CONTENT AND FORMS OF SOCIAL WORK WITH THE FAMILIES OF MILITARY PERSONNEL

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The review article is devoted to highlighting the results of scientific research on finding out the content and forms of social work with the families of military personnel, because it is this category of people today that faces many difficulties and therefore needs special social, psychological and pedagogical support. Social work with the families of military personnel is an important area of social work, as it is aimed at support and assistance in solving problems that arise in the families of military personnel as a result of their service. As a result of the search, it was found out that the main problems and needs of families of military personnel determine the content of social work with this category of clients and include: post-traumatic stress syndrome; economic difficulties; problems in family relationships; medical and psychological assistance; access to education and professional training, etc. The key goal of social work with family members of military personnel is comprehensive support of their well-being, providing access to various services and resources aimed at improving the quality of life. Each family of a military man has its own unique needs, so approaches to the use of various forms of social work should be individual. The main forms of support for the mental and social well-being of family members of military personnel include psychological support (various types of psychological therapy, counseling, training in coping and self-regulation, development of communication skills, psychological work with traumatic experiences) and social support (provision of information and resources, social services , support programs, legal advice, creation of communities for communication).

The perspective of further research on the topic of the article is a further theoretical and empirical study of the achievements of domestic and foreign scientists and the substantiation of the scientific foundations of social work with the families of those military servicemen who took part in the armed military conflict.

Keywords: *military personnel, families of military personnel, post-traumatic stress syndrome, psychosocial support, forms of work.*

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DEEPFAKES AS A PROBLEM OF MODERNITY:
A BRIEF OVERVIEW AND CURRENT STATE

The article delves into the impact and utilization of generative images, commonly known as "deepfakes," in the context of the rapid advancements in artificial intelligence (AI) technologies. Deepfake technology, relying on AI-enabled techniques, manipulates photos and videos to create hyper-realistic visual content, presenting

potential threats to various aspects of society, from political manipulation to misinformation dissemination. As digitalization increasingly pervades modern life, the rise of deepfake technology raises the urgency for developing critical thinking methodologies to discern the authenticity of media and news. This article examines global awareness of deepfakes, concerns about their misuse, and the ability of individuals to identify them. It emphasizes the importance of media literacy, public awareness, and fact-checking efforts to combat the challenges posed by synthetic media content. The study demonstrates that deepfakes have the potential to erode trust in visual and auditory perceptions, highlighting the need for collaborative efforts to enhance digital literacy and discernment in an era characterized by digital disinformation and information warfare. The findings underscore the pressing concern posed by deepfakes and call for action to address this issue.

Key words: *Deepfake Technology, Artificial Intelligence, Generative Images, Misinformation, Media Literacy, Critical Thinking, Digitalization, Information Warfare, Public Awareness, Synthetic Media Content.*

Introduction. Modernity is marked by the widespread digitalization of nearly all aspects of public life. This article particularly delves into the impact and utilization of generative images, commonly known as "deep fakes," in the context of the rapid advancements in artificial intelligence technologies.

Deepfake Technology or “deepfakes”are manipulated photo or videos, which rely on artificial intelligence (AI) - enabled technologies to splice the likeness of someone onto the face of another person (Chemerys, 2024b).

The continuous evolution of information and computer technologies has brought about significant changes in the media landscape. Modern computer graphics tools are increasingly being used for creating photorealistic images and modeling objects for virtual and augmented reality.

Furthermore, neural networks are used for generating realistic images, from common photo editing practices to content generated by artificial intelligence, such as NeuroArt, CheepFake, DeepFake, DeepNude, CryptoArt, anamorphic Virtual Performances, and Face Swapping, etc.

Technological advancements have simplified the creation of visual content through "Deepfake" technology, allowing for hyper-realistic visual manipulation, including face swaps that leave no discernible traces of alteration. Deepfake technology has the potential to create humorous, pornographic, or politically manipulated videos without the subject's consent. It is particularly dangerous as it can be used for political sabotage, fake video evidence in legal proceedings, terrorist propaganda, blackmail, market manipulation, and the dissemination of fake news.

In the optimal situation, it might result in a humorous exchange among friends. However, in the most undesirable circumstance, individuals might misattribute your identity to another person or fabricate content depicting you engaging in actions or making statements you haven't actually made. The risk of generating misinformation, infringing on someone's privacy, or accessing sensitive information is higher now than ever before (Chemerys, 2024b).

The increasing popularity of video content highlights the necessity to develop techniques that will form critical thinking, enabling individuals to determine the authenticity of media and news. To combat the challenges posed by misinformation, public awareness, media literacy, and fact-checking efforts are of utmost importance. Due to the psychological characteristics of an individual, trust is instilled after seeing something with one's own eyes, providing a foundation for the manipulation of consciousness through the dissemination of misinformation via synthetically reproduced media content using Deepfake technology and other methods.

