Characteristics of the submitted research/ artistic/other output

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Surname awarded to the assessed person	Gunčaga
Name awarded to the assessed person	Ján
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Area of assessment	Učiteľstvo a pedagogické vedy/ Teaching and pedagogical sciences
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Annotation of the output in English	Education is a constantly evolving field that encompasses various approaches to teaching and learning. In our paper, we focused on qualitative research conducted with future primary level teachers using a STEAM (Science, Technology, Engineering, Arts and Mathematics) approach. The research involved classroom observation, analysis of the student work, and obtaining interpretations from the students via report protocols and focused interviews. We examined the students' learning and problem-solving strategies within STEAM-based activities as well as their perspectives on its use in primary education. Students participated in the research activity in two stages. In the first stage, further referred to as Activity 1, they followed a predetermined algorithm, instructions to construct an electronic device. The instructions for this device were developed to serve as a resource for primary education and to prepare the students for the second stage. In the second stage, further known as Activity 2, the students were tasked with creating a new electronic device together with providing the instructions. The new device was required to have a practical application. Following the completion of these activities, we collected and analyzed the procedural reflections and didactic interpretations from students. Within these interpretations, we also sought their opinions on how STEAM projects like these could help develop various aspects of STEAM competencies in children such as technical skills and knowledge, algorithmic thinking, and device architecture as well as mathematical and scientific thinking.
Characteristics of the output's impact on socio-economic practice	Implementing innovative approaches in primary STEM education fosters critical thinking and technical skills among students. This enhances their interest in technical and scientific disciplines, potentially leading to a greater number of professionals in these fields. Such a trend contributes to societal innovation and economic growth.
Characteristics of the output and related activities' impact on the educational process	Implementing innovative approaches in primary STEM education, such as integrating technical aids and project-based learning, positively impacts the educational process. These methods foster the development of critical thinking, creativity, and problem-solving skills among students, enhancing their motivation and interest in technical and scientific disciplines. Such an approach can lead to an increased number of students pursuing careers in STEM fields, essential for innovation and economic growth.
Area of assessment	Učiteľstvo a pedagogické vedy/teaching and pedagogical sciencestion
Category of the research/ artistic/other output	scientific output
Year of publication of the research/artistic/other output	2022
ID of the record in the Central Registry of Publication Activity (CRPA) or the Central Registry of Artistic Activity (CRAA)	1022429
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Annotation of the output in English	The rapid changes in information and communication technology (ICT), the increasing availability of processing power, and the complexity of mathematical software demand a radical re-thinking of science, technology, engineering, arts, and mathematics (STEAM), as well as mathematics education. In the transition to technology-based classrooms, the constant use of educational software is a requirement for sustainable STEAM and mathematics education. This software supports a collaborative and actionable learning environment, develops 21st-century skills, and promotes the adoption of active and innovative methodologies. This paper focuses on learning and teaching mathematics and analyses the role and utility of ICT tools in education as computer algebra systems (CAS) and dynamic geometry systems (DGS) in implementing active and innovative teaching methodologies related to sustainable STEAM education. Likewise, it highlights the necessity for learners to have extensive knowledge of mathematical theory, an essential asset to ensure the reliable and effective use of mathematical software. Through a practical experiment, this study aims to highlight that a mixed teaching method can significantly improve the sustainability of math knowledge. The outcomes of the paper should offer educators and learners new elements of active strategies and innovative learning models that can be immediately applied in education.
List of maximum 5 most significant citations corresponding to the output	[o1] 2023- Peng, Ran; Razak, Rafiza Abdul; Halili, Siti Hajar: Factors influencing in-service teachers' technology integration model : Innovative strategies for educational technology SCIE ; WOS CC ; SCO In: PLoS One [electronic document] . – San Francisco (USA) : Public Library of Science. – ISSN (online) 1932-6203. – Roč. 18, č. 8 (2023), ar. no. e0286112, s. [1-19] [online] [o1] 2024-Ariani, Yetti; Suparman, Suparman; Helsa, Yullys; Zainil, Melva; Rahmatina, Rahmatina: ICT-based or-assisted mathematics learning and numerical literacy : a systematic review and meta-analysis. – SCO In: International Journal of Information and Education Technology [textový dokument (print)] . – Singapur (Singapur) : IACSIT Press. – ISSN 2010-3689. – Roč. 14, č. 3 (2024), s. 382-397 [print form]
Characteristics of the output's impact on socio-economic practice	The rapid changes in information and communication technology (ICT), the increasing availability of processing power, and the complexity of mathematical software demand a radical re-thinking of science, technology, engineering, arts, and mathematics (STEAM), as well as mathematics education. In the transition to technology-based classrooms, the constant use of educational software is a requirement for sustainable STEAM and mathematics education. This software supports a collaborative and actionable learning environment, develops 21st-century skills, and promotes the adoption of active and innovative methodologies. This paper focuses on learning and teaching mathematics and analyses the role and utility of ICT tools in education as computer algebra systems (CAS) and dynamic geometry systems (DGS) in implementing active and innovative teaching methodologies related to sustainable STEAM education, which belongs to the 21st Century Skills.
