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THE INFLUENCE OF EDUCATION ON THE ISSUE OF HYBRID THREATS *

Antonín Korauš [1]*, Peter Gallo [2], Bohuslava Mihalčová [3], Michal Pružinský [4], Lucia Kurilovská [5]

E-mails: [1]antonin.koraus@akademiapz.sk. (Corresponding author); [2]peter.gallo.1@unipo.sk; [3]bohuslava.mihalcova@euba.sk; [4]mpruzinsky@afm.edu.pl; [5] lucia.kurilovska@flaw.uniba.sk*

[1]Police Academy in Bratislava, Sklabinská 1, 835 17 Bratislava, Slovak Republic
[2]University of Prešov in Prešov, Institute of Educology and Social Work, Faculty of Arts, 080 01 Prešov, Slovak Republic
[3]University of Economics in Bratislava, Faculty of Business Economics with seat in Košice, Department of Economics and Management, Tajovského 13, 040 01 Košice, Slovak Republic
[4]Faculty of Security Studies of the Andrzej Frycz Modrzewski Krakow University, Poland.
[5] Faculty of Law, The Comenius University in Bratislava, Šafárikovo nám. 6. 818 06 Bratislava. Slovak Republic

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Abstract. The contribution is devoted to the issue of hybrid threats in connection with the level of education achieved. Hybrid threats represent coordinated activities by which different interest groups try to influence people in other areas. The research subjects are the respondents divided according to their levels of education. Data for the research were collected through the questionnaire method. The study was based on predetermined hypotheses, subsequently verified by statistical tests. The research was conducted with 157 respondents. The research results reveal that the level of education impacts the knowledge of the concept of hybrid threats. The verified hypothesis confirms this conclusion, the result of which is at the level of value p = 0.0482. The second hypothesis proves the danger of hybrid threats and their relationship with achieved education, calculated at the level of p=0.0334. The research also focused on the area related to information sharing and its subsequent verification. The hypothesis, aimed at verifying information from multiple sources, did not confirm the differences between university-educated respondents and respondents with secondary education. The verified hypothesis represented the value level of p = 0.039. To eliminate hybrid threats, effective and efficient measures would be used to prevent the spread of negative impacts on society. In this context, the hypothesis was established for examining the differences between educational attainment and protection methods against hybrid threats. The result of the verified hypothesis at the level of p = 0.04 confirms the differences between the level of education. It shows that people with higher education consider an effective educational process to protect against misinformation, compared to people with secondary education who favour repressive measures and various forms of control by the government.

Keywords: hybrid threats; education; disinformation; questionary survey; research

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2023 Volume 11 Number 2 (December)
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1. Introduction

The current world is characterized mainly by the information and digital age, which generally creates positive elements (Cabinova et al., 2018; Balzer et al., 2020; Inkábová et al. 2021). They also bring plenty of negatives. Hybrid threats fit within the serious category. Many factors are attacking our society. Not long ago, it was the coronavirus pandemic, the energy crisis, and we are currently witnessing a war in Ukraine and Israel. All these negative situations are accompanied by misinformation, hoaxes, and different perspectives (narratives) on these events. Many people do not know how to find their way in the tangle of varying information hoaxes, to divide news into true and those whose purpose is only to polarize society. Various alternative media or disinformation websites infiltrated everyday life. They become assert themselves on the scene. Their content is often unregulated and inflammatory, and it is about the highest possible number of users who spread this harmful content. Hoaxes and misinformation are part of our daily lives today. By sharing various hoaxes and misinformation, users contribute to the spread of polarity in our society, which causes not only its cognitive but also moral decline. We face them on various social platforms, even on the home pages of alternative media. They belong to political groups and different interest groups. Our society should be able to avoid these misinformation and hoaxes. At the same time, the government must offer inhabitants both trustworthy and safe information.