While the issue of deepfakes isn't novel, the accessibility and sophistication of the tools required to produce them are rapidly increasing. Ultimately, deepfakes pose a significant threat because they erode our trust in visual and auditory information.

However, the most harmful applications of deepfake technology are likely to originate from Advanced Persistent Threats. These entities can utilize deepfakes to create convincing videos and images that manipulate public opinion, as exemplified by Russia's dissemination of deepfake footage featuring Ukrainian President Volodymyr Zelenskyy in March 2022. The emergence of deepfake videos involving Zelenskyy may only represent a fraction of

the broader information warfare tactics employed (Chemerys, 2024b) (Fig. 1).

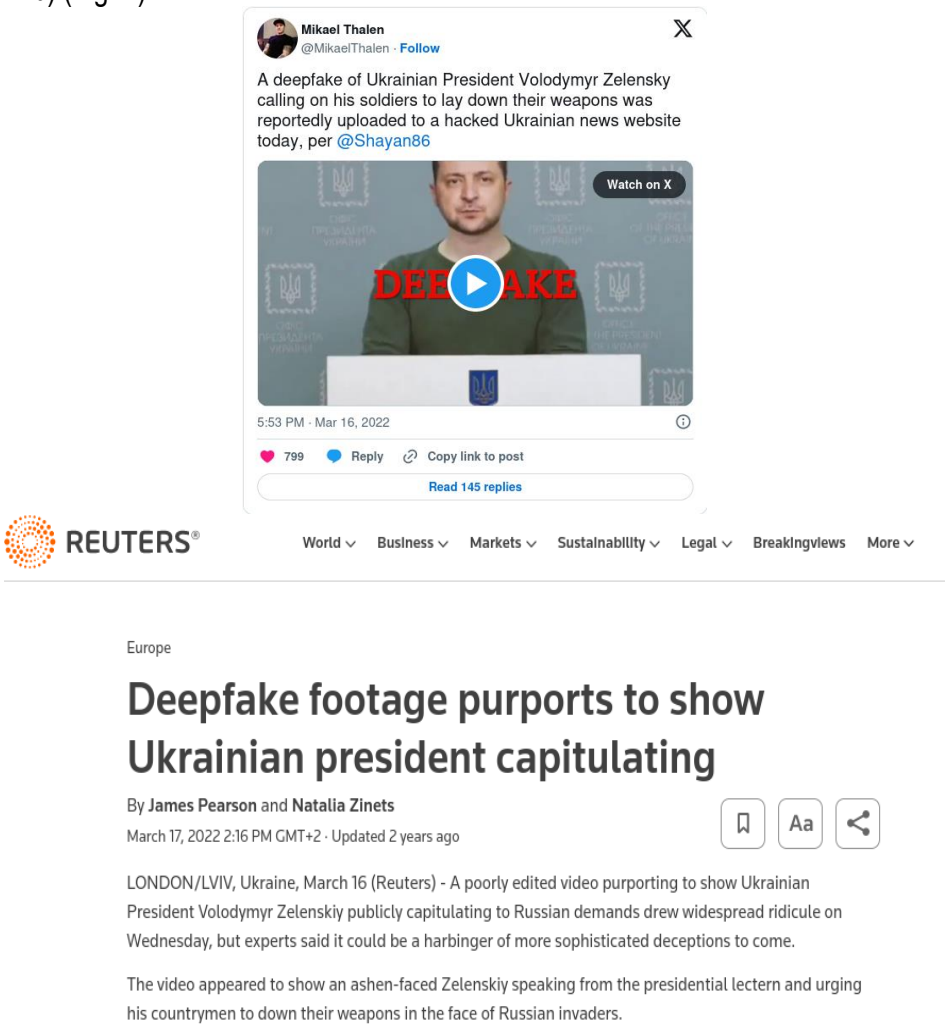

Figure 1. Deepfake footage of Ukrainian President Volodymyr Zeklenskyy

Analysis of recent research and publications. In recent years, the proliferation of fake news has emerged as a grave threat to public discourse, human society, education and democracy (Borges et al., 2019, p. 4; Qayyum et al., 2019, p. 16, Chemerys et al., 2021a,b; Chemerys & Ponomarenko, 2023; Chemerys et al., 2022a,b). Fake news denotes fabricated news-style content created with the intent to mislead the public (Aldwairi & Alwahedi, 2018; Jang et al., 2018). This false information spreads through social networks, transcending geographical boundaries and potentially impacting millions of users (Figueira & Oliveira, 2017). The increasing popularity of video content underscores the necessity for developing techniques aimed at fostering critical thinking among the public to ascertain the authenticity of media and news, given that new technologies enable highly convincing manipulation of visual information (Anderson, 2018). We presently find ourselves in an age marked by digital disinformation and information warfare, with the orchestration of fake information campaigns designed to influence public opinion (Anderson, 2018; Qayyum et al., 2019; Zannettou et al., 2019). The recent progress in technology has made it easier to generate visual content through the utilization of "Deepfake" technology. This has led to the development of hyperrealistic visuals achieved through seamless face swaps, leaving behind hardly any noticeable signs of manipulation (Chawla, 2019, p. 4-5; Maras & Alexandrou, 2019, p. 256). Deepfake technology has the potential to produce various types of content, such as humor, pornography, or political videos, wherein individuals appear to say

things without their consent, their images and voices being manipulated (Day, 2019, p. 108; Fletcher, 2018, p. 455-456). Notably, Deepfake technology poses a significant danger due to its capacity to generate counterfeit visual content for purposes including political sabotage, fabricating video evidence for legal proceedings, disseminating terrorist propaganda, enabling blackmail, manipulating financial markets, and propagating fake news (Maras & Alexandrou, 2019).

