Forming the Ability of Younger Students to Behave Safely on the Internet

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ABSTRACT

Aim. The aim of the research is to elucidate the essence of the concept of "safe behaviour on the Internet"; and determine the means of developing digital literacy skills among primary school students, as well as the specifics of their usage. The study also involves experimentally investigating the effectiveness of the identified tools in enhancing the level of safe behaviour on the Internet skills among primary education learners.

Methods. The research used the following methods: analysis, generalisation, experiment, observation, and statistical methods.

Results. The use of thematic stories and comics, ready-made didactic games and exercises, conducting thematic lessons according to plans, etc., provided that the activity is systematic and consistent, taking into account the age and individual characteristics of students in grades 1-4, contributes to the successful development of the ability of primary education learners to behave safely on the Internet.

Conclusion. The ability to behave safely on the Internet is the ability to perform online activities without harming one's own health, the health of others and financial situation, formed on the basis of knowledge and experience. The means of forming the skills of safe behaviour of primary school students on the Internet are thematic fairy tales, stories, presentations, video clips, illustrative material, comics, ready-made materials for didactic games and exercises, development of thematic lessons, computer, etc. The results of the experiment allowed us to draw conclusions that by using the developed tools in the learning process, it is possible to increase the level of primary school students' ability to behave safely on the Internet.

Keywords: safe behaviour on the Internet, means of developing safe behaviour on the Internet, thematic stories, comics, younger students, primary school

INTRODUCTION

When the Internet has covered all spheres of life of a primary school student, the question of developing safe behaviour in the Global Network among primary school students clearly arises. According to the *Kontseptualni zasady reformuvannia serednoi shkoly "Nova ukrainska shkola"* [Conceptual principles of reforming the secondary school "New Ukrainian School"] (Hryshchenko, 2016) and the *Derzhavnyi standart pochatkovoi osvity* [State Standard of Primary Education] (Kabinet Ministriv Ukrainy, 2018), one of the key competences that should be promoted in primary school students is information and digital (information and

communication) competence, which is understood as "critical use of information and communication technologies for creating, searching, processing, exchanging information at work, in public space and private communication" (Hryshchenko, 2016, p.11); "mastery of the basics of digital literacy for development and communication, the ability to use information and communication competence safely and ethically in learning and other life situations" (Kabinet Ministriv Ukrainy, 2018, para. 7). Its structure includes the ability to behave safely on the Internet.

This problem is studied in their scientific works by such modern Ukrainian and foreign scholars as Kostiantyn Chub, Serhii Petrenko, Olena Chernykh, Martin Valcke, Sarah Bonte, Bram De Wever, Isabel Rots and others. Therefore, the provisions of the regulatory framework and scientific and pedagogical research in this area determine the relevance of this topic.

The ability to behave safely on the Internet and threats in the global network for younger students

In the *Slovnyk ukrainskoi movy: v 11 tomakh (t.10)* [Dictionary of the Ukrainian Language: In 11 volumes], it is noted that skill is "the ability, based on experience and knowledge, to perform something properly" (Bilodid, 1979, p. 440). According to Petrenko, working safely on the Internet means that the user possesses the necessary knowledge and skills, enabling them to engage in online activities "without causing anyone physical or moral harm and without causing material damage" (Petrenko, 2020, p. 85).

The term "safe behaviour on the Internet" refers to the ability to perform online activities without harming one's own health, the health of others, or one's financial situation, based on knowledge and experience.

There are many dangers on the Internet for both adults and minors. In general, scholars distinguish between different approaches to identifying threats and risks on the Internet for primary school children. Chernykh defines the author's classification of threats on the Internet, which includes threats to physical well-being, mental well-being, social well-being and material well-being; and the four basic competencies of safe behaviour on the Internet include the following:
- understanding of the application of the concept of human rights on the Internet (knowledge of human rights on the Internet; observance of human rights on the Internet; attitude to the Internet as an instrument of empowerment);
- E-participation involves knowledge of electronic participation opportunities, experience in participating on the Internet, and a values-based attitude toward the possibilities of managing the Internet and electronic participation;
- health protection when working with digital devices (knowledge about threats on the Internet and their impact on health; taking measures to protect health when using the Internet; value attitude to one's own health);
- seeking help and protection (knowledge of the necessary actions in case of being a victim of someone's actions on the Internet; experience of seeking help in case

of being exposed to threats on the Internet; respect for human rights on the Internet and understanding of protection mechanisms) (Chernykh, 2017).