Characteristics of the output and related activities' impact on the educational process	The article provides the doctoral student with an overview of the rapid changes in information and communication technology (ICT), the increasing availability of processing power, and the complexity of mathematical software demand a radical re-thinking of science, technology, engineering, arts, and mathematics (STEAM), as well as mathematics education. In the transition to technology-based classrooms, the constant use of educational software is a requirement for sustainable STEAM and mathematics education. This software supports a collaborative and actionable learning environment, develops 21st-century skills, and promotes the adoption of active and innovative methodologies. This paper focuses on learning and teaching mathematics and analyses the role and utility of ICT tools. Likewise, it highlights the necessity for learners to have extensive knowledge of mathematical theory, an essential asset to ensure the reliable and effective use of mathematical software. Through a practical experiment, this study aims to highlight that a mixed teaching method can significantly improve the sustainability of math knowledge.
Area of assessment	Učiteľstvo a pedagogické vedy/teaching and pedagogical sciences
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Year of publication of the research/artistic/other output	2022
ID of the record in the Central Registry of Publication Activity (CRPA) or the Central Registry of Artistic Activity (CRAA)	1036118
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Annotation of the output in English	2019 marked the two-hundredth anniversary of elementary-level teacher training for the German minority in Hungary. A systemic review of regulations, laws and curricula enable an examination of the changes in teacher training institutions, including the language of instruction in teacher training, beginning from the period of the Kingdom of Hungary to modern-day Hungary. Important stage in institutionalization of teacher training were the establishment of Teacher Institutes in Spišská Kapitula (1819) and Eger (1828) by bishop Johann Ladislaus Pyrker (1772-1847). The most important historical sources of this study, which will be examined in this qualitative research analysis, are curricula, educational laws and regulations as well as textbooks and timetables, in addition to the review of related publications. An in-depth look of the documents makes it possible to follow the continuously changing attitudes toward minority teacher training throughout the different epochs of Hungarian and Slovakian education.
Characteristics of the output's impact on socio-economic practice	2019 marked the two-hundredth anniversary of elementary-level teacher training for the German minority in Hungary. A systemic review of regulations, laws and curricula enable an examination of the changes in teacher training institutions, including the language of instruction in teacher training, beginning from the period of the Kingdom of Hungary, in which Slovakia was an part, to modern-day Slovakia. Important stage in institutionalization of teacher training were the establishment of Teacher Institutes in Spišská Kapitula (1819) and Eger (1828) by bishop Johann Ladislaus Pyrker (1772-1847). The most important historical sources of this study, which will be examined in this qualitative research analysis, are curricula, educational laws and regulations as well as textbooks and timetables, in addition to the review of related publications. An in-depth look of the documents makes it possible to follow the continuously changing attitudes toward minority teacher training throughout the different epochs of Hungarian and Slovakian education. It was the time of the establishing of the teacher training study at university level, which is inspirative for nowadays transformation processes.
Characteristics of the output and related activities' impact on the educational process	The article provides an overview about of the establishing of the teacher training study at university level, because the year 2019 is marked as the year of the two-hundredth anniversary of elementary-level teacher training for the German minority in Hungary. A systemic review of regulations, laws and curricula enable an examination of the changes in teacher training institutions, including the language of instruction in teacher training, beginning from the period of the Kingdom of Hungary, in which Slovakia was a part, to modern-day Slovakia. Important stage in institutionalization of teacher training were the establishment of Teacher Institutes in Spišská Kapitula (1819) and Eger (1828) by bishop Johann Ladislaus Pyrker (1772-1847). The most important historical sources of this study, which will be examined in this qualitative research analysis, are curricula, educational laws and regulations as well as textbooks and timetables, in addition to the review of related publications. An in-depth look of the documents makes it possible to follow the continuously changing attitudes toward minority teacher training throughout the different epochs of Hungarian and Slovakian education. The student is supported, in the field, that he/she is able to acquire new knowledge and information, apply and creatively use in his/her own research.
