

The use of ICT elements in a specific student environment in the pre-pandemic and pandemic periods of COVID-19: A comparative study

Ondrej Takáč^{1*}, Krisztina Czakóová¹, Ladislav Végh¹, Gergely Kocsis¹,
Zsófia Kocsis², Eva Tóthová Tarová², Melinda Nagy²

¹Faculty of Economics and Informatics, J. Selye University, Slovakia

²Faculty of Education, J. Selye University, Slovakia

*(takaco@ujss.sk) Email of the corresponding author

(Received: 31 January 2025, Accepted: 03 February 2025)

(2nd International Conference on Pioneer and Innovative Studies ICPISS 2025, January 30-31, 2025)

ATIF/REFERENCE: Takáč, O., Czakóová, K., Végh, L., Kocsis, G., Kocsis, Z., Tarová, E. T. & Nagy, M. (2025). The use of ICT elements in a specific student environment in the pre-pandemic and pandemic periods of COVID-19: A comparative study. *International Journal of Advanced Natural Sciences and Engineering Researches*, 9(2), 168-10.

Abstract – This study examines the use of ICT resources among university students, focusing on the COVID-19 pandemic and pre-pandemic periods. Findings show a significant increase in daily hours spent on digital devices for educational and leisure activities during the pandemic, with social media being the dominant platform. This surge was observed across educational and leisure activities, highlighting the pandemic's significant impact on ICT usage patterns. Social media emerged as the dominant platform, drawing the most attention from students during their leisure time. The convenience and accessibility of platforms such as these played a key role in connecting individuals, providing entertainment, and serving as an escape from the challenges of lockdowns and restrictions. The role of ICT tools in facilitating online learning during the pandemic was undeniable. They provided critical support in maintaining educational continuity and enhancing communication between students and educators. However, the increase in screen time was not without drawbacks. A considerable portion of this time was spent on non-educational activities. Mobile phones, in particular, were the most frequently used devices for leisure activities, reinforcing their status as indispensable tools in students' daily lives.

Keywords – ICT Usage, COVID-19 Pandemic, University Students, Online Education, Social Media, Health Risks.

I. INTRODUCTION

The use of computers, tablets, smartphones (hereinafter called PCs), and the internet is now a common, everyday activity for most people in developed countries [1]. Acquiring digital competencies is undoubtedly a prerequisite for achieving above-average academic results, gaining more profound knowledge, and progressing in studies, especially in higher education. ICT tools enable personalized learning, more efficient communication between students and teachers, and foster critical thinking [2]. Mastering these tools is essential not only for fulfilling academic responsibilities but also for succeeding in future professional duties. Unequal access to ICT resources among schools, regions, or social groups may also impact the quality of education [3]. Digital skills are thus indispensable for effective learning [4].

On the other hand, ICT tools and internet access also provide opportunities for leisure and recreation. Sometimes, we use ICT excessively without even realizing it. Research in the Czech Republic and Slovakia

has identified differences in ICT usage between students of humanities and technical fields. Students in technical disciplines spent more time using ICT, with some reporting health problems caused by excessive technology use [5]. Several studies indicate that high school students in Slovakia primarily use ICT for leisure activities rather than educational purposes. However, there is limited research comparing the periods of the COVID-19 pandemic and the pre-pandemic era, particularly regarding weekdays and weekends [6]. It is becoming increasingly challenging to define the boundaries of how many hours spent online, on social networks, or using ICT tools are considered average or normal in the modern sense of the word, and when it becomes excessive, potentially leading to health issues or addictions.

Our research focuses on how the COVID-19 pandemic influenced respondents' time using ICT tools. We will employ a questionnaire survey to gather data to explore which activities students engaged in most.

II. MATERIALS AND METHOD

We conducted a questionnaire survey of 36 university students, the majority of whom were aged 20 (19 respondents) or 21 (12 respondents). Additionally, one respondent was younger than 20, one was 22, one was 23, one was 24, one was 25, and one was older than 25. This is presented in Figure 1.

