

THE USE OF A SPECIALIZED COMPUTER GAME IN PRACTICAL CLASSES IN THE SPECIALITY CYBERSECURITY

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ABSTRACT. The relevance of the research topic is due to the need for lecturers to find ways and technologies to maintain a high level of motivation and attention of students and cadets of the cybersecurity speciality in practical classes. Traditional methods and means, as practice shows, are not limitless. The main aspects of the work. The paper examines the existing best practices of the use of games by researchers in the educational process. Based on the positive results, it is proposed to develop specialized computer programs to increase the educational interest of students and cadets of the cybersecurity speciality in practical classes. Scientific novelty. The concept of building a training complex for training cybersecurity specialists based on a computer game is proposed for the first time.

KEYWORDS: *class, practical training, specialist, cybersecurity, computer game.*

INTRODUCTION:

With the advent of computer engineering, the motivation for traditional teaching methods began to fade paradoxically rapidly among students and cadets. Given the degree of declining interest among young people in technical (engineering) specialities and artificial demand for economic specialists, in modern market conditions, the problem of finding new approaches to the motivation of students and cadets has arisen.

To help solve this problem, gaming methods of adult education have come to the fore. Excessive use of a phone or tablet during training does not create a sense of compulsion in a person, but unfortunately, it covertly leads to gambling addiction – a disease of the XXI century.

However, this is not entirely true, since addiction increasingly arises from the game, game program, online games with which it connects the user [1]. There is nothing special about smartphones themselves that would cause addiction, but the real driving force of our attachment to these devices arises from the hypersocial environment in which a person lives in the modern world [2].

ANALYSIS OF RESEARCH AND PUBLICATIONS

An analysis of current research has shown that this issue has attracted the attention of quite a large number of scientists. Among the many publications, in relation to our subject of research, the following works are of great importance.

In work [3], an innovative idea of gamification of the higher education system through the introduction of computer games is proposed. In this paper, the hypothesis is laid that as a result of the introduction of game pedagogical technology for teaching electrical engineering disciplines by the method of virtual computer game, due to the interest shown by young people in computer games, a positive effect will be achieved in motivation and learning outcomes. The preliminary results served as the basis for the further development of the method of playing using a virtual computer during the independent training of cadets on training facilities [4].

It has been established that the use of gaming technologies in education (gamification) attracts the attention of a significant number of researchers.

"Gamification is an educational technology that is rapidly developing, having a huge potential to positively influence the effectiveness of the educational process" [5, p. 135]. According to V.Y. Buhaieva, gamification can be considered as a way of forming active professional behavior of future IT industry specialists.

Continuing to develop the idea of the prospects of gamification of higher education, it is interesting to note the opinion of researchers that:

"gamification is the concept of applying game mechanics and game design methods in a non-game context to attract and motivate people" [6, p. 25];

gamification reveals the possibility to consider the formal and informal space of the learner [7]; gamification allows you to build learning based on game methods and thus strategically improve learning and education [8].

In a separate group, it is possible to combine studies in which scientists consider gamification as a certain pedagogical technology: teaching [9]; innovative [10]; professionally-oriented learning [11].

A separate group of studies consists of the results of scientists, in which reflections on gamification are presented, namely:

on the advantages and disadvantages of gamification in online higher education [12];

as a warning to the modern and popular gamification process, the results revealed numerous risks in media practice [13].

Considering the abovementioned, we agree with the author that gamification is a trend of modern higher education [14] with many advantages and prospects, and at the same time excessive cybernetization of education makes it more vulnerable to cyber threats [15].

Problem statement and its connection with important scientific tasks. The result of the research analysis [3-15] showed that in modern pedagogy, the lecturer's problem of increasing the interest and motivation of students and cadets in cybersecurity by improvised means for the effective organization of the educational process remains relevant and unresolved. Taking into account the above, the authors have chosen this relevant area of research.

PURPOSE OF THE ARTICLE

To substantiate the concept of a training complex for training cybersecurity specialists based on a computer game.

To achieve the goal, the following tasks are set:

1. Analyze the current state of research and publications.
2. To develop a conceptual idea of using a computer game in the practice of training specialists in the field of cybersecurity.