To enhance the battle against misinformation, the European Commission is focusing on revising the Code of Practice on Disinformation within the framework of the future Digital Services Act, aiming to adjust regulations and obligations for internet platforms. The objective is to introduce measures that heighten the accountability of media outlets and beneficiaries of information campaigns for the propagation of misinformation. The urgency of this issue is underscored by numerous normative and legislative documents aimed at regulating actions to uphold national information security and the right to access reliable information. The key principles for advancing information, telecommunications, and media technologies in Ukraine are outlined in the Strategy for the Development of the Information Society in Ukraine (2013). In response to hybrid threats and misinformation dissemination, Ukraine has ratified and implemented the Cyber Security Strategy for 2021-2025, titled "Safe Cyberspace – the Key to Successful Development of the Country," along with the National Security Strategy of Ukraine and the Law of Ukraine "On National Security" (2018). Specifically, on July 15, 2021, Ukrainian state authorities engaged in discussions with foreign delegations to the OSCE on combating misinformation and enhancing information security. This dialogue analyzed global best practices in safeguarding society against the detrimental impacts of misinformation and other hybrid tactics. Notably, several foreign frameworks have been developed, including the Code of Practice Regarding Disinformation of the European Union (2018), and the European Commission has endorsed a "Joint Framework on Counter-Hybrid Response" as part of the European Union's response (2016).

Objective: The objective of this study is to investigate the current state and challenges associated with Deepfakes, and to present the outcomes of the research along with the effectiveness of implementing a methodology for fostering critical thinking among citizens.

Methods: To achieve the outlined objectives, this study employed a comprehensive approach, utilizing general methodologies such as systematic, instrumental, and functional approaches, as well as dialectical and comparative analysis, synthesis, and systematization for examining pedagogical, scientific, technical, and methodological literature. General-logical methods including extrapolation, induction, and deduction were employed to formulate conclusions. Static methods of scientific research were utilized to evaluate the current state of the Deepfakes issue, assess the practical outcomes of the developed methodology for cultivating critical thinking, identify priorities for enhancing education within the framework of strategies aimed at promoting media literacy and critical thinking among the populace and scholars, and provide a scientific characterization of its potential.

The results of research. Deepfakes have been a longstanding issue, but the tools required for their creation are increasingly accessible and sophisticated. In the end, deepfakes pose a significant danger as they erode our ability to have confidence in our visual and auditory perceptions. A brief analysis of the search terms related to deepfakes highlights a concerning emphasis on the available creation tools. Google Trends indicates a consistent worldwide increase in searches for "deepfake," with a notable surge since the start of 2022 (Fig. 2).