Belgian scholars Valcke et al. (2010) emphasise the need for "network education", based on the results of a study on children's risky behaviour on the Internet. Young children do not have a sufficient level of e-maturity to be able to manage the current risks in the Global Network. The researchers note that many primary school students (86,3%) recognise the existence of unsafe Internet use. They emphasise five risk areas on the network:

- the Internet can have a negative impact on social relationships (42% of children become victims of cyberbullying or cyber harassment);
- negative emotional impact due to unwanted exposure to pornography, violence, foul language, etc. (many children (up to 16,7%) report being threatened online; many do not understand the risk of sharing personal data with unknown "friends" on the Internet);
- the Internet affects physical health (studies indicate obesity, decreased concentration, and muscle pain);
- a negative impact on time management, which leads to addiction to the Internet and neglect of schoolwork, less participation in family activities (compare: Kralik, 2023; Pavlíková et al., 2023);
- risk of consumerism and commercial exploitation (Jarmoch et al., 2022; Valcke et al., 2010).

Petrenko divides threats on the Internet into 4 groups: threats related to personal health, threats related to personal safety, threats related to the safety of others, and threats related to the leakage of personal information. The first group — personal health — covers the formation of addictions (gaming, computer, Internet); familiari-sation with suicidal information; intrusive advertising of alcohol, tobacco products, drugs. The second group — personal safety of a person — includes familiarisation with pornographic materials, profanity; familiarisation with racist, hateful or sectarian content; communication with dangerous people (perverts, fraudsters, burglars, etc.); involvement in illegal actions (hacking, violation of the rights and freedoms of others, copyright infringement). The third group — the safety of other people — involves the presence of materials, the existence and use of which may cause an encroachment on the safety and health of others (information on the creation of explosive or poisonous substances, etc.); dissemination of deliberately false or inaccurate information; committing illegal acts that entail liability under applicable law; cyberbullying (deliberate harassment and humiliation of peers). The fourth group — threats of personal information leakage — covers the disclosure of personal and confidential information (surnames, names, contacts, secret credit card details, telephone numbers, home addresses, place of work and positions of parents, photos

of rooms and houses, etc.); threats of PC infection with viruses of various categories; dangers of downloading programmes with malicious functions (Petrenko, 2020).

Focusing on forming the ability of younger students to behave safely on the internet is imperative in addressing the challenges posed by media manipulations. Hedviga Tkáčová et al. (Tkáčová, Al-Absiová et al., 2021; Tkáčová, Pavlíková et al., 2021; Tkáčová, Maturkanič et al., 2023; Tkáčová, Pavlíková et al., 2023) research provides insights into the multifaceted aspects of online behaviour and the need for comprehensive strategies to enhance digital literacy and safety among young individuals (compare: Colì et al. 2023; Lesková et al., 2023).

In today's digital age, it is crucial to focus on shaping the ability of younger students to behave safely on the internet, Tkáčová, Eva Al-Absiová et al. (2021) highlight the pervasive threats on the internet by shedding light on media contents that represent the opinions of others. This content, packaged attractively for immediate consumption, often lacks intellectual depth and fails to encourage individuals to contemplate the presented facts. The danger lies not only in the manipulative elements within digital media but, more significantly, in the false belief that individuals are immune to such manipulation.

Furthermore, Tkáčová, Patrik Maturkanič et al.'s research (2023) emphasises the importance of caution in the realm of current social media and networks, especially concerning young people. Students' inclination to share content on platforms like Facebook is not solely influenced by the truthfulness of the content; instead, it is driven by factors like personal beliefs. This highlights the need to address the willingness to share online content, even if it is unverified, as risky behaviour with global implications.