MAIN RESULT OF THE RESEARCH

Until now, competitive (game) tasks are most used in the study of the processes of armed struggle.

With the advent of cyberspace, according to the authors [16], a new space for fighting has appeared – cybernetic.

In work [17], the researcher proposed the idea of considering the conflict of interaction of objects in cyberspace as a kind of model. Taking into account the classification of game theory problems [18, p. 221] and the strategy of a possible educational game in cyberspace [19], we can present this model in the form of the following Figure 1.

The main principle of gamification is to ensure the receipt of constant feedback from the user, providing the possibility of dynamic correction of his behavior [14].

The main aspects of gamification according to the researcher [14] are:

dynamics – the use of scenarios that require the user's attention and reaction;

mechanics – using scripted elements such as virtual rewards, statuses;

aesthetics – creating a general gaming experience that promotes the emotional involvement of the user;

social interaction is a wide range of techniques that ensure user interaction.

Gamification of the educational process, according to the author of the study [14] affects three areas of student behavior, namely:

– *cognitive* (the game contains a system of rules for players; provides solutions to specific problems adapted to the skill level of the player; the growth of difficulties contributes to the acquisition of appropriate skills by players; the content and organization of the game provide an opportunity for students to go different routes that allow players to choose their intermediate goals within the overall task);

– *emotional* (participation in the game allows players to experience different emotions from joy, pride in their achievements to disappointment. This is due to the fact that in order to acquire new knowledge, the player has to fail at some stage of the game. During the game, students' attitude to

mistakes changes (they have the right to make mistakes), they do not get a bad grade for an incorrect answer);