The presented contribution deals with the issue of hybrid threats in society. It examines it from the point of view of education. The contribution structure is divided into individual chapters connected to the results of the questionnaire research and the discussion of the given findings.

2. Theoretical background

2.1 Historical starting points

The concept of security has existed since ancient times. At that time, however, it was not considered a matter of public interest but something necessary or by the gods' will. Modern ideas about safety only developed in the 19th century thanks to the Industrial Revolution when many factory accidents aroused people's interest in prevention. Today, global security concerns focus on many local, national, and international government and private agencies. This is where security science finds its place. Security thus becomes a process or means of protecting against external or internal errors, hazards, losses, criminals and other individuals or actions that threaten, hinder, or destroy the organization's "steady state" and deprive it of its intended purpose. (Oakes, 2009).

The concept of hybrid threats is closely related to the concept of security. Historical origins gave rise to several definitions and concepts related to hybrid threats. In general, however, it is an activity carried out by state and non-state entities to cause harm by influencing local, regional, state, or institutional decision-making.

As we have already mentioned, this problem did not arise in the 21st century. Its content was already known before our era. Let's mention e.g., Ramesses II, called the Great, the pharaoh of ancient Egypt. Even though he was the most famous pharaoh of the time, he was imposing and very vain. He spread misinformation and propaganda, exaggerated his actions, and fabricated some victories in battle (see the battle of Kadesh in 1274 BC). The well-known Chinese thinker Sun Tzu also drew attention to the use of misinformation in hybrid warfare in The Art of War, when he wrote that "The real secret is the ability to confuse the adversary so that he is unable to recognize our true intention" (Sarvaš, 2021). We also find mention of the content of the concept of hybrid threats in the life and work of Ptolemy I. Soter (367–283 BC), who was the Macedonian general of Alexander the Great. Alexander the Great and Ptolemy I. Soter were close friends from childhood. Ptolemy later founded the Ptolemaic dynasty. He accepted the title of Egyptian pharaoh (processed according to Wikipedia) in 305 BC. He spread misinformation around the country that he was Alexander's half-brother to secure his place on the throne after Alexander's death. Another representative was Augustus (63 BC – 19 AD), a ruler named Gaius Octavius, later

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2023 Volume 11 Number 2 (December)
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Gaius Iulius Caesar Octavius was the great-nephew of Gaius Iulius Caesar, who liked to use the tools of treachery, corruption, and manipulation to his advantage.

Many other examples of propaganda and hoaxes can be found in the so-called Nazi propaganda, which was behind the outbreak of World War II.

And now, let's talk about the views of the authors of the article on the investigated issue. At the end of the 20th century, optimistic scenarios for the further development of humanity began to prevail despite several regional and local global conflicts. The economic growth of many countries was on the rise. However, the end of the first decade brought mortgages and financial and economic crises. However, knowledge about economic growth and the cycle was already at such a level that it made it possible to consolidate the economic situation gradually. Unfortunately, armed conflicts of national and international dimensions have not stopped. These were the countries of Africa and the Middle East, but also Afghanistan, Syria, and the former republics of the Soviet Union. Especially in these republics, the Russian Federation positioned itself as a peace-making force. After Putin took power in Russia, he installed his followers at the head of these countries.

At the beginning of the 21st century, Frank G. Hoffman entered the scene. He, among other things, was a special assistant to the US Secretary of Defence in 2017 and worked on the national defence strategy. He is best known for his analysis of the Lebanon War from 2006. Based on these analyses, he defined a hybrid threat as purposeful with irregular tactics, terrorism, and criminal activity. He also understood it as a challenge at the military operational level. He talked about the fact that there are a whole range of different ways of waging war, both conventional and unconventional, different tactics, and acts of terrorism, including wanton violence. However, humanity is not only troubled by armed conflicts. In the late 1920s, the COVID-19 epidemic hit hard. The highly contagious, fast-spreading virus with frequent mutations killed an estimated 14.9 million people in 2020 and 2021. The World Health Organization (WHO) estimates that the pandemic has destroyed a total of 336.8 million human lives in its victims, including post-covid diseases. The WHO calculated that, on average, the life of one COVID victim was shortened by roughly 22 years. According to the organization's statistics, the pandemic also harmed the global fight against infectious diseases because vaccinations and health services were insufficient, or they operated with a lack of personnel and material medical equipment. Not only did COVID-19 cause a decrease in vaccination against measles, tetanus, and other diseases (RTVS + ČTK, 2023), but there accrued 2 war conflicts (Ukraine and Israel).