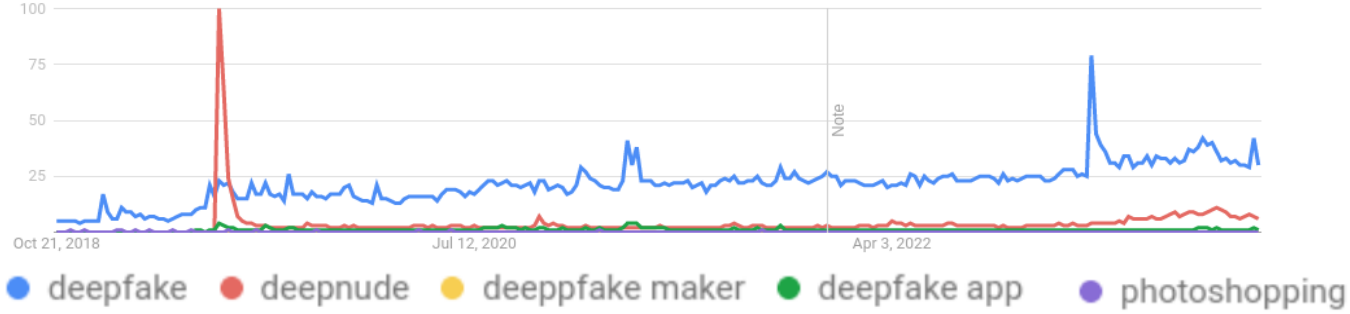

Figure 2. Google Trends dynamics

The count of academic papers focusing on Deepfake research categorized by publication year, and the number of publications within each studied category by year, extracted from Google Scholar (Masood et al., 2023) are shown on the next figure (Fig. 3).

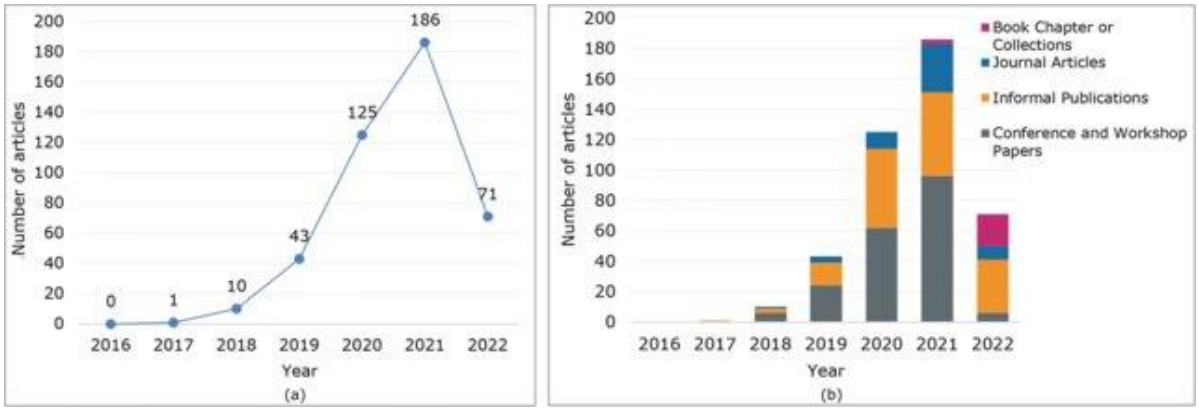

Figure 3. Google Scholar dynamics

As the media landscape expands with the proliferation of generative images and AI's growing influence, it becomes imperative to engage individuals and experts from diverse backgrounds in steering this technology towards avenues that augment human capabilities and yield positive results. This approach, endorsed by the World Economic Forum's Expert Network, is crucial for shaping the trajectory of technological advancement (Fig. 4).