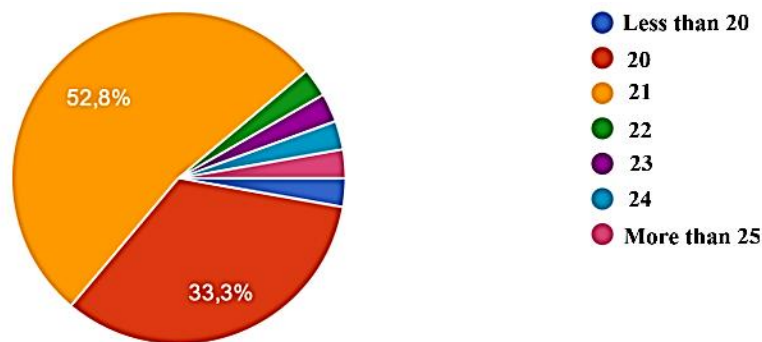


Fig. 1 Age range of respondents

Our research was conducted primarily on a sample of university students from the Hungarian national minority in southern Slovakia. The participants were studying in economic fields. We focused on finding out how many hours they spent using ICT tools per day on weekdays, weekends or public holidays. These questions targeted the period of online education during the COVID-19 pandemic as well as the period before it. We selected activities that we considered important, namely using internet services in general and participating on social media platforms.

III. RESULTS

We present our results in graphs. The results are structured so that two categories are represented by two pairs of graphs, each addressing a specific question but divided into weekdays and non-working days—i.e., weekends and public holidays. The colored bars represent the number of hours respondents spent engaging in a particular activity, while the "y" axis indicates the number of students.

The first category focuses on the COVID-19 pandemic period, and the first question respondents answered was: How many hours on average did you spend during online education on a computer/mobile device/the internet/social networks on weekdays for learning activities (above) and leisure activities (below)? The results are presented in Figure 2.

The previous question is followed by another one focusing on non-working days. Specifically: How many hours on average did you spend during online education on a computer/mobile device/the internet/social networks on weekends and holidays for educational activities (above) and leisure activities (below)? The results are presented in Figure 3.

The second category focuses on the period before the COVID-19 pandemic. The first question in this category was: How many hours on average did you spend before the period of online education on a computer/mobile device/the internet/social networks on weekdays for educational activities (above) and leisure activities (below)? The results are presented in Figure 4.

The next question follows the previous one, focusing on non-working days. Specifically: How many hours on average did you spend before the period of online education on a computer/mobile device/the internet/social networks on weekends and holidays for educational activities (above) and leisure activities (below)? The results are displayed in Figure 5.

