

The Impact of COVID-19 on ICT Usage Patterns and Educational Practices: A Case Study of University Students

Ondrej Takáč^{1*}, Krisztina Czakoóová¹, Ladislav Végh¹, Gergely Kocsis¹, László Marák¹,
Iveta Szenczióová², Zsófia Kocsis², 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: 15 December 2024, Accepted: 18 December 2024)

(4th International Conference on Frontiers in Academic Research ICFAR 2024, December 13-14, 2024)

ATIF/REFERENCE: Takáč, O., Czakoóová, K., Végh, L., Kocsis, G., Marák, L., Szenczióová, I., Kocsis, I. & 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.

Abstract – The rapid development of Information and Communication Technologies (ICTs) has reshaped modern life, with significant implications for education and work processes. This study examines the impact of the COVID-19 pandemic on university students ICT usage patterns and their perceptions of online education. A survey conducted among 36 students at J. Selye University, Slovakia, highlighted the positive and negative effects of the pandemic. Respondents noted the increased availability of digital study materials and improved access to education through to online learning. However, they also reported physical health problems, such as headaches and back pain and mental health challenges, including feelings of isolation and anxiety. The findings underline the dual nature of pandemic-induced changes, and highlight the need to balance technological advancements with well-being. This research contributes to the understanding of how crises can reshape educational methods and ICT integration.

Keywords – ICT Resources, COVID-19, Questionnaire Survey, ICT Usage Patterns.

I. INTRODUCTION

The rapid development of information and communication technologies (ICT) has had a significant impact on all aspects of social and economic life. With the continuous growth of digitalization, people now spend a considerable amount of time working with computers or other electronic devices. This trend was particularly intensified during the COVID-19 pandemic, leading to increased online activities and a shift in traditional working and educational practices. The pandemic forced educational institutions to adopt online platforms, changing the way students and teachers interact and learn. This shift highlighted both the opportunities and challenges associated with the integration of ICT into everyday life [1-4].

The COVID-19 pandemic brought both challenges and opportunities. Numerous studies have highlighted its negative effects, including increased calorie intake, reduced physical activity, and an increase in mental health problems such as feelings of isolation and anxiety. At the same time, it has accelerated the adoption of digital tools in a number of areas. Online learning not only ensured the continuity of the educational process but also facilitated the creation and improvement of electronic learning materials, thereby increasing the accessibility of educational resources. In addition, the period demonstrated the potential of

ICT to support flexibility and adaptability in education, meeting the diverse needs of students in different environments [7-10].

It can be assumed that young people prefer to use modern technologies and electronic learning materials. These tools are practical and flexible, making them ideal for current educational needs. Today's era therefore offers an opportunity for further innovation in education, particularly in the development of interactive and engaging digital resources. However, it remains crucial to strike a balance between technological advancement and attention to physical and mental well-being, as prolonged screen time and limited physical activity pose significant risks. Lessons learned from this period highlight the importance of building a sustainable digital infrastructure that prioritizes both accessibility and health [2-6], [11-12].

II. MATERIALS AND METHOD

In our research, we conducted a survey with a sample of 36 respondents. The participants were university students from the J. Selye University in Slovakia. The survey focused on the period of the COVID-19 pandemic, with the aim of assessing how this period affected the respondents' mental and physical health several years later. Our main aim was to find out whether respondents still remembered the negative effects of this period. Our primary objective was to determine whether the respondents still remembered the negative impacts of this period. At the same time, we were interested in identifying any positive aspects that the pandemic might have brought, particularly in terms of study and educational materials. The values in the line graphs are presented in relation to the total number of responses. As respondents were often able to select multiple options, these responses are also reflected in the proportional percentages.

As shown in the following pie chart below, the responders were predominantly young people aged around 20 to 24 years. Only one respondent was younger than 20 years, and one was older than 25 years. The age distribution also shown that one respondent was 22 years old, one was 23 years old, and one was 24 years old. Overall, 21 women and 15 men participated in the survey.