In an overall complicated situation, on February 24, 2022, the Russian Federation launched an unprecedented war against Ukraine, long termed by the Kremlin as a "Special Military Operation". The biggest victims of this aggression are in Ukraine, but significant negative consequences fall on most countries of the world. The events mentioned above became the basis for the emergence of an asymmetric hybrid, energy threats, raw materials, and food shortages. Examining the entire spectrum of problems is essential, above all from the point of view of the security situation.

2.2 Hybrid threats and education

Since the 1990s, Slovakia has experienced significant economic growth and country fully acquired its membership in both the European Union and NATO. However, support for democracy and commitment to democratic freedoms in the country is far from absolute. (European External Action Service (EEAS), 2022) In addition, Slovaks show a heightened sense of threat perception directed at various actors and groups. According to several public opinion polls by GLOBSEC and other institutions, Slovakia is the most prone to conspiracies of all Central European countries.

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2023 Volume 11 Number 2 (December)
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Interestingly, Slovakia is the only V4 country where it is possible to observe a direct correlation between belief in conspiracy theories and the level of higher education. Slovaks with higher education are more likely to agree with conspiracy statements than those with primary education (this hypothesis was confirmed in our research).

The data show an inverse correlation between belief in conspiracy claims and educational attainment. By authors view the widespread belief in conspiracy theories can also reflect gaps in the Slovak education system and indicate insufficient media literacy. Another explanation could be that Slovaks believed all the messages spread by their political representatives. While disinformation narratives were characteristic of far-right extremists, the emergence of a conspiracy could be observed among mainstream political figures. In this sense, "ordinary" people only follow the ideas of the political elites they have elected. Slovaks who are deeply suspicious of the mainstream media are well above the EU average. One of the explanations lies behind the massive number of alternative media available online, which claim to have the only truth about disputed matters (Konspiratori.sk 2022). According to Straková et al. (2021), social networks play a key role in managing people and society. It changes the way they communicate, engage in group discussions and shape their perception of the public as well as the world at large. Social media offers insights over time, allows for instant and direct communication and engagement, offers tons of data analysis, and more. They shape a person's mind, either in the right direction or in the wrong direction. According to the authors Korauš et al. (2022), Tvaronavičienė et al., 2020 and Milbradt et al., (2023) social networks are essential in today's digital age; on the other hand, they became a resource for information operations and cyber warfare. The impact of misinformation was manifested in an increase in online cyberbullying and the so-called trolling and there has also been a significant increase in political violence through the misuse of social media platforms (Hawi & Samaha, 2017). So, we ask ourselves what is common for both the hybrid threat for example through social media and education.