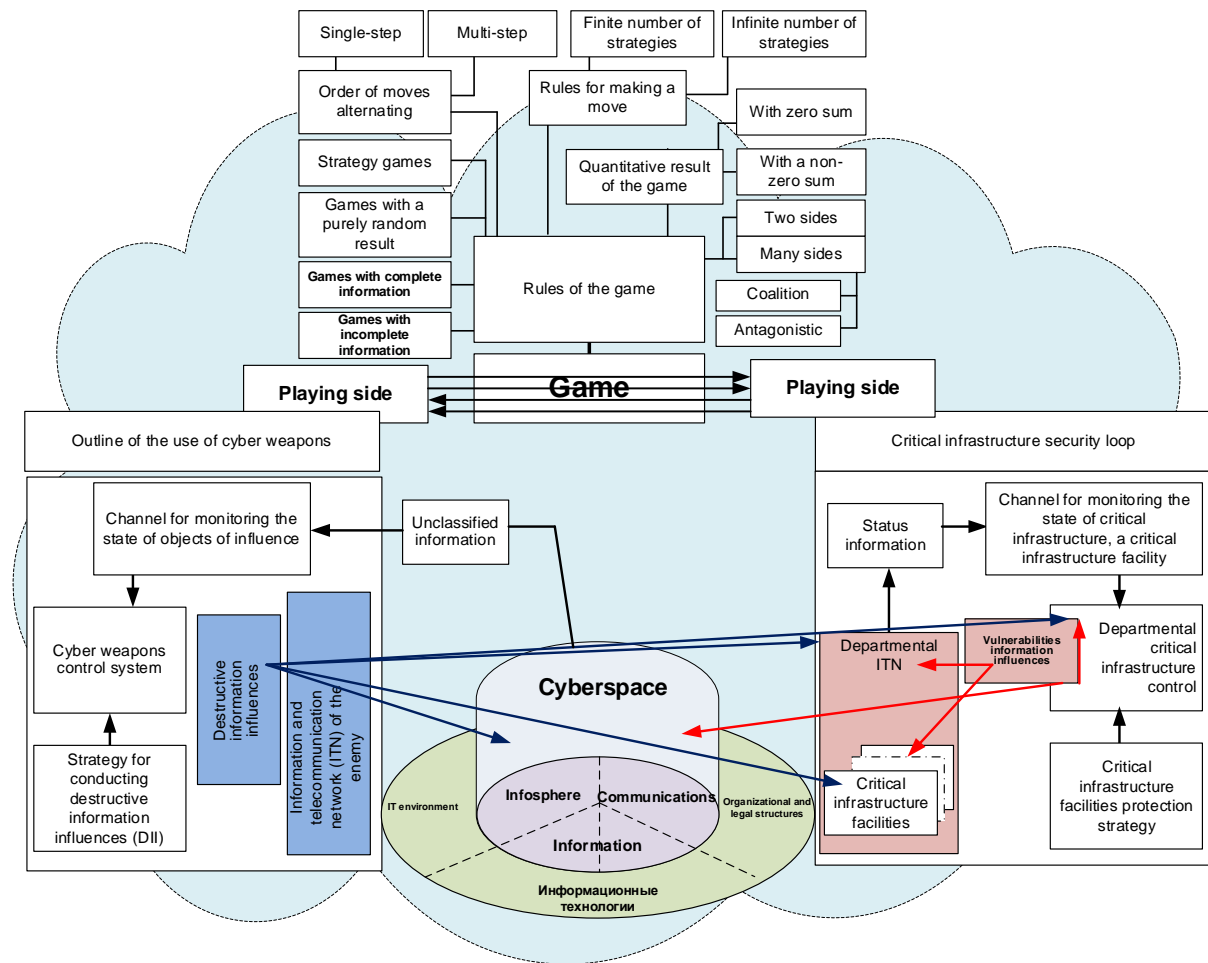


Figure 1 – A model of confrontation in cyberspace taking into account the classification of game theory

– *social* (content of the game and its organization allow players to perform new roles and make decisions. Playing alone or in a team and performing various roles, players in the safe space of the game have the opportunity to form a willingness to work in team, dialog speech).

The game of cybersecurity, like any game, has certain rules that oblige all participants of the game to adhere to certain sequences, analysis and the choice of response algorithms, depending on the conditions of the tactical situation deployed on the virtual battlefield.

The value of the game cannot be exhausted and evaluated by entertainment and reactive capabilities [20]. The phenomenon of the game lies in the fact that, being entertainment, recreation, it is able to develop into study, into creativity, into a model of the type of human relations and manifestations in work.

In this study, it is proposed to consider the game from the point of view of the teaching method. Then the method of pedagogical play will be widely used in the development of military art, which means it will contribute to students and cadets in acquiring professional skills.

Unlike games in general [20], a controlled pedagogical game has an essential feature – a clearly formed learning goal and corresponding pedagogical results that can be justified, explicitly highlighted and characterized by an educational and cognitive orientation.

Taking into account the abovementioned, an educational model of the computer game "practical implementation of confrontation in cyberspace according to the rules of the ontology of

cybersecurity" is proposed, the functional model of which is presented in Fig. 2. On this model, it is possible to study (model) the influence of incoming processes in cyberspace.

By analogy to the work [20], we suggest that game software developers join the creation of a training game strategy for cybersecurity similar to the one used in computer games. Its emulation, like a computer game, is rationally used during practical training in the training of cybersecurity specialists.

The purpose of using the software product is for students and cadets to acquire primary practical skills in manual configuration of systems and components of a cybersecurity system. In addition, the game software product will be useful, for example, when configuring routers, firewall, etc. on a conditional educational information system (see Fig. 3).