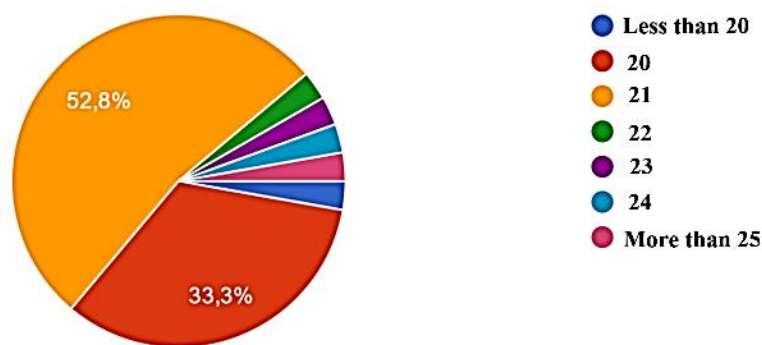


Fig. 1 Age structure of the respondents

III. RESULTS AND DISCUSSION

The main findings of our research are presented in the following graphs. In order to gain a comprehensive understanding of the experiences and behaviours of students during the COVID-19 pandemic, we asked the respondents the following questions:

- Indicate the health problems you experienced (multiple answers were possible).
- Have you noticed any of the following in your online home-schooling or in your anti-epidemic measures (curfews, isolation, restrictions on outside activities, etc.)? (multiple answers were possible)
- What do you think are the positive aspects of online education? (multiple answers were possible)
- Do you spend most of your free time in virtual space? (multiple answers were possible)

- Please indicate in order (1-mostly, 2-often, 3-sometimes, 4-rarely, 5-almost never) which tools you use most often for learning activities during in online education.

The inclusion of these questions not only allowed us to analyze quantitative data but also provided a platform for respondents to reflect on their personal experiences during a unique period of global disruption. The results derived from these questions allow us to address the challenges identified and further explore the integration of ICT in education in a way that promotes both academic success and overall well-being.

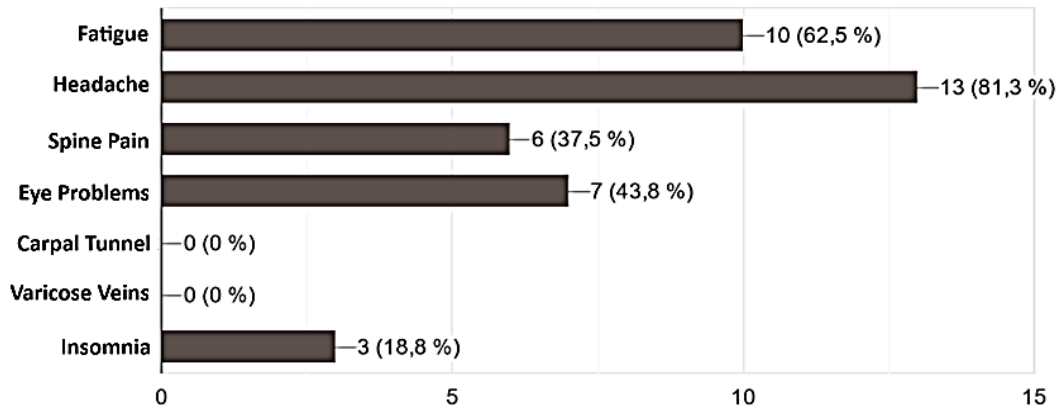


Fig. 2 Answers to the question: Indicate the health problems you have encountered (multiple answers were possible).