The aftermath of the COVID-19 pandemic has seen a surge in media manipulation, posing significant threats to the safety of young internet users (Tkáčová, Pavlíková et al., 2023). Another research underscores the necessity to enhance media literacy, critical thinking, and credibility verification among individuals. This study delves into the impact of media manipulation on students' resilience, emphasising the seven factors influencing susceptibility to digital media manipulative elements.

In the context of education, Tkáčová, Pavlíková et al. (2021) present the Internet and media as valuable tools that expand schools' possibilities. These tools aid in drawing attention to various situations and problems, fostering safety and awareness beyond the school premises.

Therefore, to summarise, Internet safety encompasses the ability of younger students to counteract these risks, despite the diversity of their classifications, and the skills that make up Internet safety are as follows:

- the ability to counteract risks related to personal health, which implies the ability to avoid the negative effects of information about various forms of addiction and advertising of bad habits;

- the ability to counteract potential threats to personal safety on the Internet, which involves the formation of a clearly defined position among younger students on the inappropriateness of using profanity, reducing contacts with dangerous people (criminals, strangers, etc.); this ability will reduce the statistics of cases of illegal actions on the Internet against younger students;
- the ability to counteract the risks to the safety of others, which involves developing in students aged 6-10 the ability to understand the consequences of personal negative actions for other people (the use of offensive comments, swear words, unreasonable complaints about an account, etc.), which often lead to legal liability of parents or guardians of minors, as well as the awareness of the need and ability to check the accuracy of information before disseminating it;
- the ability to counteract the risks associated with the leakage of personal information, including the ability to overcome threats of disclosure of personal or confidential data, threats of computer viruses, etc. (Ban et al., 2024).

Means of forming safe Internet behaviour skills in younger students

The policy of Ukraine determines the course of raising the level of information and digital skills of citizens of different age categories. The website of the Ministerstvo osvity i nauky Ukrainy contains up-to-date information on child safety on the Internet, which is justified by the importance of the topic under study. In particular, mon.gov.ua has a tab "Children's Safety on the Internet", which contains:

- Parental Guide: *Dity. Internet. Mobilnyi zviazok* [Children. Internet. Mobile communication];
- a series for parents called *Bezpeka ditei v interneti* [Children's Safety on the Internet];
- informational video clips from the International Conference *Safe Online 2020: Modern Challenges* (Ministerstvo tsyfrovoi transformatsii Ukrainy, 2020);
- *Rekomendatsii Upovnovazhenoho Verkhovnoi Rady Ukrainy z Prav Liudyny Shchodo Zakhystu Personalnykh Danykh Pid Chas Dystantsiinoho Nadannia Osvitnikh Posluh* [Recommendations of the Ukrainian Parliament Commissioner for Human Rights on the protection of personal data in the course of remote provision of educational services];
- materials from a meeting on preventing the spread of aggressive subcultures among adolescents (Ministerstvo osvity i nauky Ukrainy, 2023).

Additionally, on the Ministerstvo osvity i nauky Ukrainy portal, as part of the educational project STOP SEXTING, there is a proposal for a lesson plan to develop safe online behaviour skills among primary school students, focusing on combating sexual violence in the Global Network. The lesson plan for grades 1-2 is titled *My Superpower—Safety on the Internet*, for grades 3-4, it is lesson "#Not_Fooled: We Are Heroes of Safety on the Internet". For grades 1-4, there is a lesson titled "Online Threats in Times of War: How to Protect Yourself?" which includes working with thematic fairy tales, presentations, and interactive exercises. For children aged 6-9, it offers information about the most common forms of interaction

on the Internet among children, the main risks associated with them; protection of private information on the Internet; outlines the signs of risky communication and rules of safe behaviour on the Internet, etc. (Hromadska orhanizatsiia "Tsentr zakhyshchenosti v interneti "Stop sekstynh"", 2018); Ministerstvo osvity i nauky Ukrainy, 2023). We also developed didactic games and exercises for younger students to help them develop the ability to behave safely on the Internet, for example: *Vriatuvaty Huhlyka* [Save Google] (the essence of the game is for a primary school student to determine whether Google is behaving correctly or not on the Internet by signalling (showing a like or dislike); *Test Bilborda* [Billboard Test] (junior schoolchildren write information about themselves on stickers that reflect their own appearance or character, their life's victories and secrets, and then analyse which of them they can post for public viewing and which they cannot, suggesting that in the future they should transfer the ability to divide information into public and private and when using social media); collage *Bezpechnyi internet* [Safe Internet] (junior schoolchildren create, visualise and discuss the basic rules of behaviour on the Internet); etc. (Hromadska orhanizatsiia "Tsentr zakhyshchenosti v interneti "Stop sekstynh"", 2018).