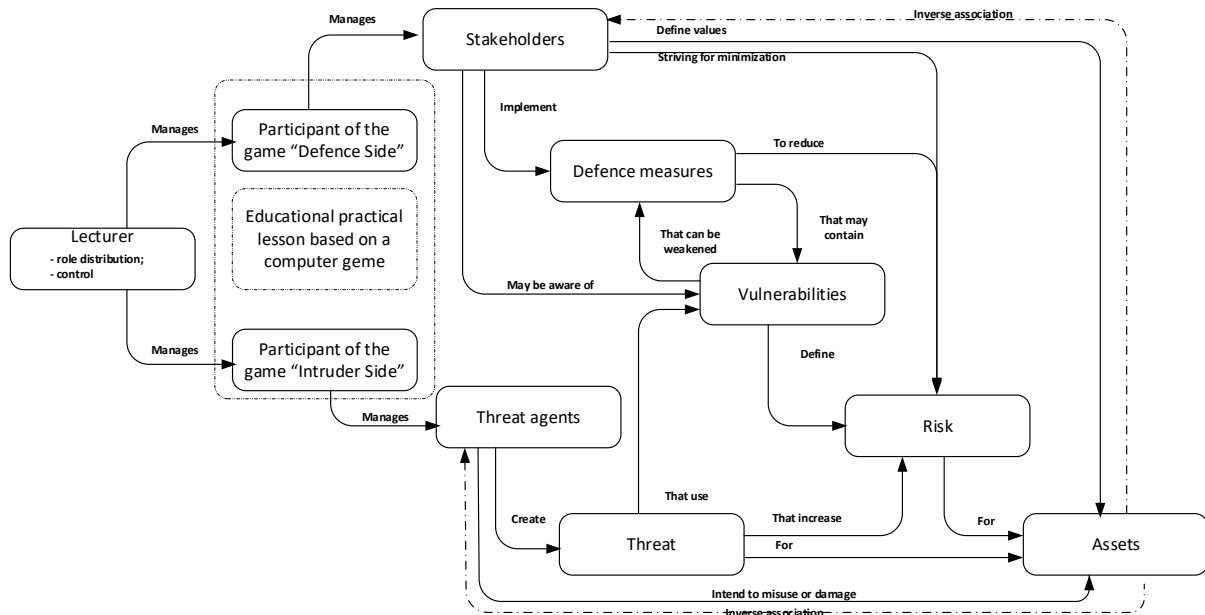


Figure 2 – Functional model practical implementation of confrontation in cyberspace according to the rules of the cybersecurity ontology

With the help of the game emulator, practical training of specialists in the field of cybersecurity can be carried out during training sessions:

- arrangement of the workplace by a specialist;
- on the speed of assembly / disassembly (block repair) of a computer, laptop;
- simulate the settings of the access point to the components of the information and communication network (Fig. 3);
- remote configuration of routers, firewall, etc.;
- development of fast programming skills;
- working out the algorithm for the commander's decision-making.

It is necessary to point out the main advantage when training specialists in the field of cybersecurity, which is that it is possible to preserve expensive equipment from damage as much as possible in case of erroneous actions of students.

Own modeling helps a cybersecurity specialist to clearly understand the sequence of elementary actions, study the construction of the network, understand the meaning of cyberspace protection in accordance with his sector of responsibility, develop a creative idea of searching for new contextual algorithms for implementing cybersecurity.