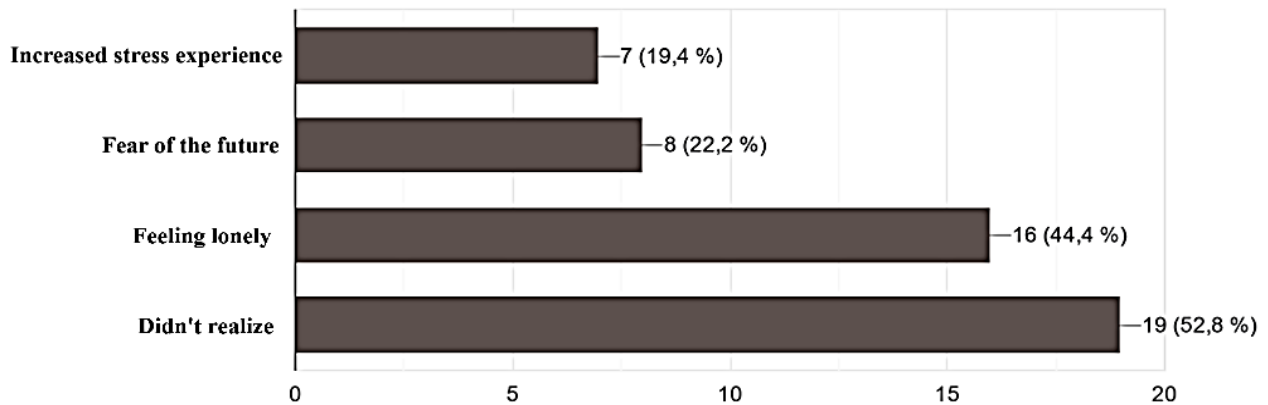


Fig. 3 Answers to the question: Have you noticed any of the following in your online home education or in your anti-epidemic measures (curfews, isolation, restrictions on outside activities, etc.)? (multiple answers were possible)

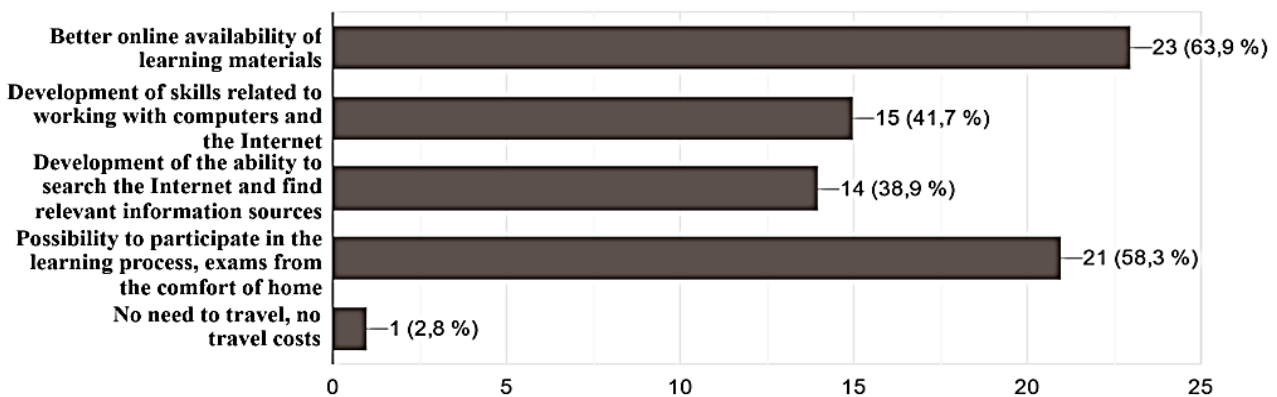


Fig. 4 Answers to the question: What do you think are the positive aspects of online education? (multiple answers are possible)

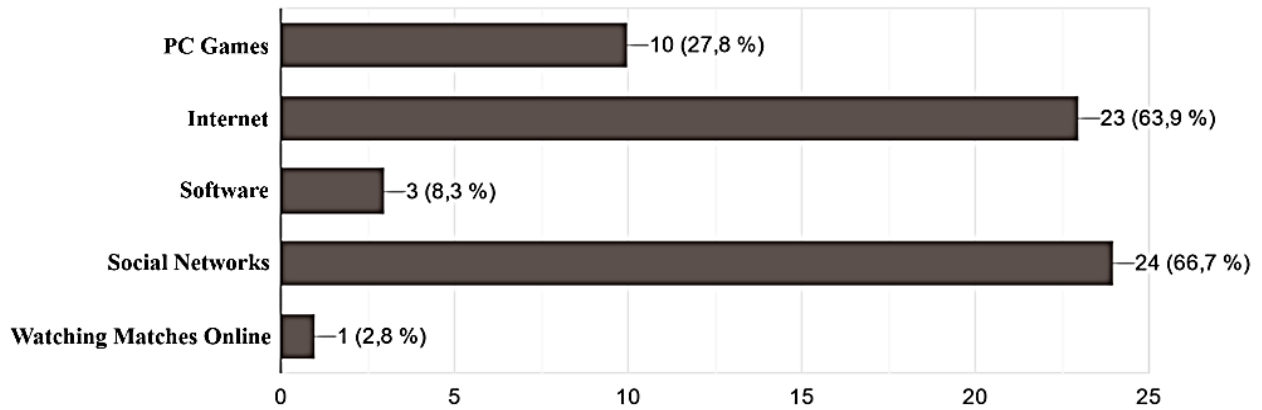


Fig. 5 Answers to the question: Do you spend most of your free time in virtual space? (multiple answers were possible)