Area of assessment	Učiteľstvo a pedagogické vedy/teaching and pedagogical sciences
Category of the research/ artistic/other output	scientific output
Year of publication of the research/artistic/other output	2022

ID of the record in the Central Registry of Publication Activity (CRPA) or the Central Registry of Artistic Activity (CRAA)	512424
Hyperlink to the record in CRPA or CRAA	https://app.crepc.sk/?fn=detailBiblioFormChildGDERR&sid=E3A9CAEA6873959EB70A531D4E&seo=detail-%C4%8Cl%C3%A1nok

Annotation of the output in English	The article examines challenges faced by students at the University of Ostrava, Comenius University in Bratislava, and Al-Farabi Kazakh National University during the COVID-19 pandemic, with minimal prior experience in online teaching. Through qualitative pedagogical research, interviews with selected students revealed their perspectives on online learning, focusing on its positive and negative aspects, social and personal impacts, and technical challenges. Key difficulties included limited social interaction, Internet connectivity issues, and adaptations to online lectures and exams.This small-scale study aims to provide insights for future research on the pandemic's impact on university education and to help educational providers address potential issues when implementing online learning environments. The students' responses are categorized to highlight recurring themes, offering a foundation for further investigation into improving online education practices.

List of maximum 5 most significant citations corresponding to the output	(o1) Mu, E., Florek-Paszkowska, A., & Pereyra-Rojas, M. (2022). Development of a framework to assess challenges to virtual education in an emergency remote teaching environment: A developing country student perspective—the case of Peru. Education Sciences, 12(10), Article 704, 1–35. https://doi.org/10.3390/educsci12100704 (o2) Pop, M.-D., Pugna, A. P., Cretu, V.-I., & Potra, S. A. (2022). Two years of hybrid education in Romania: A comparative overview of the students' expectations for the online educational platforms. Sustainability, 14(21), 1–27. https://doi.org/10.3390/su142114241 (o3) Nurdauletova, B., Aimukhambet, Z., Saparbaikyzy, S., Kamarova, N., & Tolegenuly, B. (2023). The effect of traditional and online learning approaches on the survival and transmission of the oral culture, students' attitude and national values. International Journal of Education in Mathematics, Science and Technology, 11(1), 133–155. https://doi.org/10.46328/ijemst.2922 (o4) Peng, R., Wang, S., & Liu, N. (2024). Factors influencing Chinese EFL students' online learning anxiety in the post-COVID-19 era. Heliyon, 10(4), Article e26112, 1–12. https://doi.org/10.1016/j.heliyon.2024.e26112 (o5) Mcmanus, R., Logan, A., Wilders, D., Pennycook, C., Vergara, D., & Khine, M. S. (2024). "A world of possibilities": The future of technology in higher education, insights from the COVID-19 experience. Education Sciences, 14(1), Article 63, 1–24. https://doi.org/10.3390/educsci14010063
Characteristics of the output's impact on socio-economic practice	The study identified positive and negative aspects of online teaching, highlighting issues such as lack of social contact, technical difficulties with internet connectivity, and challenges related to organizing lectures and exams in the online environment. These factors significantly impacted the personal and social lives of students, as well as their academic performance. The study's findings can serve as a basis for further research in education and help educational institutions anticipate and address potential problems when implementing online learning environments. The results point to the need for improving technical infrastructure, supporting social interactions, and adapting teaching methods for the online environment, which can contribute to more effective and inclusive education in the future.
Characteristics of the output and related activities' impact on the educational process	The study examines the impact of emergency remote teaching on students during the COVID-19 pandemic. Through questionnaires, data were collected from students at universities in Slovakia, the Czech Republic, and Kazakhstan, focusing on their experiences, challenges, and satisfaction with online education. The findings indicate that students faced technical issues, a lack of interaction with instructors and peers, as well as decreased motivation and concentration during online studies. Despite these obstacles, some appreciated the flexibility and accessibility of digital resources. The study highlights the need to improve technical infrastructure, provide support for students, and offer training for instructors in online pedagogy to enhance the effectiveness and quality of distance education in the future.