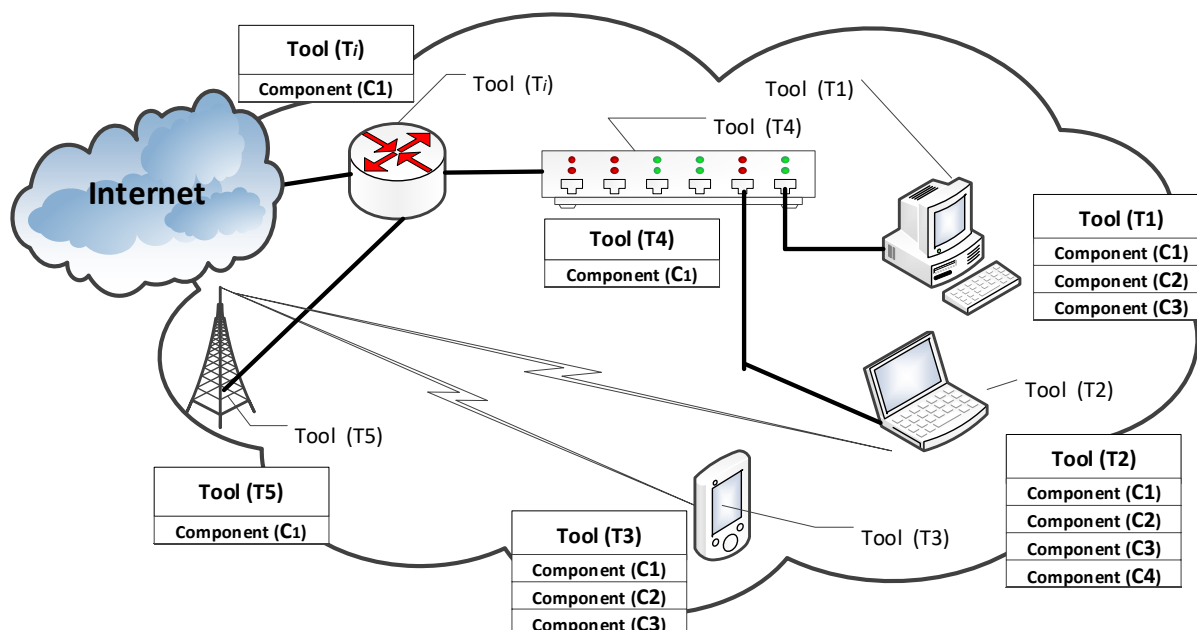


Figure 3 – A fragment of a conditional educational information system

The participant of the game "Intruder Side" under the guise of "Threat Agents" create educational cybernetic destructive informational effects if necessary to attack an enemy resource. At the same time, the participant of the "Defense Side" game, acting as a future specialist in the field of cybersecurity, should form a quasi-professional solution in the game that would neutralize the cybernetic destructive information impacts created by threat agents.

The result of the game will be the preservation of the integrity of the assets by the participants of the game "Defense Side".

So, the implementation of a computer game with a certain form of classes takes place in the following main areas[20]:

- the didactic goal is set by students and cadets in the form of a game task;
- educational activity is subject to the rules of the game;
- the educational material is used as its means;
- an element of sports competition is introduced into the educational activities of students and cadets, which turns the didactic task into a game;
- the successful completion of a didactic task is associated with the game result.

Then the trainee, while learning during a computer game, does not suspect that he is learning something. In an ordinary higher school, it is not difficult to indicate the source of knowledge. There is no source of knowledge in a computer game that is easily learned by students and cadets. The learning process develops in the language of actions as a result of active contacts with each other. Such game training (by analogy with work [20]) will be unobtrusive for cadets.

Discussion of preliminary results.

Estimates of the effectiveness of using computer games in the military sphere on the example of the use of virtual reality and 3d technologies given in work[21], confirm the high effectiveness of computer games in the educational process.

With the help of building training of cybersecurity specialists using a computer game, it is possible to increase the level of motivation, which is confirmed by the results achieved in similar areas, for example, motivation in esports players [22], which is confirmed by the gaming motives considered in the work [20].

It should be borne in mind that computer games increasingly carry a modern danger, which lies in the mass emotional, psychological perception of the game [23]. The paper [24] established the

influence of computer games as a new cultural factor on the formation of personality. With excessive enthusiasm for them, such a perception can lead a person to an aggressive manifestation [25] and when similar symptoms of computer addiction are detected [26].

It should be stated that virtual space is a new type of cultural space, which is characterized by freedom of creativity, illusory, dynamism, the ability to accelerate or turn time [27] and there is no way without it. As is known, there is no going back.

CONCLUSIONS

Gamification in higher school makes it possible to create such an information and learning environment that promotes independent, active striving of students and cadets to acquire knowledge, professional skills and abilities, such as critical thinking, decision-making, teamwork, being ready to cooperate; helps to reveal abilities and motivates self-education. Taking into account the presence of positive experience in the use of computer technologies in the training of people of different ages, it seems appropriate to use elements of the game in the training of specialists in the field of cybersecurity. At the same time, it is necessary to be careful about the use of gamification. It is clear that the spirit of struggle encourages students and cadets to do tasks faster and better, but if one of the participants gets a result that is much worse than that of the leaders, then with certain attitudes, this person may lose courage and decide that there is no point in learning, anti-motivation ensues. Game software developers are invited to develop specialized computer programs to increase the educational interest of students and cadets of the cybersecurity specialty in practical classes. Based on the above, it can be predicted that the use of computer games in the training of specialists in the field of cybersecurity at the initial level, whose purpose is to develop an interest in technology, improve communication skills that can be transferred to simulators of real means. The skills acquired during classes will be useful in future professional activities.

SCIENTIFIC NOVELTY

The concept of building a training complex for training cybersecurity specialists based on a computer game is proposed for the first time.

PROSPECTS FOR FURTHER SCIENTIFIC RESEARCH

The theoretical results obtained in the process of scientific research form the basis for further research in substantiating the technical task for the development of computer software from the game in cyberspace.

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