Given that information and communication technologies are currently essential in the lives of young people, we focused on the extent to which education and resilience against the negative consequences of hybrid threats are important. According to the authors Genys (2023), Almaiah, Al-Khasawneh & Thunibat (2020), Volchik, Posukhova & Strielkowski (2021), Bida et. al., (2021) and e.g. Ragnedda, Ruiu & Addeo (2022) there has been a rapid shift towards digital education during the pandemic. This has prompted researchers to examine the impact of social networks and digital education on the educational content and social life of individuals as well. A consensus emerged on the advantages of digitization for education in terms of ensuring a smooth educational process due to its wide availability, ease of use, but also the social exclusion of the individual from the collective. Young people are spending much of their free time with information technologies means since elementary school. They chat a lot, blog, watch TV, play online games and others, and often publish their photos on the Internet through social media for communication and visibility. Young people tend to rely on most of information even many of them represent both the junk and hoax. The reason is simple they lack critical way of thinking, and their creativity is often deformed. Among the main problems of the contemporary world, which we encounter in several areas of human activity, in addition to globalization, migration, post COVID, climate changes, new work ethics, there is also a lack of creativity, which hinders the development of the human personality. (Korauš et al. 2020; Dragićević Šešic, 2021; Scanlon, 2005). According to authors of this article, the "fast time" and often insufficient technical ability to navigate the online space deprives parents of the possibility of thorough control. The dimensions of digitization and the influence of social media on people highlight the area of intervention in civic education and the direction of the educational process. Accordingly, the educational process also has its patterns. (Genys, 2023) The international environment has an increasingly hybrid character. International law is supposed to promote security, justice, cooperation, predictability, and shared values, but hybrid activities play the opposite role. The question of how to combat hybrid threats is fundamental, but by no means straightforward. Effective tools for combating hybrid threats, although military means may also be necessary, are precisely education, prevention, monitoring and raising social awareness. However, hybrid threats move between what is legal, illegal, and illegal. Therefore, grey area law is needed to determine whether activities fall within (Susana Sanz-Caballero, 2023; Sari, 2019, 2020) the limitations of the legal order, and if not, further legislation will again

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2023 Volume 11 Number 2 (December)
http://doi.org/10.9770/jesi.2023.11.2(34)

be needed to combat such action or behaviour. These questions must be constantly confronted in the environment of any kind of school. It is, therefore, up to schools to provide their pupils and students with a critical view of online propaganda, disinformation and hoaxes and thus increase digital literacy and the ability to judge what is positive and what is not.

Council of Europe (2017) also has critical thinking and understanding of the world anchored in its core competencies based on the continuous education of individuals. Naturally, schools also face serious problems. Technologies are changing too quickly, and the activities of young people are enormous, which sometimes causes the teacher stress due to his inability to adapt rapidly to these problems. In this way, they limit their activities in information technology use and are restrained in relation to the problem. If teachers want to expand their media and information literacy, their superiors must train them. In this way, teachers at all levels of study can be expected to make the issue of hybrid threats visible. Preventing the negative consequences of hybrid threats will only be effective if the states also ensure the motivation of teachers to deal with the given issue. (European Council, 2017).

3. Research objective and methodology

The presented contribution deals with the issue of hybrid threats in relation to education. In addition to logical methods, we chose a questionnaire survey for our research to investigate the mentioned issue. Within our survey and elaboration of data obtained, we used the most methods aimed at this type of research. Such methods are often used in the social sciences. It allows data to be obtained relatively quickly on issues reflecting the relation between hybrid threats and education. The questionnaire research was based on predetermined hypotheses such as:

H1: We assume that there is a statistically significant difference between the level of education achieved and knowledge of the concept of hybrid threat.
H2: We assume that there is a statistically significant difference between the level of education and the perception of the dangerousness of hybrid threats.
H3: We assume that verification of information from more than one source occurs more among people with university education than among people with secondary education.
H4: We assume that there is a statistically significant difference between educational attainment and methods of protection/prevention against hybrid threats.

The questionnaire consisted of two main parts, which were logically connected. In the first part, we asked the respondents about their demographic characteristics. These characteristics include questions about gender, education, age, etc., while for the needs of the research, the authoritative question was focused on the respondents' education. We segmented the education of the respondents from elementary to university. In the second part of the questionnaire, the questions focused on the issue of hybrid threats. These questions were developed in such a way that some of them were open questions or closed. There were also questions in which we allowed respondents to express their opinions on a five-point Likert scale. (Joshi et al., 2015).