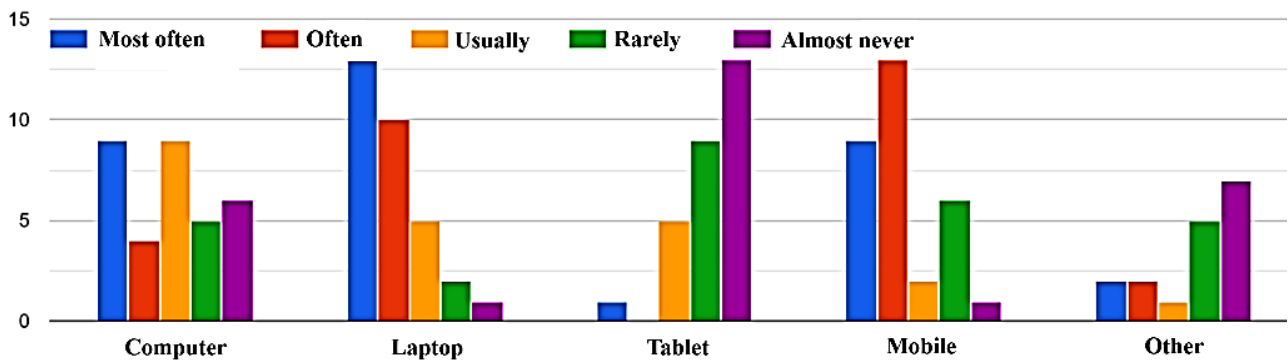


Fig. 6 Answers to the question: Please indicate in order (1-Mostly, 2-Often, 3-Sometimes, 4-Rarely, 5-Almost never) which tools you use most often for learning activities during online education.

The results of our research show that during the COVID-19 pandemic, respondents used laptops primarily for studying. Desktop computers and mobile phones were in second place, with approximately the same number of responses. This suggests that respondents preferred mobile devices such as laptops and mobile phones among technical devices.

In terms of physiological health problems, respondents most frequently reported headaches, fatigue, as well as vision problems and back pain. In terms of mental health effects, if any occurred, if any, respondents most commonly reported feelings of loneliness and anxiety about the future. Stress was the least common.

According to the study by Chakladar et al. [13], the overall rate of feelings of depression and anxiety during the COVID-19 pandemic was about two times higher than the average prevalence of depression or depressive symptoms in medical students, according to a previous meta-analysis provided by Rotenstein et al. [14].

The high transmission and mortality rates of COVID-19 have negatively affected the mental health of many healthcare workers [15]. University students are also at high risk of various mental health problems, such as anxiety, depression, and substance use, when faced with stressful situations or crises. However, in the study by Soliman et al. [16], most participants were moderately stressed, with a mean PSS score of 18.76. In a similar finding reported by Son et al [17], the mean PSS score for 195 university students during the COVID-19 pandemic in the USA was 18.8.

Regarding the positive aspects related to study materials and studying, the survey revealed that respondents were satisfied with the availability of study materials. In addition, respondents cited improved access to education as a positive aspect. This was probably due to the ability to study from home. Acquiring greater competence in using computers and the Internet was also an important benefit. As part of the research, we also asked respondents about their methods of relaxation during the COVID-19 pandemic. As anticipated, respondents most often spent their free time on social networks and the internet. Interestingly, computer games were only mentioned in the third place.

In the 2019/2020 academic year, online education was evaluated by 226 students of the J. Selye University in Komárno [18-20]. Knowledge of COVID-19 among biology and non-biology university students was assessed. The results showed that 39% of the students were happy with the transition to online education. However, almost as many students 34% stated that they were afraid of online education. Of the educational interfaces provided by the university, 28.8% used the possibility of live online lessons, 14.8% also used the web portal provided (Moodle, Cloude, Canvas), 9.1% of the students also used the help of internet links, 12% used all the possible options and their combination and 35.1% of the responding students also communicated intensively via email. 35% of students felt that the main significant advantage of online education was that they did not have to travel, and 18% could better schedule the time they needed to study [18].