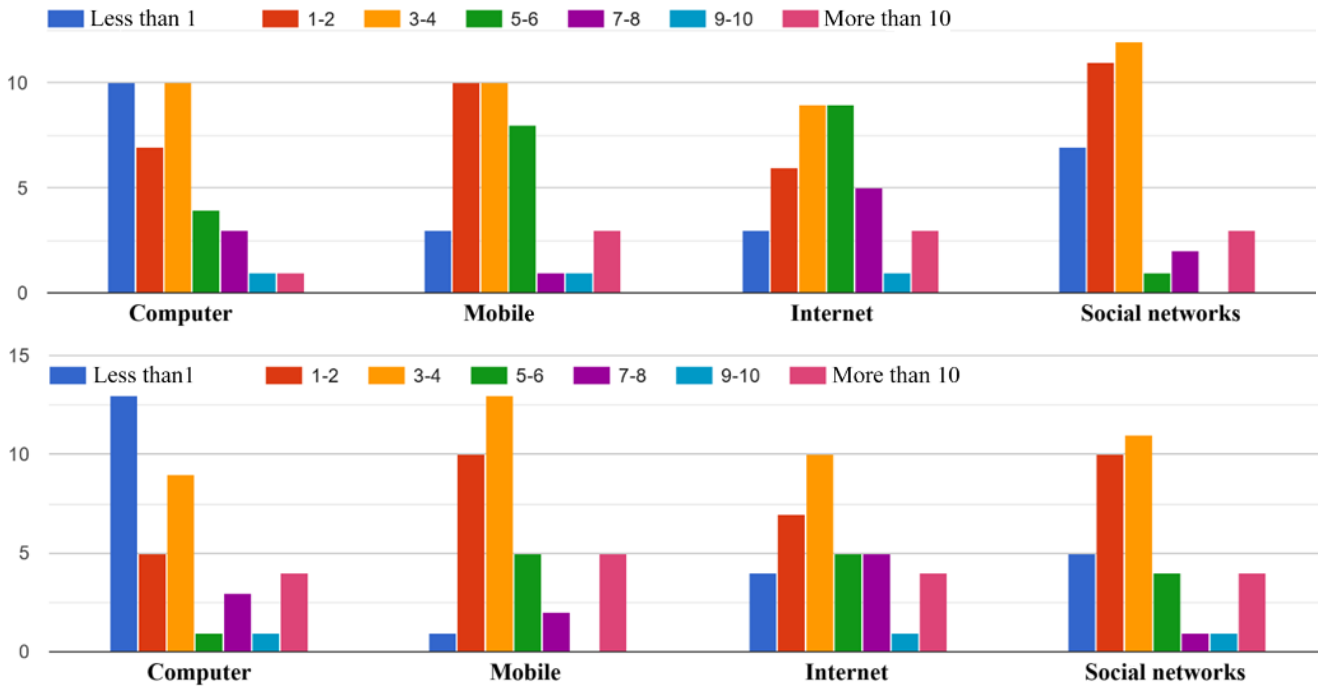


Fig. 2 Answers to the question: How many hours on average did you spend during online education on a computer/mobile device/the internet/social networks on weekdays for learning activities (above) and leisure activities (below)?