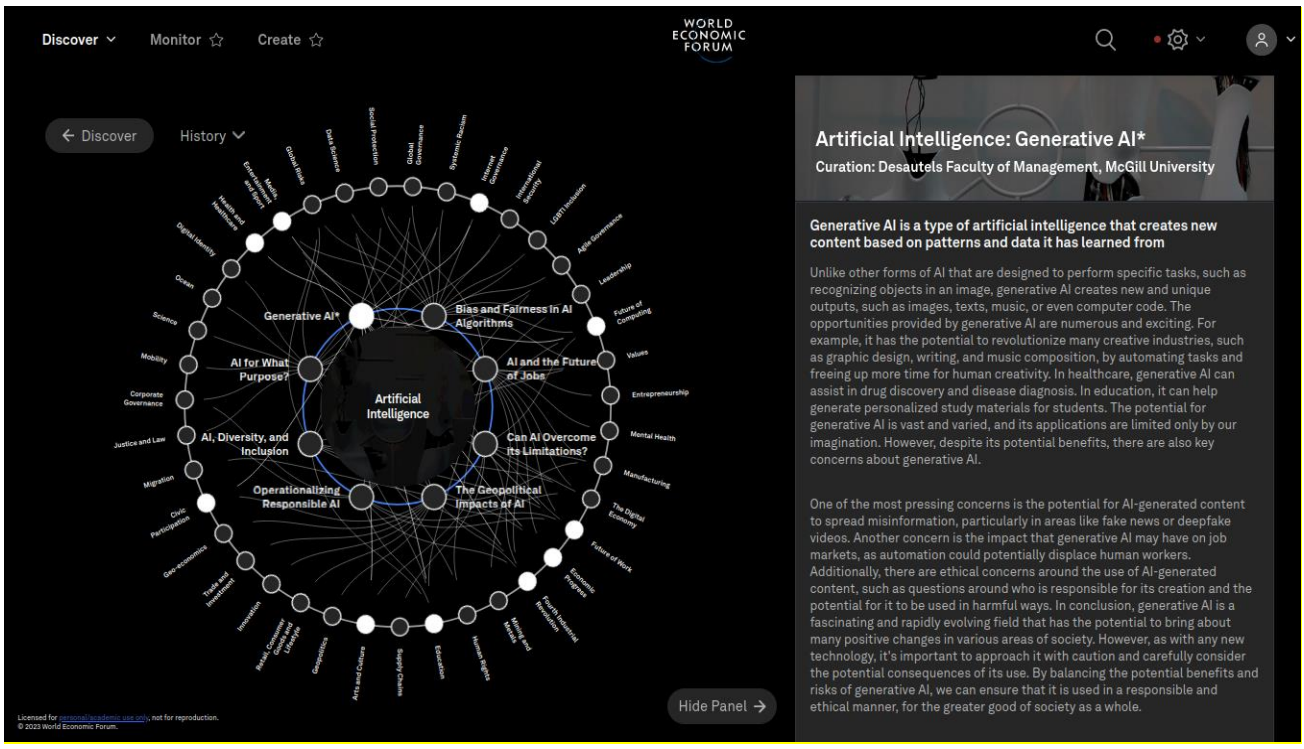

Figure 4. Media landscape of generative images and influence and impact of AI spread by the World Economic Forum's Expert Network

The iProov company's global research (IProov) indicates a significant increase in the percentage of people who are familiar with the concept of deepfakes since the last survey. In 2019, only 13% acknowledged awareness of deepfakes, whereas in 2022, this figure has more than doubled to 29%. Nevertheless, a substantial 71% of respondents worldwide still have no knowledge of what deepfakes are. Approximately one-third of global consumers claim to be informed about deepfakes. Notably, Mexico and the UK exhibit the highest familiarity with deepfakes, with 40% of Mexican respondents and 32% of UK respondents stating their awareness. Conversely, Spain and Germany appear to be the least informed, as 75% of respondents in both countries answered negatively. While it's encouraging that awareness of the deepfake threat is on the rise, it remains concerning that in 2022, only 29% of people are cognizant of the issue (Fig. 5b).

To understand the current situation in Ukraine, we decided to launch a similar research in 2022-2023 in Ukraine and compare its data to our results, and discuss solutions to the growing threat. At the current stage, we compare answers of 124 respondents from the Zaporizhzhia region and 34 respondents from Poltava region. We asked the following question: “Do you know what a deepfake is?” Results were the following: 25% replied «Yes», for 35% of respondents it was difficult to answer, and other do not know what deepfake is. So, deepfakes have significant potential for misuse and fraud and if people don’t know what they are, they are less likely to be prepared to identify them when they are being spoofed (Fig. 5b).

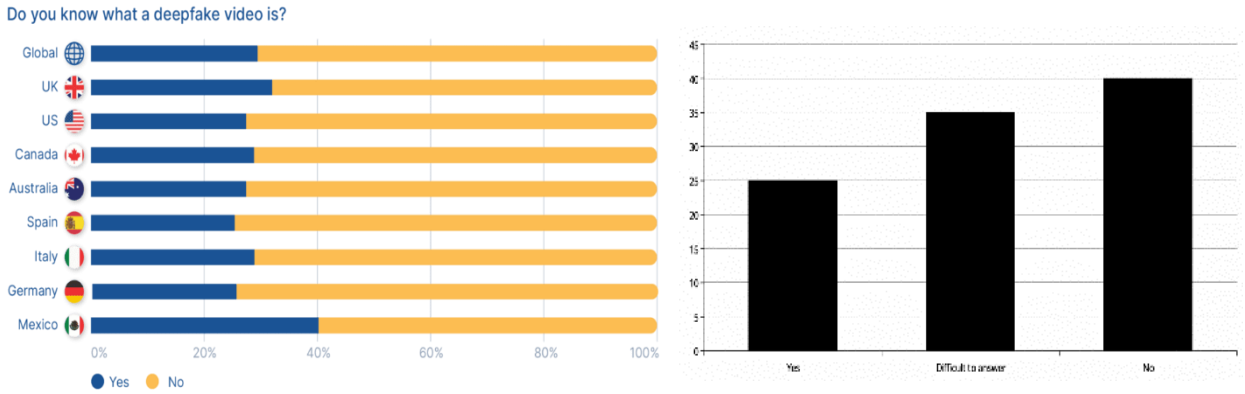

Figure 5. Research of people who know what a deepfake is. a) percentage of iProov company worldwide research; b) current situation in Ukraine

In accordance with iProov's worldwide research, 57% of respondents from around the world believe they have the ability to identify a deepfake, representing an increase from 37% in 2019. Conversely, 43% acknowledge that they would struggle to distinguish between a genuine video and a deepfake. This suggests that while 57% of global respondents express confidence in their ability to detect deepfakes, 43% admit to their inability to differentiate between real videos and deepfakes. It's noteworthy that respondents from Mexico exhibit the highest level of confidence, with 82% expressing their belief in their capacity to discern a deepfake from a genuine video. On the other hand, respondents from Germany display the lowest level of confidence, as 57% state their inability to differentiate between the two (Fig. 6a).