IV. CONCLUSION

It is undeniable that COVID-19 has had an impact in both the social and educational spheres. The results of the questionnaire showed that respondents noticed an increased availability of study materials. This is logical, as the COVID-19 period necessitated the development of online study resources. In addition, respondents highlighted improved access to education as a positive aspect. This was probably due to the fact that they could participate in their studies more conveniently from home. This form of learning was probably more acceptable to the respondents than physically travelling to school and attending in-person classes.

However, along with these positive aspects, respondents also reported some negative aspects, particularly the physiological and mental health problems mentioned earlier. Despite this, respondents spent their free time using social networks and the internet. We assume that this was because it allowed them to stay in real contact with classmates, friends, or family members.

Finally, it should be mentioned that the questionnaire survey was carried out completely anonymously and with the consent of the respondents.

ACKNOWLEDGEMENT

This publication has been produced 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] Prakash, V. 2024. Investigating the effect of a software intervention based on a theoretical behavior framework to encourage ergonomic compliance during computing device usage. DOI: 10.1016/B978-0-443-22038-8.00011-8.
- [2] Tolstykh, Olesya. 2024. Cognitive load management through ergonomic design in a digital learning environment. In: IX Annual International Conference "EAP / ESP / EMI IN THE CONTEXT OF HIGHER EDUCATION" National University of Science and Technology "MISIS" At: Moscow.
- [3] Tolstykh, Olesya. 2023. Влияние цифровой образовательной среды на когнитивную нагрузку студентов. In: ПОЗНАНИЕ И ДЕЯТЕЛЬНОСТЬ: ОТ ПРОШЛОГО К НАСТОЯЩЕМУ Материалы V Всероссийской научной конференции. Омск, 2023 At: Омский государственный педагогический университет.
- [4] Robertson, M. 2011. Ergonomics and Health Aspects of Work with Computers. In: International Conference, EHAWC 2011, Held as Part of HCI International 2011, Orlando, FL, USA, July 9-14, 2011. Proceedings. 10.1007/978-3-642-21716-6. ISBN: 978-3-642-21715-9. DOI: 10.1007/978-3-642-21716-6.
- [5] Winnie, S.; Vivian, A.; Novia, R. 2024. Ergonomic Workspace Design to Reduce the Risk of Musculoskeletal Disorders. In: E3S Web of Conferences. 10.1051/e3sconf/202450003045.
- [6] Machaiová, H.; Krajňák, S.; Dankvá, S. L. 2022. BOZP pri práci z domu a zabezpečenie ergonómie pracoviska. In: www.ip.gov.sk.