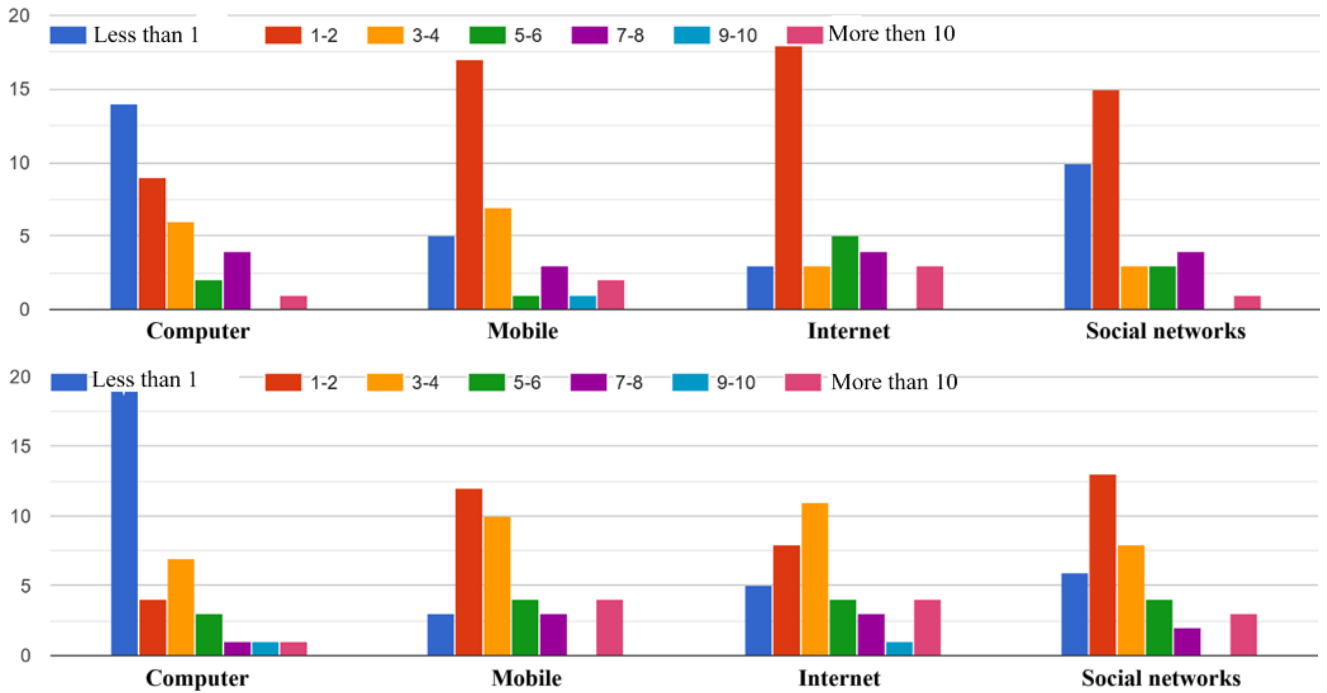


Fig. 3 Answers to the question: How many hours on average did you spend during online education on a computer/mobile device/the internet/social networks on weekends and holidays for educational activities (above) and leisure activities (below)?

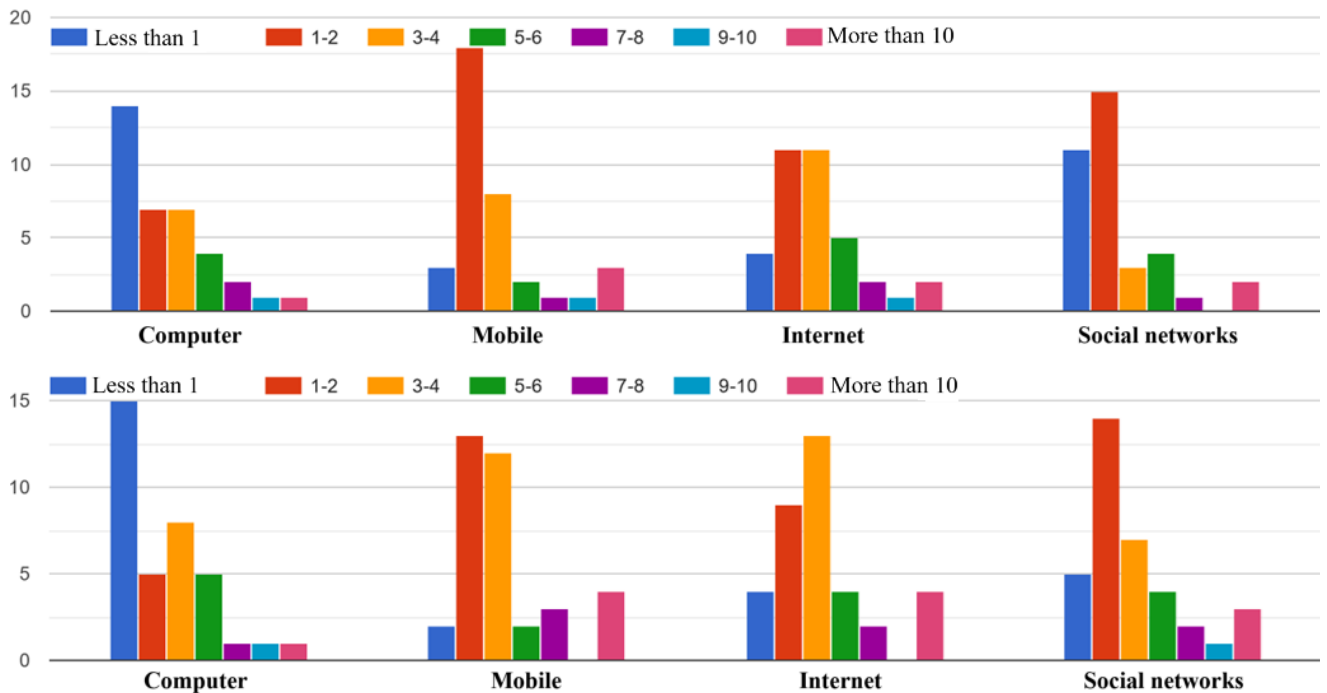


Fig. 4 Answers to the question: How many hours on average did you spend before the period of online education on a computer/mobile device/the internet/social networks on weekdays for educational activities (above) and leisure activities (below)?