The range of answers allowed expressing options from complete agreement to the possibility of total disagreement. The research questions of the second part of the survey were focused on knowledge of concepts such as disinformation, hoaxes, and hybrid threats, on the perception of the dangerousness of hybrid threats, on the verification of sources when obtaining information, and on the possibilities that could prevent the spread of disinformation and hoaxes as hybrid threats for society. (Council of Europe, 2017).

The research took place online and was implemented using the Google Forms application. The research period was in the first half 2023 (from January to June). 680 respondents were approached with a questionnaire, of which

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2023 Volume 11 Number 2 (December)
http://doi.org/10.9770/jesi.2023.11.2(34)

157 referees correctly filled and returned it. In percentage terms, this is a return at the level of 23.09%. We assumed it was an adequate return for research focus. We used a random sampling method in addressing respondents. The questionnaire survey was carried out anonymously, and research ethics were ensured. Participation in the research was voluntary, and the respondents were familiar with the research issues and personal data protection, which were not necessary for the study focused on hybrid threats.

The data obtained from the respondents were verified by mathematical-statistical methods based on established hypotheses, which quantify the research results. Analysis and synthesis methods, as well as contingency tables, were used for research purposes. Methods such as the Chi-square test of independence and the Mann-Whitney U-test were used. Data were evaluated using the statistical software Statistica, version 12. (QUEST.COM, 2010).

4. Results

The issue of hybrid threats was investigated through a questionnaire survey created based on predetermined hypotheses. The first hypothesis was focused on knowledge of the term hybrid threat in connection with the level of education achieved and was determined as follows:

H1: We assume that there is a statistically significant difference between the level of education achieved and knowledge of the concept of hybrid threat.

The hypothesis was tested using the two-sample Mann-Whitney test of independent variables. The test result confirmed a statistically significant difference, as the test characteristic (2.35) reached a greater value than the table test criterion (1.96). Confirmation of a significant result is also approved by the resulting p-value ($p = 0.0482$), which is lower than the tested level of significance $p = 0.05$. It follows from the above that there is a statistically significant difference between the level of education achieved and the knowledge of the concept of hybrid threat. We provide the resulting characteristics of the Mann-Whitney test in Table 1.

Table 1. Testing the first hypothesis

Test criterion name	Value of Test Criterion
Test characteristic (z)	2.35
Table value	1.96
U value	669.5
p-value	0.0482

Source: authors' processing

The confirmation of the hypothesis means that the level of education represents a factor that affects the knowledge of the concept of hybrid threat and proves that education impacts the spread of misinformation and hoaxes in the environment. The more educated a person is, the more he can distinguish the hybrid threats he encounters.

The second hypothesis was aimed at investigating differences in education in relation to the dangerousness of hybrid threats. Disinformation and hoaxes are dangerous in terms of their impact on society and cause potential threats. The research investigated whether there is an effect on the perception of the dangerousness of hazards depending on the respondent's level of education. The hypothesis was established as follows:

H2: We assume that there is a statistically significant difference between the level of education and the perception of the dangerousness of hybrid threats.

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2023 Volume 11 Number 2 (December)
http://doi.org/10.9770/jesi.2023.11.2(34)

The investigated hypothesis was tested using the two-sample Mann-Whitney test of independent variables. The test characteristic (2.24) exceeded the table test criterion (1.96). The analysis thus confirmed a statistically significant difference in the relationship between the level of education and the perception of the danger of hybrid threats. A significant statistical difference is also confirmed by the resulting p-value (p = 0.0334), which is lower than the tested significance level of p = 0.05. The research shows a statistically significant difference between the level of education and the perception of the danger of hybrid threats. The resulting characteristics of the Mann-Whitney test are shown in Table 2.

Table 2. Testing the second hypothesis

Test criterion name	**Value of Test Criterion**
Test characteristic (z)	2.24
Table value	1.96
U value	598.3
p-value	0.0334

Source: authors' processing

The verification of the hypothesis represents the results of the research, which show that the higher the respondent's education, the higher the perception of the danger of hybrid threats. The above shows that educated people are more aware of the risk of spreading misinformation and hoaxes in society than the uneducated.

The subject of the third hypothesis was the examination of respondents from the point of view of verification of shared information. Also, in this context, the factor of achieved education was investigated in relation to the verification of information. The investigated hypothesis was established as follows:

H3: We assume that verification of information from more than one source occurs more among people with university education than among people with secondary education.

Spearman's correlation coefficient was used to verify the hypothesis. Through statistical evaluation, the coefficient reached R = -0.039, representing a negligible, negative degree of correlation between the observed variables. From the above, it follows that education has no influence on the verification of respondents' information, and whether they are university- or high-school-educated people, the verification of information from the point of view of the respondents' education is not an essential factor. The resulting criteria are listed in Table 3.

Table 3. Testing the third hypothesis

Test criterion name	**Value of Test Criterion**
Test characteristic (z)	0.379
Table value	1.96
U value	0.70
p-value	-0.039

Source: authors' processing

Graphic processing of the relationship between the verification of information from more than one source in terms of education is presented in Figure 1.

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2023 Volume 11 Number 2 (December)
http://doi.org/10.9770/jesi.2023.11.2(34)

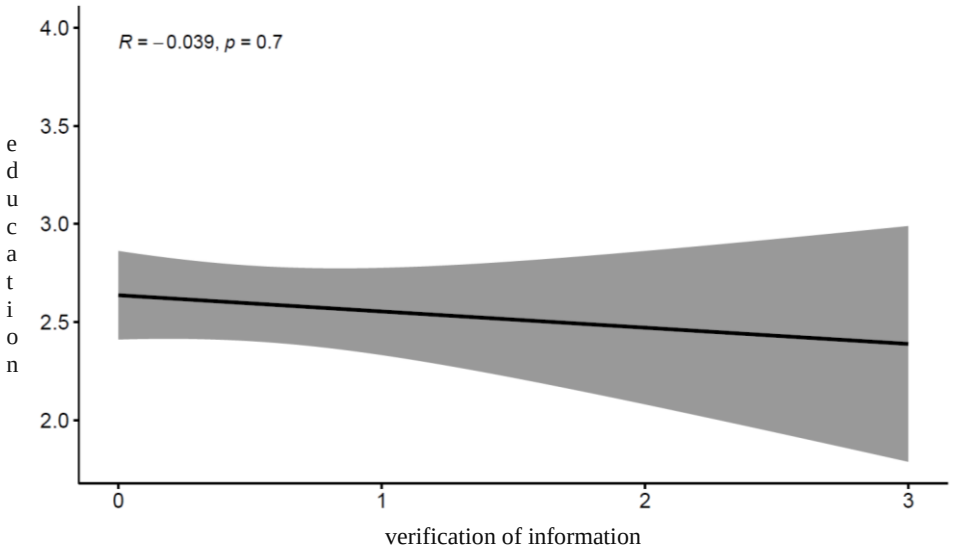

Figure 1. The relationship between verification of shared information and education
Source: authors' processing

The last hypothesis aimed to examine educational attainment in relation to the fight against hybrid threats. Respondents answered questions focused on the possibilities of combating hoaxes and disinformation. The answers related to methods of protection against hoaxes and disinformation were analysed from the point of view of their education. In this context, the hypothesis was established as follows:

H4: We assume that there is a statistically significant difference between educational attainment and methods of protection against hybrid threats.

The verification of the hypothesis was carried out employing the two-sample Mann-Whitney test of independent variables. The result of the analysis confirmed a statistically significant difference, as the test characteristic (3.35) reached a higher value than the table test criterion (1.96). The statistical difference is also confirmed by the resulting p-value (p = 0.04), which is lower than the tested significance level of p = 0.05. The verified hypothesis shows a statistically significant difference between the level of education and methods of protection against hybrid threats. The resulting characteristics of the Mann-Whitney test are shown in Table 4.

Table 4. Testing the fourth hypothesis

Test criterion name	Value of Test Criterion
Test characteristic (z)	3.35
Table value	1.96
U value	951
p-value	0.04

Source: authors' processing

The fourth hypothesis was focused on the possibilities of combating hybrid threats, and the result confirmed that university-educated people use different measures to combat hoaxes and misinformation than secondary-educated people. In the survey, university-educated people cited education and training in schools as the fight against hybrid threats, compared to secondary-educated people, who noted more repressive measures, such as control by government bodies, etc.

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2023 Volume 11 Number 2 (December)
http://doi.org/10.9770/jesi.2023.11.2(34)

Discussion

Hybrid threats are the subject of research by many experts and studies. Authors Astafieva et al. (2023) mention in their research the strengthening of media and information education and the development of civic education as an effective method of combating hybrid threats. They emphasize the development of a comprehensive strategy of educational security and education for the resistance of university students to destructive informational influences. The mentioned contribution also confirms part of the solution of our presented research focused on the importance of education as an effective fight against hybrid threats. The issue of hybrid threats was investigated in the Czech Republic by the author Filipec (2019), who states that disinformation and hoaxes are currently a vital threat to modern democratic societies and fundamentally impact society's functioning. The contribution provides experience from the Czech Republic in eight areas related to the creation and dissemination of disinformation and the analysis of obstacles in building resistance to disinformation. The study also confirms the results of our research, in which the respondents perceive hybrid threats as a critical element of destabilization of society, whether they are respondents with secondary or university education. Hybrid threats act as a dangerous element in all countries. In research on disinformation and hoaxes in Bulgaria, the author Sharkov (2020) addresses the design and implementation of national cybersecurity strategies and programs to achieve cyber resilience.

The paper examines the evolution of national security strategies against hybrid threats, focusing on cyber maturity. The research presents Bulgaria's cybersecurity plan in the context of evolving hybrid threats and the need for institutionalized cooperation between the public and private sectors. Currently, artificial intelligence projects are coming to the fore. This project is not only related to a positive contribution to science and education but also brings a negative aspect, namely, using artificial intelligence to spread hybrid threats. Authors Freedman et al. (2023) state in their study that hybrid threats currently target critical infrastructure, especially vulnerabilities associated with human and artificial intelligence. Like our research, the study focuses on education in the field of hybrid threats. The paper recommends that colleges and universities add subjects, courses and training to counter hybrid threats to their curricula. The specifics of the study programs would include their learning objectives and associated planned learning outcomes with detailed information from personal knowledge, skills, beliefs, and values. In a study focused on investigating hybrid threats, the authors Daniel and Eberle (2021) state that the concept of a hybrid threat has gained awareness in discussions and political conversations about European security. Based on critical scholarship on narratives, security knowledge, and hybrid warfare, the research reports it creates a framework for studying security narratives around the four elements of threat, value at risk, response, and core knowledge. The research results in the creation of prerequisites for a healthy state policy, cultured information discussion and an educated public.

Conclusion

The issue of hybrid threats is highly topical because we encounter hybrid threats in our daily routine. Its impact on society is highly damaging. Therefore, we suggest that pupils and students be trained in the issue of hoaxes and misinformation. This results from the knowledge that many social network users do not know precisely what hoaxes and misinformation mean and whether they are dangerous for them. In this sense, it is, therefore, necessary to conduct training and courses for students, but also for other social groups, so that users of social networks can distinguish what misinformation and hoaxes lurk in the online space and how they are dangerous for society.

