

Characteristics of the submitted research/ artistic/other output

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Document type: Characteristics of the submitted research/ artistic/other output
The name of the university Comenius University Bratislava
The seat of the university Šafárikovo námestie 6, 818 06 Bratislava

OCA1. - