NEW TECHNOLOGIES IN INSTITUTIONS FOR SECURITY AND DEFENSE STUDIES – CHALLENGES AND RECOMMENDATIONS

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Abstract: The aim of the article is to identify future challenges related to the implementation and use of new technologies in the didactic process in institutions for security and defense studies. The author also presents expert recommendations formulated on the basis of their current experience and forecasted achievements in science and technology. Taking into account these recommendations may contribute to more effective management of the quality of education, including the introduction of changes, the way of designing learning and teaching processes. The article uses a critical literature review and qualitative research based on expert interviews and analysis of respondents' statements.

Keywords: new technologies, education for security and defence, challenges for institutions, recommendations.

1. Introduction

The world of new technologies fascinates and surprises with more and more advanced solutions. These solutions on the one hand arouse curiosity, encourage to explore innovative ideas, and on the other give rise to fears about random traps set on human weaknesses. New technologies are understood as those developed over the past decades that affected all areas of human activity (Tort, 2010, p. 44-57; Andrada, 2010, p. 139). In another definition, new technologies (explained more precisely as *emerging technologies*[1]) are solutions that are or will be developed within the next 5-10 years (www.businessdictionary.com/…). More and more questions, discussions on new or emerging solutions (mostly IT) appear in the field of education, especially in institutions that work for security and defense. This is because the support for education and training in new technologies generates both new opportunities and unforeseen consequences. One should be aware that the development of the information society is inseparably connected with innovation and mobility, while the role of institutions introducing new technologies in education for safety and defense is to support the

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[1] Some authors regard these terms as identical; for the purposes of this article, these terms will be used as related but not synonymous.

implementation of the didactic process. However, the introduction of these technologies, especially in the specific training conditions (in dispersed and dynamic operation), is also associated with overcoming limitations and striving to achieve the best results. That is why the issue under discussion is a great challenge for both decision-makers and educators. According to M. Kozub, challenges are elements of a set of expected events, phenomena, states, processes, etc., which the subject (organization) should (must) take into account while designing the future. Challenges are both subjectified and objectified. They should be seen as threats, but also as opportunities. They are neither good nor bad, they are *electrically neutral* (Kozub, 2013, p. 29-30). In the light of the quoted definition, the article will attempt to identify challenges in education for security and defense, which will be discussed in terms of opportunities[2] and threats[3]. Awareness of these challenges implies the need to create recommendations and guidelines for both decision-makers and educators. In the institutional dimension, they will be important for the management of the quality of education, including the effective implementation of changes, support of learning and teaching processes, monitoring the learner's activity, and the individualization of educational tasks.

In order to identify these challenges and develop key recommendations (for educators and decision-makers), a critical analysis of literature and qualitative research involving the analysis of the content of statements collected through expert interviews was carried out. As the questions were open (free speech), the content of the statements was analyzed, and the answers of each respondent were classified according to the previously developed codes (categories). In the course of the quantitative analysis, the frequency of the occurrence of similar or synonymous statements was established and factors differentiating the type of justification for the given code were determined thanks to statistical analysis. The interview itself was carried out in 2014 with a group of international experts, hence the research results can be generalized to the international environment.

2. Challenges for institutions

The constantly changing world and the need to generate unique solutions bring challenges. Identification, analysis and evaluation of these challenges is critical for planning the path of development of a given community or institution.

When formulating and assessing challenges, it is essential to refer to megatrends that shape the directions of civilization development and affect the broadly understood education. In the report entitled *Jak będzie zmieniać się edukacja? Wyzwania dla polskiej szkoły i ucznia,*

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[2] Opportunities – elements of a set of challenges whose impact on the basis, course and/or results of our activities is assessed as positive, facilitating, accelerating. Ibid., p. 28.

[3] Threats – elements of a set of challenges whose impact on the basis, course and/or results of our activities are assessed as negative, obstructing, delaying. Ibid., p. 28.

instytut obywatelski, W. Kołodziejczyk and M. Polak estimate that *the development of civilization leaves no illusions to the education system. Digitization, digital didactics, mixed styles, IT-assisted learning, connectivism, social learning, and mobility are emerging.* The authors add *that habits that make us perceive a teacher through the prism of the system are still firmly rooted: a cog in the machine, dependent, without necessary tools, a part of the enormous mindless testing machine* (Kołodziejczyk, Polak, 2011, p. 45). Another author, L. Hojnacki, emphasizes the existence of generational differences and barriers that are related to the use of new technologies in the educational process (Hojnacki, 2011).

Challenges that may arise in connection with the development of new technologies in the area of education are also the subject of discussions at high levels of the state. In the Long-term National Development Strategy *Poland 2030. Third Wave of Modernity* (Ministerstwo Administracji i Cyfryzacji…) it was emphasized that by 2030 we will face new digital divisions (resulting from lack of competences in this area), while Poland faces the challenge of creating a modern infrastructure of services and digital resources. This challenge is included in the chapter titled *Strategic goals and directions of intervention in the area of competitiveness and innovation of the economy – innovation of the economy and individual creativity*, in which the so-called *Goal 5* is to create a Digital Poland (Ministerstwo Administracji i Cyfryzacji…, p. 92). It is worth mentioning that *Poland 2050* is the most forward-looking document underlining the importance of necessary actions for the development of the civilization of knowledge, innovation, research and progress (Kleiber, Kleer, Wierzbicki, Galwas, Kuźnicki, Sadowski, Strzelecki, 2011).

The indicated challenges regarding the future of education, although discussed in a general context, also have an impact on education for security and defense. To learn more about the challenges in this area, the author conducted an expert study in 2014, in which specialists from international environments participated (n = 30)[4]. In the interview, open questions were asked about possible opportunities and threats related to the use of new technologies in the broadly understood education for security[5]. The analysis of responses has become the basis for presenting the perception of new technologies by experts who use them in their daily work, as well as identifying the associated risks.

On the basis of the analysis of the content of the statements, eight codes were formulated, expressed in the form of the following statements:

1. sharing content through popularization and development of new achievements of science and technology,
2. increasing the level of education,

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[4] The research was published in the author's monograph (Gawlik-Kobylińska, 2016). Due to fact that the book was issued in a relatively small number of copies (*self-publishing*), the research was presented again in this article for the purpose of its popularization.

[5] Although there is a distinction between education for security and for defense, some authors indicate that education for security also includes defense in its scope, e.g. (...) *it also concerns the preparation of the youth and the society for defensive and effective responding to threats* (Kunikowski, 2014, p. 36). This article adopts J. Kunikowski's approach.

3. costs of implementing new technologies,

4. creation of advanced didactic tools,

5. barriers resulting from improper use and understanding of new technologies,

6.   raising the level of innovation towards the commercialization of research results,

7. developing interinstitutional cooperation,

8. thinking about the future.

The distinguished codes, recognized as opportunities and threats, became the basis for grouping the experts' statements, as presented in Table 1.

Table 1.
The expert's statements about the challenges related to supporting education for security with new technologies

Opportunities
1) Availability of content through popularization and development of new achievements of science and technology (9)
• *development of new technologies*   • *access to many recipients, mass use*   • *wider application of hardware innovations*   • *increasing interest in new technologies, especially in military institutions - including those at lower levels – where they are becoming more common – mainly due to efficiency, speed and precision of applied technologies*   • *the possibility of using the innovations of programs outside the area of education, after completing a training course*   • *possibility of logging in to exchange or obtain information from the platform*   • *popularization of technology*   • *remote access to the platform*   • *spreading interest among new social groups*
2) Increasing the level of education (4)
• *developing a "habitual reaction" in the listeners during the process of launching crisis response procedures*   • *the ability to check the reaction to emerging threats, delays, etc.*   • *increasing the level of education and expanding teaching opportunities (including the number of people who want to and can be educated) related to expert cooperation, feedback and accessibility (time and place of study)*   • *virtualization of a dangerous environment in order to consolidate and automate the reactions of the personnel*
3) Raising the level of innovation towards the commercialization of research results (2)
• *new patent applications*   • *commercialization of innovation*
4) Creation of advanced didactic tools (2)
• *the most important challenge in my opinion is to build such a mathematical (statistical) model, which after introducing the problem would in almost 100% give answer to the question: "What effect will the given event or its likely course trigger and what the successive phases, stages or intermediate states and possible final effects would be?"*   • *the ability to monitor very unusual situations*
5) Developing interinstitutional cooperation (4)
• *increasing the level of expert cooperation in specific fields of teaching and in the field of new technologies (2)*   • *creation and use of simulators (automatic for developing habits and automatic-expert for non-typical situations) that would replace the so-called practical workshops*   • *possible access to many institutions and faculties of departments cooperating within the framework of broadly understood security*

cd. tabeli 1.

6) Thinking about the future (2)
• *rapid „aging" of technologies*
• *e-learning platforms and new technologies are the future of education, yet they are underestimated*
Threats
7)Costs of implementing new technologies (4)
• *purchase of licensed but expensive computer simulation programs, e.g. CBRN Analysis*
• *obtaining reliable and up-to-date data; the problem that is also associated with the above thesis is the cost of obtaining the data and the software itself*
• *cost of purchasing new technologies (2)*
8)Barriers resulting from improper use and understanding of new technologies (3)
• *lack of management support, technophobia*
• *the possibility of flattening of the presented forms and consequently the creation of information blockade*
• *cyber-bulling*

Source: study based on: Gawlik-Kobylińska, 2016, p. 175-176.

It can be noticed that the most of the experts' opinions concerned opportunities (6 codes with 23 statements), while threats were described by two codes, distinguished on the basis of 7 statements. Challenges are therefore associated more with opportunities than with threats. These opportunities relate primarily to the popularization of knowledge and easier access to didactic content. In addition, experts pointed out that it is possible to use the potential of new technologies in various types of exercises, which are usually extremely expensive and difficult to prepare in traditional conditions with the use of classical forms and didactic methods. New technologies also facilitate the preparation of the course participant to automate the reactions and maintain desired habits.

In the era of knowledge economy, knowledge is transferred to business, it is a product that should be gradually developed. However, its development costs, hence the statements of experts also emphasized the importance of international cooperation, commercialization of research results and even patent applications.

On the other hand, in terms of threats, the costs of implementing modern solutions and the problem of misuse and misunderstanding of new technologies was mentioned as well. Previous experience of experts in this area is the basis for stating that the lack of response to such barriers may lead to information delay, which is a significant threat to the development of a given organization.

Awareness of the existence of challenges, understood as opportunities and threats, is crucial for each institution, therefore it is important to observe new trends, as well as to discuss the development of modern tools.

3. Recommendations

Preparing recommendations for the implementation of new technologies to the didactic process of a civil-military university may turn out to be a difficult and risky task, as their

subject of concern is a future reality. In addition, they may refer to specific situations, institutions, conditions that are still subject to various changes (Gawlik-Kobylińska, 2016, p. 171-172). When preparing recommendations, it is essential to make them consistent or to complement the strategic concepts of social and economic development of the state and the region.

The most common recommendations in the literature on the implementation of new technologies for the didactic process concern the form of education, preparation of teaching resources and implementation of innovative educational solutions – analyzing their usefulness and optimal use (Voogt, Knezek, Roblin, 2015, p. 619-623; Billon, Crespo, Lera-López, 2017, p. 51-68). However, in order to describe the current state of knowledge in such a dynamic field, the author decided to conduct her own research in an international expert environment.

The recommendations presented refer to both educators and institutions (decision-makers). In an expert interview conducted in 2014, 36 experts were asked to express a recommendation or suggestion on the effective use of new technologies in education and training in civil-military institutions. The opinions collected were used to distinguish the following codes in the form of affirmative sentences. For educators they are as follows:

- creating an open attitude (thinking about the future),
- individualization (Karpeta-Peć, 2017, p. 97)[6] and personalization of (Karpeta-Peć, 2017, p. 111)[7] education.

For the decision-makers, the following codes were distinguished:

- promoting a pragmatic approach in the use of technology,
- creating an open attitude (thinking about the future, similar as for educators),
- increasing funding for innovations.

These codes will be illustrated with the examples of experts' statements (opinions).

3.1. Recommendations for educators

In a survey conducted among experts on recommendations for educators, the opinions assigned to specific codes are as follows (Table 2).

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[6] Individualization is defined as a *process aimed at individual development and gradual taking over of responsibility by the pupil/student.*

[7] Personalization is *associated with giving the process of learning a personal character (not only individual). Personalization is achieved by developing autonomy and through reflection* (over actions and their effects).

Table 2.
Experts' statements on recommendations for educators

Educators – recommendations	Opinions
Creating an open attitude (thinking about the future) (7)	• *do not be afraid of new technologies* • *openness to young people, greater understanding* • *more frequent use of distance learning* • *using technologically advanced equipment.* • *seeking new solutions in the area of education, using "foreign" technologies and striving to develop own appropriate teaching models* • *observing the current development of science and technology in the field of education for security* • *skilful and effective use of possessed potential; long-term development planning related to technological progress*
Individualization and personalization of education (3)	• *the use of tools suited to age and skills of students; flexible selection of teaching methods* • *individual work on simulation sets* • *paying attention to the evaluation process and suggestions of trainees*

Source: (Gawlik-Kobylińska, 2016, p. 173).

Considering the first code – creating an open attitude (thinking about the future), the educators should be, according to experts, open to new technologies (*do not be afraid of new technologies)*, even the most advanced ones. Searching for and developing teaching models and at the same time observing emerging new trends also fit into the subject of this code. Experts also point to a *skilful and effective use of owned potential.* Even today, it can be noticed that new technologies included in the education process enable faster transfer and verification of knowledge: monitoring and checking the progress of learning is automated. In this slightly changed environment, the teachers have a completely new role: they are advisers, trainers, and experts in learning; they may or may not be the only source of knowledge. They support the acquisition of knowledge and the development of competencies and attitudes, show how to learn, and, above all, motivate students. A. Pieczywok, and L. Wełyczko emphasize that since the (academic) teachers are supposed to be *open-minded creators who possess the skills to share knowledge in a comprehensible and accessible way (...), they should be open to technological progress and use it at their work* (Pieczywok, Wełyczko, 2008, p. 10). The main goal of educating teachers should be the *development of innovative attitudes, creative explorations with the use of their own intellect, diagnosing, interpreting phenomena, and critical approach to the problem* (Pieczywok, Wełyczko, 2008, p. 10). Therefore, openness to new things and thinking about the future is associated with the changes in the approach to the role of the teacher. What are the expected effects of this change? Polak and Kołodziejczyk argue that the *combination of expert knowledge and the teacher's huge experience with the student's digital skills and with the capabilities of digital devices create a real synergy in forming modern education and in raising a generation that will change the world more consciously and responsibly* (Kołodziejczyk, Polak, 2011, p. 45).

Taking into account the second code – individuallization and personalization of education – experts point to, among others, flexibility in designing and conducting classes, adapting the

tools to the level of skills and the age of the student, the ability to conduct simulations in virtual reality (Maciejewski, 2017, p. 121-137), and finally the possibility of creating a better (more accurate) system of evaluation. This code is reflected in the provisions of the *Long-Term National Development Strategy Poland 2030. The third wave of modernity,* according to which the adjustment of the education model to the challenges of the modern world is associated with the individualization and personalization of teaching (Ministry of Administration and Digitization, 2013, p. 384).

It is therefore possible to make a generalization that new technologies should improve didactic activities and provide a field for testing new, useful solutions.

3.2. Recommendations for decision-makers

Where the teaching process is supported by new technologies, decision-makers should be open to novelty, use the innovations in a pragmatic way, and ensure sufficient expenditure on innovation (Table 3).

Table 3.
Experts' statements on recommendations for decision-makers

Institutions – recommendations	Opinions
promoting a pragmatic approach in the use of technology (8)	• *recommending/applying technologies that have been already tested in the process of education* • *saving time on analyses, transparency and accuracy of information* • *use common sense and the principle of limited trust in relation to unauthorized people, because the developed technologies may not only help in predicting the effects of a given threat, but also may promote their effective use against the population by the so-called groups of social discontent* • *more efficient implementation of modern equipment* • *make new technologies easily accessible in the field of education in order to be able to use them in everyday work* • *new specializations* • *organize courses and trainings supported by new technologies more frequently* • *recommendation to use free [8]software*
Creating an open attitude (thinking about the future) (7)	• *having a conscious approach to the topic* • *being open to innovations - a chance to increase the share of educational services on the market* • *striving to meet the latest trends*
increasing funding for innovations (3)	• *allocate funds for the development of new technologies* • *investing in and searching for new technologies for visualizing and presenting knowledge* • *enabling the purchase of simulation programs*

Source: Gawlik-Kobylińska, 2011, p. 175-176.

The pragmatic approach to the tools of new technologies (e.g. *recommending/applying technologies already tested in the education process, saving time on analyzes, transparency and accuracy of information)* is, according to experts, based on flexible application of these

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[8] Author's note: free *open source* software.

tools, limiting unnecessary costs, and on prudent use, including also the development of new training courses. Therefore, during the planning phase of the training particular attention should be paid to the selection of appropriate tools, through the prism of their effectiveness and efficiency in achieving the assumed learning objective. If through their use it is possible to expand the educational offer (*new specialties*), then the institution gains a new group of recipients and functions in a broader context.

The last two codes are openness to new technologies (e.g. *being open to innovations – a chance to increase the share of educational services on the market*) and the need to increase expenditure on innovation financing (*enabling the purchase of simulation programs*). It is worth noting that they are convergent in line with the *Long-term National Development Strategy Poland 2030* (Ministry of Administration and Digitization, 2013, p. 386), which stressed the openness to new technologies, for example through the necessity of eradication of the digital divide. Is possible to counteract this divide through skilful planning and organizing education in a manner that corresponds to current needs and trends, as well as through increasing funding for education. It can therefore be noted that the directions of education development recommended by the group of experts are consistent with the provisions in the strategic documents. Such unity of thinking has a chance to be transformed into a coherent action aimed at the thoughtful and pragmatic use of innovation in education.

4. Conclusions

The article identifies challenges in the implementation of new technologies in institutions for security and defense studies, as well as recommendations for decision-makers and educators. Identified challenges are understood as opportunities and threats. Perceived by the prism of opportunities, they relate to the wider popularization of knowledge, raising the level of education, designing advanced teaching tools, raising the level of innovation and commercialization of research results, developing cooperation between institutions, and thinking about the future. Challenges understood as threats are related to two fundamental issues, i.e.: high costs of implementing modern tools and the misusing and misunderstanding of new technologies.

According to the conducted research, educators should demonstrate an open attitude towards new technologies, and use them as teaching tools to individualize the learning process (Jędryczkowski, 2012, p. 174-192). Decision-makers should promote pragmatic use of new technologies, encourage an open attitude towards new solutions, and increase fundings on innovations related to education for security and defense.

It can be assessed that the current thinking about education in military-civil environments generally takes into account the role of new technologies and concerns the near future.

Although in the national literature one can find strategic documents reaching the year 2015, the content of experts' statements (international group) indicates that the thinking about new technologies in education for security and defense was short term (used phrases included: *searching for new visualization technologies, simulation programs, implementation of modern equipment, technologically advanced equipment*, while there was lack of concepts such as: artificial intelligence, augmented reality, virtual reality accessories). Therefore, it seems that in order to plan educational activities in the area of security and defense in a more efficient way, it is necessary to think more deeply about the development of science and technology, and perhaps to include the sciences of the future in the process of planning education for security and defense. Not only in Poland, but also abroad. It can help in forecasting the directions of universities' development and contribute to the creation of such an institution strategy that will meet the future requirements and needs of as many interested parties as possible. Research on the future (possible futures) (Kozub, 2013, p. 80-81, 86-88) is particularly important in this context due to the constantly increasing pace of scientific and technological development, which implies non-linear and irregular changes (Aleksandrowicz, 2014, p. 217), significantly impeding the functioning in the educational environment.

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