This distinguishing should be part/method of education. It is important to teach social network users how to communicate critically within them and fight against misinformation. The information environment is vast and complex. Misinformation – unintentionally false information – plays a prominent role in shaping public opinion on important topics such as politics, science, health, current events, and predicted situations. Each positive

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2023 Volume 11 Number 2 (December)
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learning experience will help us better understand how false information is created and how it affects 21st-century society.

Furthermore, safety-related subjects should also be included in the courses taught to university students. It is essential to adjust the learning materials yearly to cover the most critical changes in the dynamically developing and complex security environment. Subjects/courses should be constructed to include questions about the security environment. Knowledge of these subjects affects the safe function of machines, devices, means of transport, systems, operations, and laboratories from the point of view of professional employees and management with an emphasis on preventing threats. Eliminating risks associated with an increasingly higher degree of logistics autonomy, subsequent production, management, and often decision-making processes demands well and adequately educated and trained, not only the young generation. For this reason, universities should also provide students with the latest knowledge on the issue of security aspects of the current development of society in all spheres of life.

Special attention must also be paid to preparing future management officials and members of the defence and security forces and components to cope with increasingly severe challenges and threats. Within the education sphere, specific expertise exists for which training is necessary within the armed forces at the higher military schools and police or police academies. These institutions have a significant mission in developing the highest education standards. They must prepare enough specialists not only for both the army and police. Similarly, like in developed countries, they become lecturers and researchers at public and private universities, sharing their knowledge and opinions with the students in various study branches, no specialization does not relate to security and, of course, to the hybrid threats. The preparation of the whole society in resistance to hybrid threats and disinformation is the No. 1 issue of importance.

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prof. Ing. Antonín KORAUŠ, PhD., LL.M., MBA is professor at Academy of the Police Force in Bratislava, Slovak Republic. Research interests: economy security, finance security, cyber security, energy security, finance, banking, management, AML, economic frauds, financial frauds, marketing, sustainability.
ORCID ID: https://orcid.org/0000-0003-2384-9106

Ing. Peter GALLO, PhD. is a researcher of Institute of Educology and Social Work, Faculty of Arts, University of Prešov in Prešov. Research interests: The author's publishing activity is focused on the issue of strategic management, human resources management, managerial tools in the field of tourism, managerial decisions in social companies, talent management, and gender stereotypes in society.
ORCID ID: https://orcid.org/0000-0001-5193-1997

prof. Ing. Bohuslava MIHALČOVÁ, PhD. & PhD. EUR ING is a lecture at the Faculty of Business of Economics of University of Economics in Bratislava with seat in Košice, Slovakia. Her scientific and pedagogical work at universities formed her such highly competent in the fields such economics, sociology, management even marketing. From leadership point of view, she chaired different Department and occupied Vice-deans' positions. Her research interests are such management of human resources, strategic management, sociology, and pedagogy. The author's publishing activity is focused on management of processes, decision making process, human resources, gender stereotypes, security in general and especially on hybrid threats.
ORCID ID: https://orcid.org/0000-0001-7958-3429

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prof. zw. dr hab. inż. Michal PRUŽINSKÝ is a lecture at the Faculty of Security Studies of the Andrzej Frycz Modrzewski Krakow University, Poland. His electro-technical background and teaching at military schools pushed his carer trajectory through occupation such Head of Department, Director of Institute of Strategic Studies even Rector – Commandant of Military Academy in Slovakia. His research interests are such operational research, management, logistics, national and international security etc. The author's publishing activity is focused on strategic management, human resources, management, enterprise production, and security in general.
ORCID ID: https://orcid.org/0000-0002-9848-6496

Dr. h. c. Prof. JUDr. Lucia KURILOVSKÁ, PhD., is an associated professor of the Department of the Criminal law, Criminology and Criminalistics, Faculty of Law, Comenius University in Bratislava. She is an author and co-author of more than 90 studies, contributions and publications issued in Slovakia and abroad, focusing mainly the principles and basic standards of the criminal proceeding.
ORCID ID: https://orcid.org 0000-0002-1008-9067