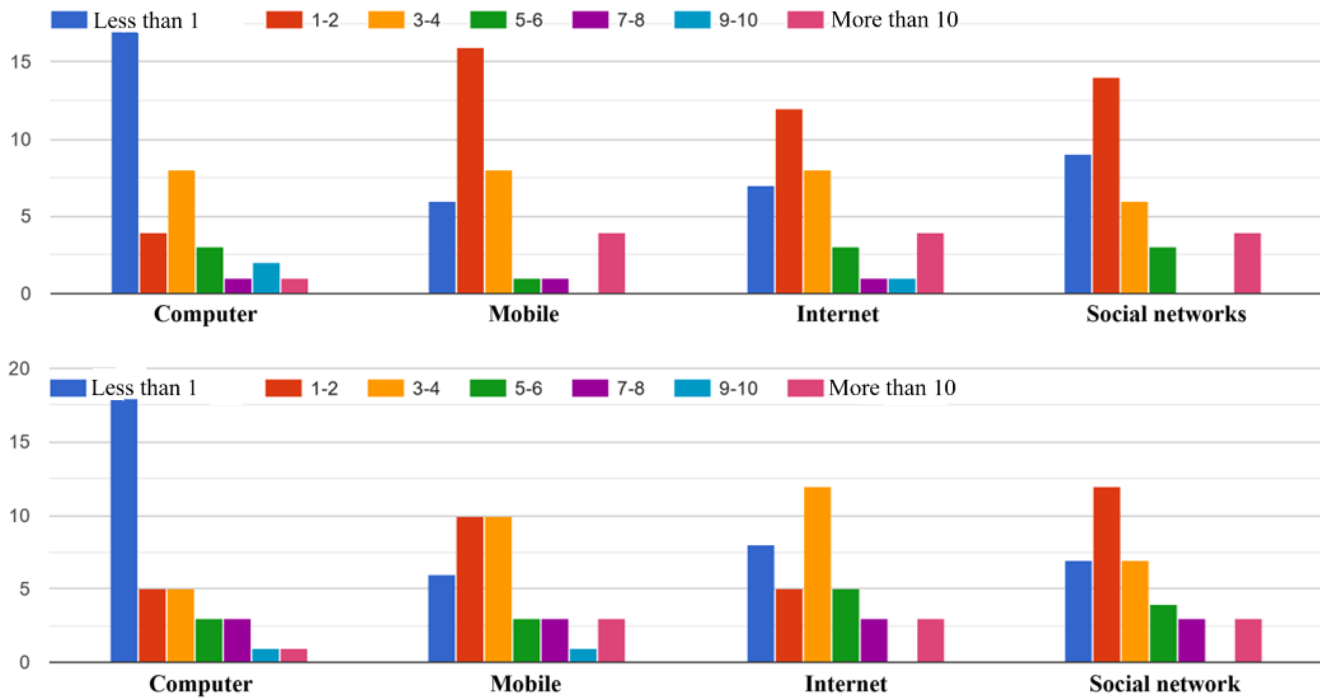


Fig. 5 Answers to the question: How many hours on average did you spend before the period of online education on a computer/mobile device/the internet/social networks on weekends and holidays for educational activities (above) and leisure activities (below)?

The graphs presented above clearly show that the COVID-19 pandemic not only caused an increase in the time spent using ICT tools for educational purposes—which we had anticipated—but also in the time spent on social media. According to our observations, this trend has remained largely unchanged. This poses a potential risk to both physical and mental health. In the future, with an increasing proportion of time spent using ICT not only for study and leisure activities but also for everyday tasks, the likelihood of health complications arising from such usage is expected to grow significantly.