The Hromadska orhanizatsiia "MINZMIN" [Non-Governmental Organisation "MINZMIN"] implemented an educational project called Lessons for Students "Moia pryvatnist" ["My Privacy"], during which it developed a lesson for primary school students to develop their ability to recognise private information on the Internet and to understand the inappropriateness of publishing it online, and an online course *Pryvatnist ditei v Interneti* [Children's Privacy on the Internet] for parents (Ministerstvo osvity i nauky Ukrainy, 2023). During the event, it is recommended to use a video, illustrative material, and a computer as teaching tools.

It is understood that a primary school teacher in a general education institution can not only use ready-made lesson plans but also independently develop them. A teacher working with a class knows best which teaching tools will be most effective in achieving the goals of the activity, taking into account not only the age-related but also the individual characteristics of the students (Kondrla & Králik, 2016; Lesková & Lenghart, 2023). In addition, it is important to remember that the application of various tools and work with them should be systematic and systematic.

If, during the formation of internet safety skills in younger students, a teacher utilises video clips, fairy tales, or narratives, it should be emphasised that they should be short in terms of processing time (5–10 minutes). If a story is longer, it can be divided into several logically completed parts. It is pertinent for the main characters to be peers of the students, as this ensures the establishment of analogies: the younger students "put themselves in the shoes" of the character and experience the situation together with them. It is essential to verify whether an elementary school student understands all the concepts they are working with, as their vo-

cabulary may not include all the terminology. Working with thematic texts for visualisation is advisable to complement with images and diagrams: mind maps, comics, narrative drawings, etc.

When organising didactic games or interactive exercises using the mentioned tools, special attention should be paid to ensuring that younger students understand the purpose of the activity and can formulate conclusions. This is because elementary school students often become engrossed in the process of interaction, the desire to win, rather than focusing on the content and the purpose of the activity.

As part of our research, we developed various tools to help elementary school students acquire the skills to navigate the internet safely. It is clear that such skills are formed based on thematic knowledge, which, through practice, transforms into practical actions. Therefore, we strive to use various means to impact the different sensory systems of primary education learners. Thus, we combined working on narratives with the analysis of comics, including:

- based on comics, we composed entire narratives or their parts;
- acted out situations depicted in comics;
- developed comics based on short stories, etc.

Here are examples of the stories and comics we have developed (StoryboardThat app) that students have worked on.

In the Clutches of Online Entertainment—a story about fourth-grader Max, who spent a lot of time playing online games. From one of them, the boy later became addicted, spending significant amounts of money to continue playing (Figure 1).

