclusion
The following approaches can be proposed to address the issue of using computer technologies during the vocational training of future automated machinery specialists:

- solving professional and academic tasks that promote skills and abilities related to safe and rational behavior among future automated machinery specialists when working with software and the Internet;
- developing a dedicated practice-oriented course for future automated machinery specialists, which will not only introduce them to each type of cyberthreat in detail but also suggest the elaboration of correct actions to be implemented when facing various cyberattacks.

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