IV. DISCUSSION

Our earlier research explored how personality influences interactions with information and communication technologies [7]. That study began laying the foundation for our current work. Additionally, we examined the socioeconomic and technological changes brought about during the COVID-19 pandemic. That retrospective provided context for further investigation [8]. Specifically, our case study of university students focused on how remote learning during COVID-19 altered their technology habits and adoption of digital education [9]. The findings from these studies formed the basis of our current research. They allowed us to contribute to the discussion on the evolving role of technology in education and professional practice.

Several studies have investigated ICT competencies and literacy levels among university students in different countries, providing valuable comparative insights. Kiss [10] and Kiss and Csiba [12] assessed ICT capabilities in Slovakia and Serbia before the COVID-19 pandemic era. They found that students in Serbia generally self-reported decreased ICT literacy compared to their Slovak equivalents, implying uneven ICT integration inside educational structures. Furthermore, a comparative study by Kiss and Árki [11] examined ICT literacy levels among Slovakian and Hungarian higher education students, emphasising that while digital skills varied, both groups demonstrated challenges in advanced ICT competencies. These findings propose that even if basic digital literacy is well-established, targeted educational interventions are still needed to enhance the ability to utilise ICT tools productively for academic and career purposes. Comparably, our study underscores the growing importance of ICT in shaping students' academic

involvement, especially in the post-pandemic era, where digital learning environments have become ubiquitous.

In their study, Kurilla et al. [1] examined the average number of hours adolescents spent on computers and the activities they engaged in, categorized by gender. The activities studied included Social media, Watching series and movies, Gaming, Surfing the internet, Pornography and Online shopping.

The study involved 1,558 respondents with an average age of 15.7 years, of whom 53% were male. Their results, published in 2018 (based on survey research conducted between 2015 and 2017), showed a significant proportion of leisure activities conducted on computers. On average, 1.6 hours per day were spent on school-related activities and 3.4 hours on leisure activities, resulting in a total average of 5 hours spent on computers daily. Their findings were published in the journal *Alcoholism and Drug Addiction* [1].

Our research yielded similar results, particularly during and even before the COVID-19 pandemic when education was conducted online. This is clearly reflected in the graphs above, where the total daily time spent on computers often exceeded 5 hours. Our findings indicate that the average time spent on computers and digital devices has increased, and it can be assumed that this time will continue to grow.

Our results also highlight those respondents predominantly used mobile phones for leisure activities and spent considerable time on social media. This finding aligns with the study's results, as mentioned earlier [1]. The authors [1] also referenced research conducted in Slovakia by other authors, such as Gregussová et al. [13] and Holdoš [14], whose findings similarly indicated that social media (including email and chat applications) were the most widely used tools among participants.

From this, we can conclude that social media significantly impacts respondents, and its importance has not diminished even today, as confirmed by our results. Respondents attach great importance to these platforms, which may bring certain drawbacks and risks, such as manipulation or surveillance.

V. CONCLUSION

Our results confirm a significant increase in the average daily hours spent using ICT tools during the pandemic, both for educational and leisure purposes. This shift, driven by the transition to online education, may also indicate an increased risk of digital addiction. While the use of ICT for educational purposes has risen, a considerable portion of time was also devoted to leisure activities. These findings align with previous studies conducted in Slovakia and the Czech Republic, which similarly identified social media as the dominant activity among young users.

ACKNOWLEDGEMENT

This publication was made possible with the support of the KEGA projects No. 014TTU-4/2024: *Intelligent animation-simulation models, resources, and environments for deep learning* and No. 011PU-4/2024: *Innovation of methods and forms of university teaching of the subject of Physiology of animals and humans*.