Figure 1
*A comic strip for the story In the Clutches of Online Entertainment*
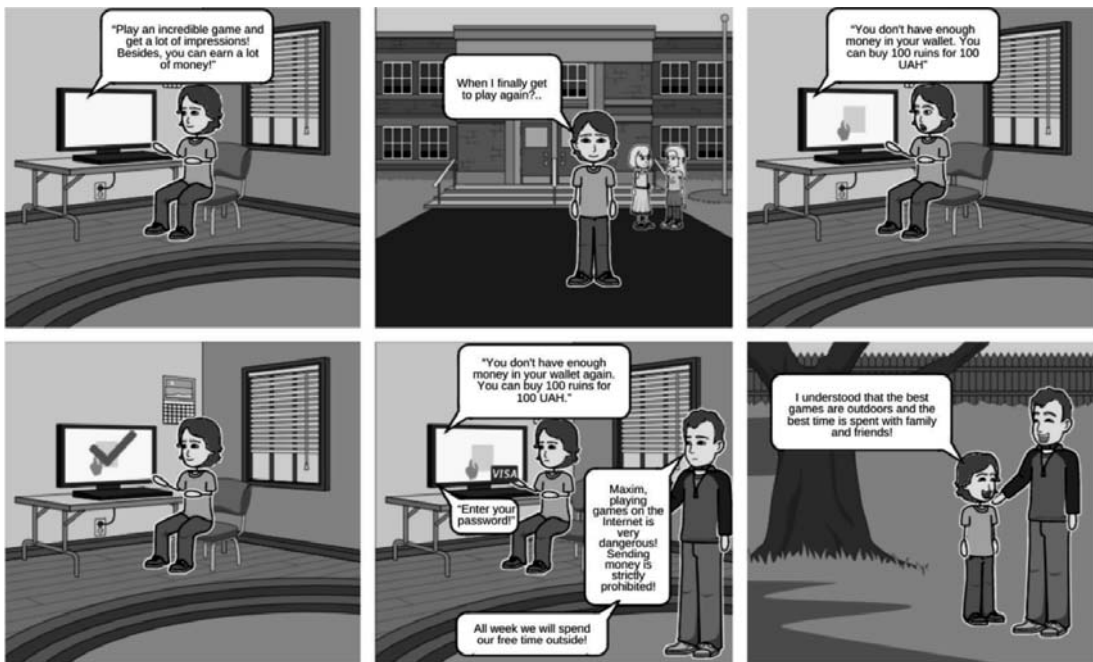
Source. Author: Andriana Shyshak.

Beware of Viruses — a story about a girl named Halyna, who received a coveted gift, a laptop, on her tenth birthday. Due to visiting unknown websites on the device, a virus "moved in," causing problems with the device's functionality (Figure 2).