In Ukraine 35% say, that it was difficult for them to recognize deepfake, and 55% say that they cannot recognize them at all. This is concerning, because the truth is that sophisticated deepfakes can be indistinguishable to the human eye. If we are over-confident in our ability to spot deepfakes, then we are more at risk of being fooled by one (Fig. 6b).

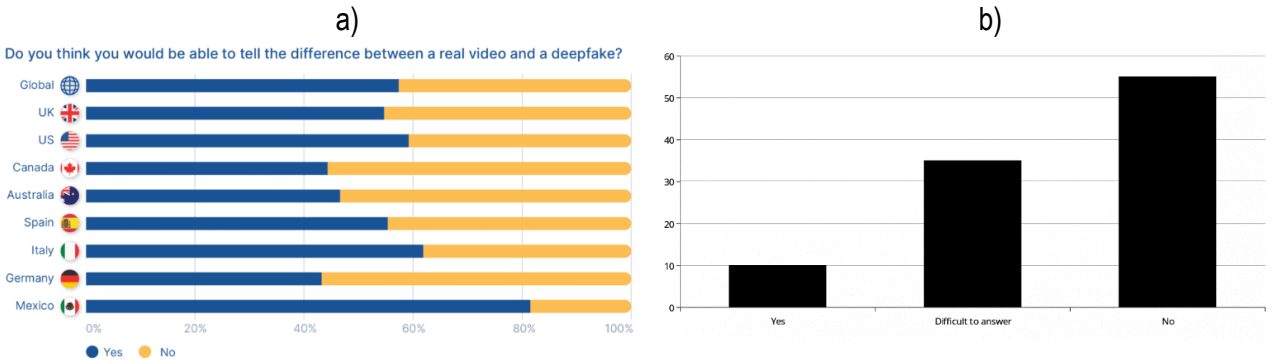

Figure 6. Research of people who believe they have the ability to identify a deepfake. a) percentage of iProov company worldwide research; b) current situation in Ukraine

In the global research conducted by iProov, respondents were asked about their primary concerns regarding the potential misuse of deepfakes. The most prevalent worry worldwide is the "theft of my identity to access my bank and other accounts," which was selected by 50% of respondents. In joint second place, with 48% of respondents selecting each, there were concerns about "being misled into believing something untrue" and "identity theft for credit cards or bank accounts in my name." Only 13% of global respondents expressed no apprehension regarding deepfakes. The concerns surrounding deepfakes vary significantly among people.

Remarkably, the overall data closely resembles data that was collected in 2019. In 2019, 58% of respondents shared the view that deepfakes represented a growing concern— a statistic that remained the same in 2022. This suggests that consumers are rightfully anxious about the erosion of trust online.

Consider a scenario where you are recorded saying or doing something highly improbable for you. Now, envision this convincing video being shown to your friends, family, or employer. It's easy to see the potential for malicious exploitation. It's important to note that not all deepfakes are malicious or harmful; many are created for social sharing and entertainment purposes. Nevertheless, they have also been misused in hoaxes, revenge porn, and, increasingly, in fraudulent activities and impersonation.

According to the report by Recorded Future, criminals are willing to pay approximately $16,000 for the production of high-quality deepfakes. These deepfakes can then be used to execute sophisticated social engineering attacks, yielding substantial profits. As deepfake capabilities become more accessible, the issue is expected to worsen over time.