Area of assessment	Učiteľstvo a pedagogické vedy/Teaching pedagogical science
Category of the research/ artistic/other output	scientific output
Year of publication of the research/artistic/other output	2020
ID of the record in the Central Registry of Publication Activity (CRPA) or the Central Registry of Artistic Activity (CRAA)	227629
Hyperlink to the record in CRPA or CRAA	https://app.crepc.sk/?fn=detailBiblioForm&sid=B45D5857F37AF061AF5B8C4ED3

Annotation of the output in English	The overall aim of education is to train proactive, motivated, and independent citizens to face and overcome continuous challenges. Critical thinking—finding solutions to problems—is of primary importance in the 21st century to handle challenging situations and deal with obstacles in careers. A critical literature review approach was used to assess, critique, synthesizes, and expand the theoretical foundation of the topic. Teaching mathematical problem-solving is an efficient way to develop 21st-century skills and to give cross-curricular experiences with real-world meaning to learners. Concrete examples were presented to prove that Pólya’s heuristic could be used in a broader context to help learners acquire the modern skills needed to succeed in their careers. By including in the learning process and practicing specific methods for solving mathematical problems, students could learn a way of thinking to approach and solve problems successfully in a broader context in life. The paper’s outcome provides teachers and educators with methods, learning models, and strategies for developing 21st-century skills in students at all levels during classroom activities.
List of maximum 5 most significant citations corresponding to the output	[o1] 2020 - Sanchez-Barbero, Beatriz - Chamoso, Jose Maria - Vicente, Santiago - Rosales, Javier - Analysis of teacher-student interaction in the joint solving of non-routine problems in primary education classrooms. - In: Sustainability, roč. 12, č. 24, 2020 ; art. no. 10428 ; SSCI ; SCOPUS [o1] 2021 - Calder, Nigel - Jafri, Mairaj - Guo, Lina - Mathematics education students’ experiences during lockdown. Managing collaboration in elearning. - In: Education Sciences, roč. 11, č. 4, 2021 ; art. no. 191 ; ESCI ; SCOPUS [o1] 2021 - Terekhova, Natalya V. - Zubova, Elena A. - The formation of students' mathematical competence through competence-oriented tasks. - In: Apuntes Universitarios, roč. 11, č. 4, 2021 ; s. 310-322 ; ESCI [o1] 2021 - Caballero-Carrasco, Ana - Melo-Nino, Lina - Soto-Ardila, Luis M. - Casas-Garcia, Luis M. - Efficacy of an emotional and cognitive regulation programme for mathematics problems solving. - In: Sustainability, roč. 13, č. 21, 2021, art. no. 11795 ; s. 8, 12, 13 ; SSCI ; SCOPUS
Characteristics of the output's impact on socio-economic practice	The overall aim of education is to train proactive, motivated, and independent citizens to face and overcome continuous challenges. Critical thinking—finding solutions to problems—is of primary importance in the 21st century to handle challenging situations and deal with obstacles in careers. Teaching mathematical problem-solving is an efficient way to develop 21st-century skills and to give cross-curricular experiences with real-world meaning to learners. Concrete examples were presented to prove that Pólya’s heuristic could be used in a broader context to help learners acquire the modern skills needed to succeed in their careers. By including in the learning process and practicing specific methods for solving mathematical problems, students could learn a way of thinking to approach and solve problems successfully in a broader context in life. The paper’s outcome provides teachers and educators with methods, learning models, and strategies for developing 21st-century skills in students at all levels during classroom activities.
Characteristics of the output and related activities' impact on the educational process	The study provides a detailed overview and analysis of the steps of Poly's problem-solving strategy and compares it with other important international theories. It also contains specific topics for experimental teaching of mathematics, including the primary level, especially in the field of discovery and problem-based teaching methods. The given examples in the field of school mathematics were mainly devoted to the concept of natural number and numerical operations - addition, subtraction, multiplication and division. Students' ability to critically analyze, re-evaluate scientific information and its usage in theory and practical applications related to the topic of their own research is supported.