Figure 2
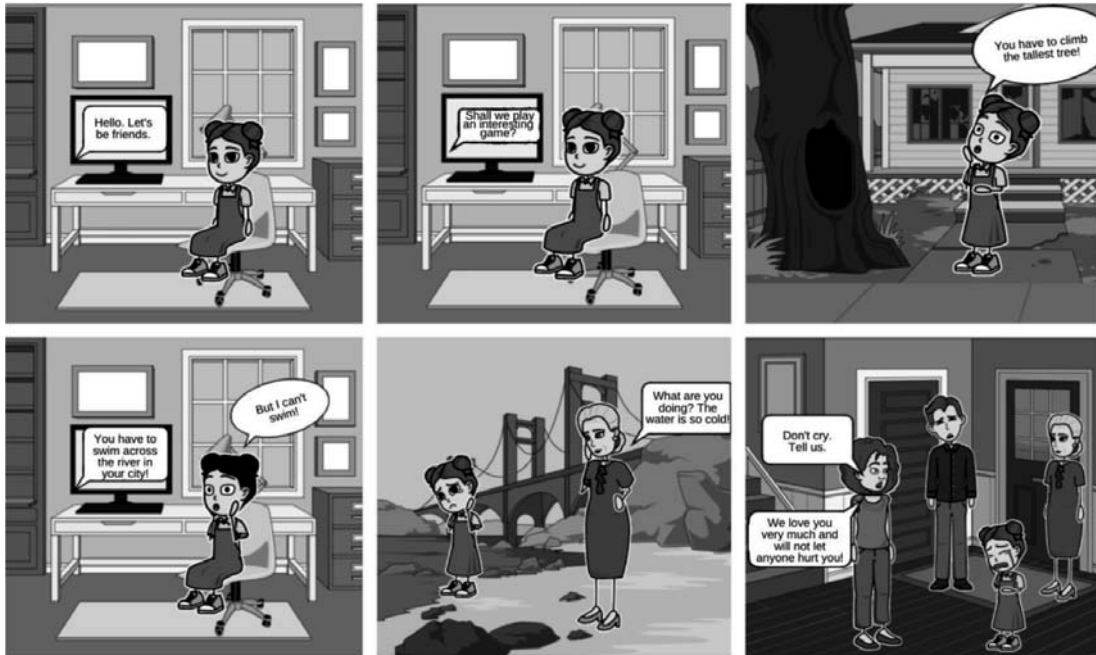*A comic strip for the story Beware of Viruses*
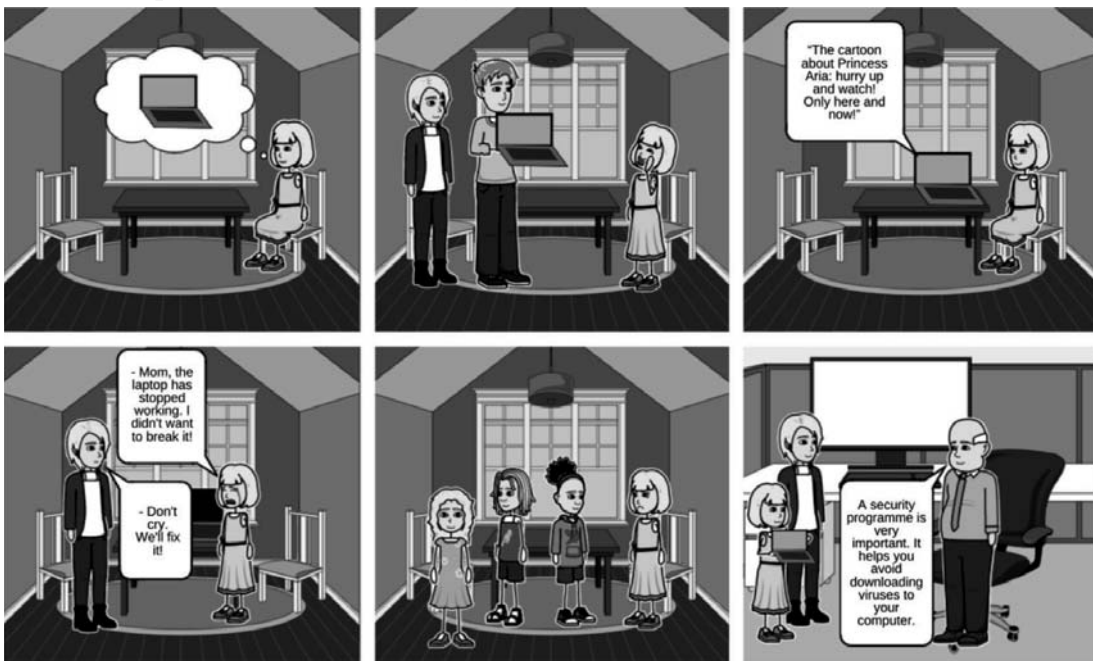
Source. Author: Andriana Shyshak.

Dangerous Game—a story about a third-grader named Maryna who, thinking she had found a virtual friend, ended up performing tasks that were dangerous for her own life and well-being, given by a malicious actor (Figure 3).

Figure 3
A comic strip for the story Dangerous Game

Source. Author: Andriana Shyshak.

Meeting Online—a story about a fourth-grader named Petro, who, in his quest to obtain a coin necessary for his collection, falls into a trap by meeting with a malicious stranger hiding behind the photo of a peer on a social network (Figure 4).

Figure 4
A comic strip for the story Meeting Online

Source. Author: Andriana Shyshak.

An experimental study of the formation of primary education students' ability to behave safely on the Internet.

The developed materials and their analogs were used during experimental teaching in primary schools in Ternopil from September to December 2023. A total of 170 third-grade students participated in the study, including 84 students from experimental classes and 86 students from control classes. The experimental training involved integrating developed narratives and comics, ready-made materials for didactic games and exercises, and conducting thematic lessons according to plans into the educational process of experimental primary school classes. The educational process in the control classes remained unchanged in this context.

The questionnaire consisted of four blocks of questions and tasks (one question and one task for each of the four components of the skill, totalling 8 questions and tasks for the comprehensive skill of safe behaviour on the Internet) aimed at the ability to counter the aforementioned risks on the Internet.

We present a summary of the descriptive statistics within the experiment in the table below.