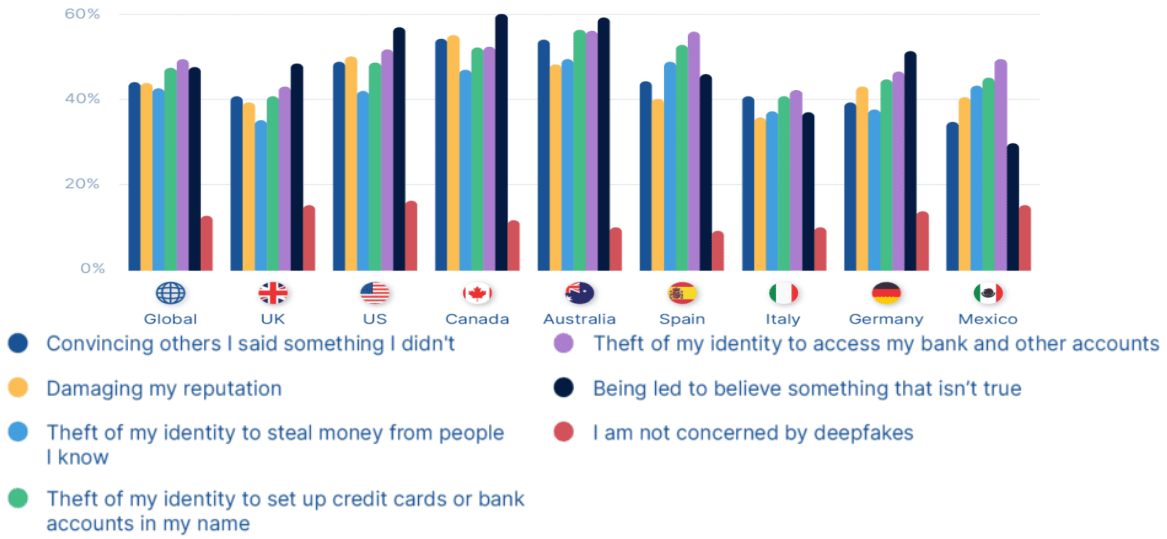

Figure 7. Research of Scares People About Deepfakes

The fundamental difficulty of identifying the fears of Ukrainians was the presence of the main fear - the fear of the ongoing war. Therefore, the objectivity of the survey results is complicated. We are currently in an era characterized by digital disinformation and information warfare, where fake information campaigns aim to manipulate public opinion. False information spreads rapidly through social networks and can affect millions of users across borders.

The concern about the public's trust in visual content has motivated to the development of critical thinking skills to protect the people from misinformation in visual media. Fostering a suitable level of critical thinking is crucial to ensuring society's resilience against cyberthreats and counteracting the negative impact of misinformation on Ukraine's sustainable development.

Even high-quality deepfakes used in the film industry and advertising still lack naturalness or realism. The slightest unnaturalness in the appearance and behaviour of the object causes anxiety and dislike in viewers - this is the so-called uncanny valley effect. Therefore, when analyzing a suspicious video, you should pay attention to the main object of overlay - the face.

To create the methodological materials, we conducted a thorough study of existing markers of image tampering. Deepfake can give away a lot of signs, for example excessive pixelisation, defects, fuzzy and blurred image, duplication of elements; blurry outlines; notice the flickering of the face (one of the obvious things, since some of these videos still look unnatural - this applies to the transitions between the face, neck and hair, which are not always organically combined with each other); unnatural facial expressions, especially when blinking, eyebrow and lip movements; pay attention to the fuzzy inside of the mouth (artificial intelligence is still learning to display the oral cavity correctly, which may result in poor clarity of the image of teeth or tongue during a conversation); detect blinks (most software cannot reproduce a normal human blink so far); low video quality, which is often used to hide incorrect neural network operation; or vice versa high quality with unnaturally perfect hair and skin; differences in body type, physique, hairstyle and voice from the original; in the most popular solutions only the face is replaced, so it is possible to notice the boundary of the face overlay, differences in shadows, lighting and skin tone. It is particulary important to pay attention to the face and body (most of these fakes are face replacements, as body replacements require much more effort, hence - if the skin colour of the face, features do not match the body structure - it is also probably a fake video); consider the length of the video (although deep faking technologies are easy to use, they still require a labor-intensive process of developing and training artificial intelligence, which is why most quality fakes are several seconds long. Hence, if you see such a short cut, but there is no obvious reason to shorten it, it may also indicate that the video is fake); pay attention to the sound of the recording (fake videos often replace only the image, so poor synchronization of the speaker's lip movements with the sound may indicate falsity); recognize details at a slower playback speed (by reducing the speed by 50%, it is easier to observe background differences or changes in the picture).

At the current stage, we compare answers of 124 respondents from the Zaporizhzhia region and 34 respondents from Poltava region. Our target audience was students majoring in Higher Education Pedagogy (as this speciality is a "lifelong learning" speciality, which gave us a diverse age group). Also, relatives and friends of students were involved in the study. However, in the next step, we plan to significantly expand the geography by involving respondents from other regions of the country in the experiment. In this table you can see the results of Definition stage of effectiveness experiment and Forming stage of effectiveness experiment.