- [7] Гозак, С.; Yelizarova, O.; Stankevych, T.V.; Parats, A.N. 2022. MAIN FACTORS OF THE NEGATIVE IMPACT OF THE COVID-19 PANDEMIC ON MENTAL HEALTH OF CHILDREN. In: Medical Science of Ukraine (MSU). 18. 74-80. DOI:10.32345/2664-4738.4.2022.11.
- [8] Striley, C.; Chaudhari, P.; Varma, D.; Cottler, L. 2021. 44191 As Food Insecurity Worsens During COVID-19, Negative Mental Health Impact on Community Members Increases. In: Journal of Clinical and Translational Science. 5. 1-2. DOI:10.1017/cts.2021.768.
- [9] Lindly, J. O.; Wahl, T.; Stotts, M. N.; Kirby, B.; Asantewaa, N. S.; Shui, M. A. 2024. Health literacy and COVID-19 pandemic impacts among adults in rural northern Arizona. In: Rural and Remote Health. 24. DOI: 10.22605/RRH9147.
- [10] Putera, M. 2024. MENTAL HEALTH IMPACTS BY ELEVATED DIGITAL SCREEN TIME DURING COVID-19 PANDEMIC. In: Journal of Psychiatry Psychology and Behavioral Research. 5. 28-31. DOI:10.21776/ub.jppbr.2024.005.02.7.
- [11] Bhagavathula, S. A.; Daglis, T.; Chattu, K. V. (2024). Temporal trends in online searches related to COVID-19 vaccine safety: A digital infodemiology study. In: Health Promotion Perspectives. 14. 304-311. DOI:10.34172/hpp.43117.
- [12] Hewawasam, H. P. K. N.; Wijesekara, P. 2024. A Bibliometric Study on the Evolution of Online Learning during COVID-19 A Bibliometric Study on the Evolution of Online Learning during COVID-19. In: Journal of Social Sciences and Humanities. 8. 19-46.
- [13] Chakladar, J.; Diomino, A.; Li, W. T.; Tsai, J. C.; Krishnan, A. R.; Zou, A. E.; Ongkeko, W. M. 2022. Medical student's perception of the covid-19 pandemic effect on their education and well-being: a cross-sectional survey in the united states. In: BMC Medical Education, 22(1). <https://doi.org/10.1186/s12909-022-03197-x>
- [14] Rotenstein, L. S.; Ramos, M. A.; Torre, M, Segal J. B.; Peluso, M. J.; Guille, C.; et al. 2016. Prevalence of Depression, Depressive Symptoms, and Suicidal Ideation Among Medical Students. In: A Systematic Review and Meta-Analysis. JAMA. 2016;316(21):2214–36.
- [15] Lai, J.; Ma, S.; Wang, Y.; Cai, Z.; Hu, J.; Wei, N.; et al. 2019. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. In: JAMA Netw Open. 2020;3:e203976. DOI:10.1001/jamanetworkopen.2020.3976.
- [16] Soliman, A.; Mabrouk, S.; Hagag, R. S.; Ghandour, A. A.; Mekhamier, H. A.; Elsherbeny, E. 2022. Stress and depression of university students in egypt during the covid-19 pandemic. <https://doi.org/10.21203/rs.3.rs-1671313/v1>
- [17] Son, C.; Hegde, S.; Smith, A.; Wang, X.; Sasangohar, F. 2020. Effects of COVID-19 on college students' mental health in the United States. In: interview survey study. J Med Internet Res. 2020;22:e21279. DOI:10.2196/21279.
- [18] Szencziová, I.; Kántor, K.; Mészárosné Darvay, S. Zs.; Tóthová Tarová, E.; Nagy, M.; Fehér, Z.; Balázs, P. 2022. Az online oktatás bevezetése és hatékonysága a Selye János Egyetemen a Covid-19 pandémia első hulláma után. In: AJ Ambrus, D. Borbélyová, & Š. Gubo (Eds.), *13. medzinárodná konferencia Univerzity J. Selyeho - Sekcie pedagogiky a informatiky* (str. 147. <https://doi.org/10.36007/4133,2022,147>
- [19] Tóthová Tarová, E.; Szarka, K.; Szencziová, I.; Mészárosné Darvay, S. Zs.; Fehér, Z.; Jaruska, L.; Nagy, M.; Balázs, P. 2021. Knowledge about COVID-19 among biology and nonbiology university students in the Faculty of Education of J. Selye University in Slovakia. In: ICERI 2021 Proceedings: 14th annual International Conference of Education, Research and Innovation / Gómez, Chova L.; López Martínez, Agustín; Candel Torres, Ignacio. – 1. vyd. – Valencia (Španielsko) : IATED, 2021. – ISBN 978-84-09-34549-6. – ISSN 2340-1095, s. 852-860. DOI:10.21125/iceri.2021.0260.
- [20] Szencziová, I.; Tóthová Tarová, E.; Mészárosné Darvay, S. Zs.; Nagy, M.; Balázs, P.; Fehér, Z. 2023. Modern online Teaching Techniques and their Effect on Students in Higher Education During the Second Wave of the Covid-19 Pandemic at J. Selye University in Slovakia. In: INTED2023: Conference Proceedings / Chova, Luis Gómez; González Martínez, Chelo; Lees, Joanna. – 1. vyd. – Barcelona (Španielsko) : IATED, 2023. – (INTED Proceedings, ISSN 2340-1079). – ISBN 978-84-09-49026-4. – ISSN 2340-1079, s. 5801-5807.