REFERENCES

- [1] Kurilla, A.; Muchová, J.; Alexanderčíková, Z.; Okruhlica, E. (2018). Používanie počítačov a Internetu adolescentmi. In: *Alkoholizmus a drogové závislosti (protialkoholický obzor)*, 53(1), pp. 5-19. Bratislava: Vydavateľstvo Obzor. March, 2018). ISSN: 0862-0350. <https://www.adzpo.sk/sk/adzpo-archiv/270-2018-rocnik-53/cislo-1/1139-pouzivanie-pocitacov-a-internetu-adolescentmi>.
- [2] Gardan, I. P.; Manu, M. B.; Gardan, D. A.; Negoita, L. (2025). Adopting AI in education: Optimizing human resource management considering teacher perceptions. *Frontiers in Education*. <https://www.frontiersin.org/journals/education/articles/10.3389/feduc.2025.1488147/full>.
- [3] Zhang, Y.; Fei, G.; Guofeng, C.; Zong, S.; Liu, H. (2025). Machine learning in education: Addressing regional disparities and enhancing quality through AI integration. *SSRN Electronic Journal*. <https://papers.ssrn.com/sol3/Delivery.cfm?abstractid=5105613>.
- [4] Farzollahi Zanjani, M.; Sarmadi, M. R. (2025). Designing education models to enhance digital skills for effective ICT usage. *Journal of Educational Studies*. https://education.scu.ac.ir/article_19823.html?lang=en.

- [5] Gavurová, B.; Ivanková, V.; Rigelský, M. (2022). Somatic symptoms, anxiety, and depression among college students in the Czech Republic and Slovakia: A cross-sectional study. *Frontiers in Public Health*, 10, 859107. <https://doi.org/10.3389/fpubh.2022.859107>.
- [6] Aristovnik, A.; Obadić, A. (2014). Measuring relative efficiency of secondary education in selected EU and OECD countries: The case of Slovenia and Croatia. *Technological and Economic Development of Economy*, 20(2), 353–370. <https://doi.org/10.3846/20294913.2014.880085>.
- [7] Takáč, O.; Czakoová, K.; Végh, L.; Kocsis, G.; Marák, L.; Kocsis, Z.; Nagy, M. (2024). Exploring the relationship between personality traits and ICT usage. *International Journal of Advanced Natural Sciences and Engineering Researches*, 8(11), 537-544.
- [8] Takáč, O.; Czakoová, K.; Végh, L.; Kocsis, G.; Marák, L.; Szenczióvá, I.; Kocsis, Z.; Nagy, M. (2024). The COVID-19 pandemic in retrospect. *International Journal of Advanced Natural Sciences and Engineering Researches*, 8(11), 529-536.
- [9] Takáč, O.; Czakoová, K.; Végh, L.; Kocsis, G.; Marák, L.; Szenczióvá, I.; Kocsis, Z.; Nagy, M. (2024). The impact of COVID-19 on ICT usage patterns and educational practices: A case study of university students. *International Journal of Advanced Natural Sciences and Engineering Researches*, 8(11), 523-528.
- [10] Kiss, G. (2017). Measuring the ICT competencies in Slovakia and in Serbia in higher education. In *ERPA International Congresses on Education 2017 (ERPA 2017)* (Vol. 37, pp. 1-10). Édition Diffusion Presse Sciences. <https://doi.org/10.1051/shsconf/20173701075>
- [11] Kiss, G.; Árkí, Z. (2016). Comparison of the ICT literacy level of Slovakian and Hungarian students in higher education. In *ERPA International Congresses on Education* (Vol. 26, pp. 1-9). Édition Diffusion Presse Sciences. <https://doi.org/10.1051/shsconf/20162601093>
- [12] Kiss, G.; Csiba, P. (2017). Analyzing the self-reported ICT literacy level of Slovakian and Serbian students in higher education. In *ERPA International Congresses on Education 2017 (ERPA 2017)* (Vol. 37, pp. 1-8). Édition Diffusion Presse Sciences. <https://doi.org/10.1051/shsconf/20173701076>
- [13] Gregussová, M.; Tomková, J.; Balážová, M. (2011). *Dospievajúci vo virtuálnom priestore: Záverečná správa z výskumu 2010*. Bratislava: VÚDPaP, Dostupné na internete: http://www.zodpovedne.sk/download/vyskumna_sprava_sk.pdf
- [14] Holdoš, J. (2015). Závislosť od internetu u mladých ľudí na Slovensku. In: Holdoš et al.: *18 Internet a jeho súvislosti v sociálnych vedách*. Ružomberok: Verbum, 2015. s. 31-58