Table 1

Basic descriptive statistics, Student's T-Tests and Cohen's d effect sizes regarding the comprehensive ability to behave safely on the Internet of younger students of the experimental and control classes

Skills that were tested / Classes	Mean		SD		Skew		Kurt		Students T-Test	d Cohen
	EC	CC	EC	CC	EC	CC	EC	CC		
Ability to resist risks related to personal health	1,29	1,04	0,67	0,76	-0,39	-0,06	-0,75	-1,24	2,28	0,35
Ability to resist potential threats to personal safety online	1,25	0,87	0,74	0,84	-0,42	0,25	-1,06	-1,53	3,11	0,47
Ability to counteract risks to the safety of others	1,30	1,22	0,67	0,69	-0,42	-0,32	-0,76	-0,87	0,73	0,11
Ability to resist risks associated with the leakage of personal information	1,33	1,01	0,73	0,73	-0,60	-0,02	-0,90	-1,08	2,87	0,44
Ability to behave safely on the Internet	5,17	4,14	2,81	3,02	-0,46	-0,15	-0,87	-1,18	2,24	0,34

Source. *Own research.*

Having determined the average values of the correct answers of the participants of the experiment, we conclude that the number of correct answers (for each of the four component skills and the value of the complex skill) of primary school students of the experimental class is higher than that of the control class, which indicates the effectiveness of the proposed methodology (Kondrla P. & Králik, R. (2016).

The standard deviation for each of the four skills and the complex ability to behave safely on the Internet for primary school students of the experimental and control classes is more than half of the mean value and more, so it is considered high.

The skewness of the distribution of data around their mean (Skew) for each of the four skills (except for the ability to resist potential threats to personal safety online for the control group of primary school students) is negative. The average Skew value (which is the Skew value for the comprehensive ability to behave safely on the Internet) for both samples is negative. This indicates the similarity of the distributions under study.

The degree of "concentration" or "sharpening" of the data distribution around their mean value (Kurt) within the experiment for each of the four component skills and the complex ability to behave safely on the Internet for primary school students

of the experimental and control classes is negative, indicating the similarity of the distributions under study.

We tested the hypothesis that the arithmetic mean of correct answers of the experimental class students is higher than that of the control class students using the parametric statistical Student's t-test for independent samples. Taking into account the value of the Student's t-test for each of the four component skills and the average value of the Student's criterion for the complex ability to behave safely on the Internet, the differences between the experimental and control class students are significant by more than 5%, i.e. the experimental class students gave more correct answers to the questionnaire than the control class students. This indicates differences between the arithmetic mean values of correct answers of two samples of primary school students and the effectiveness of the experimental methodology. The use of calculations based on the Student's t-test for independent samples made it possible to assert that the results of the study are statistically significant.

We determined the effect size by comparing the data obtained with the approximate limits for estimation (d Cohen). Taking into account the effect size for each of the four component skills and the determination of their average value, the effect size of the results obtained from a practical point of view for the comprehensive ability to behave safely on the Internet can be considered below average. Prospects for further research are the development and implementation of measures aimed at increasing the effect size of the experiment results.

Conclusion

The ability to behave safely on the Internet is the ability to perform online activities without harming one's own health, the health of others, or one's financial situation, based on knowledge and experience. The means of forming the ability to behave safely on the Internet for primary school students are thematic fairy tales, presentations, video clips, illustrative material, comics, a computer, etc. The specificity of their use is that such activities should be systematic and systematic, taking into account the age and individual characteristics of pupils in grades 1-4 (short duration of processing; the main character is a peer; ensuring interactive work on learning tools; encouraging conclusions).

As part of the experiment, the ability to behave safely on the Internet was understood as a complex formation that includes: the ability to counteract risks related to personal health; the ability to counteract potential threats to personal safety on the Internet; the ability to counteract risks to the safety of others; the ability to counteract risks associated with the leakage of personal information. Experimental training involved the introduction of developed stories and comics, ready-made didactic games and exercises, and thematic lessons in accordance with the plans into the educational process of experimental primary school classes. The educational process in control classes did

not change in this context. The results of the experiment allowed us to draw conclusions that by using the developed tools in the learning process, it is possible to increase the level of primary school students' ability to behave safely on the Internet. The use of calculations based on the student's test for independent samples made it possible to assert that the results of the study are statistically significant.

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