Table 1. Definition and forming stage of pedagogical experiment

The level of of Critical Thinking				
Scale of measurement of level of progress	**Unsatisfactory 0-59 points**	**Satisfactory 60-74 points**	**Good 75-89 points**	**Excellent 90-100 points**
1-st checkpoint	51,0%	30,5%	15,5%	4,0%
2-nd checkpoint	17,5%	60,5%	15,5%	6,5%

The methodology of the experiment included several stages, namely:

Incoming testing (1st checkpoint). Analysing the test results before implementing the developed methodology. Assessment of the level of critical thinking of the experiment participants at the initial stage.

Implementation of the methodology. Conducting training sessions with the participants of the experiment on methods of detecting synthetically reproduced or modified visual content. Rationale for developing an educational methodology of critical thinking and pedagogical support to counteract disinformation and manipulation of artificially reproduced media content are described in our research (Chemerys, 2024a).

Retesting (2nd checkpoint). After the training sessions are completed, the respondents are retested using the same algorithm to assess the effectiveness of the methodology for improving critical thinking.

Respondents were tested using test materials containing both synthetically created and authentic visual content (photos and videos) to determine their ability to detect manipulation in images and videos, and points are awarded based on their success in detecting modified or synthetically reproduced media content. The results of both tests are compared, conclusions and recommendations are made on their basis in order to improve the level of critical thinking in identifying synthetic visual content in future.

Conclusions and prospects for further research. The research highlights the widespread digitization of modern life and the growing impact of generative images, known as "deepfakes", in the context of advancing AI technologies. The research underscores the urgent need for developing critical thinking methodologies to mitigate the influence of "deepfake" technology. "Deepfake" technology relies on AI-enabled techniques to manipulate photos and videos, creating realistic content with the potential for misuse, posing threats ranging from political sabotage to misinformation dissemination. In the face of the increasing popularity of video content, the importance of media literacy, public awareness, and fact-checking efforts becomes evident to combat the challenges posed by synthetic media content. These findings reveal that "deepfakes" present a pressing concern, and addressing this issue requires collaborative efforts and education to enhance digital literacy and discernment. To the future research steps we provide the comparison of results of the first and second checkpoints of respondents knowledge. The comparison of indicators of individual progress of respondents is liable to statistic processing, namely: the number of received points of experimental group during the first and second checkpoints of the experiment. We are also planning to analyze data with the help of calculation of dispersion and with methods of mathematic statistics, using Student's t-test. In conclusion, we would like to say that a positive result of the implementation of the critical thinking methodology is not the identification of deepfakes, but the position of "trust no one".

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ДІПФЕЙКИ ЯК ПРОБЛЕМА СУЧАСНОСТІ: КОРОТКИЙ ОГЛЯД

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У науковій статті проводиться аналіз впливу та розгляд використання генеративних зображень, відомих як «діпфейки», у контексті стрімкого розвитку технологій штучного інтелекту (ШІ). Відмічається, що технологія діпфейків, що базується на методах штучного інтелекту, дозволяє маніпулювати фотографіями та відео для створення гіперреалістичного візуального контенту, що створює потенційні загрози для різних сфер суспільного життя – від політичних маніпуляцій та реклами до поширення дезінформації та порушення особистої приватності. В умовах постійної діджиталізації суспільства, розвиток технологій глибоких фейків посилює необхідність розробки та впровадження ефективних методів критичного мислення для виявлення автентичності медіа та новин. Дослідження проводиться щодо обізнаності про сучасний стан застосування технології діпфейків та використання штучного інтелекту для створення синтетично відтвореного або модифікованого візуального контенту. Розглядаються і виявляються основні аспекти та можливі наслідки використання діпфейків в різних сферах життя. В основу дослідження покладено ідею вивчення явища "діпфейків" з точки зору їхнього впливу на сучасне інформаційне середовище та можливість упровадження заходів для запобігання можливим негативним наслідкам їхнього використання. Значна увага приділяється важливості медіаграмотності, громадської освіченості та зусиль з перевірки фактів для протидії викликам, які створює синтетичний медіаконтент. Результати дослідження виокремлюють діпфейки як потенційну загрозу довірі до візуального та слухового сприйняття, підкреслюючи необхідність спільних зусиль для підвищення рівня цифрової грамотності та розрізнення правдивих від підробних матеріалів в епоху, що характеризується цифровою дезінформацією та інформаційною війною. Результати дослідження підкреслюють актуальність проблеми, що уособлює синтетично відтворений або модифікований медіаконтент, та спонукають до негайних дій для вирішення цього питання.

Ключові слова: *діпфейк технологія, штучний інтелект, генеративні образи, дезінформація, медіаграмотність, критичне мислення, діджиталізація, інформаційна війна, громадська свідомість, синтетичний медіаконтент.*

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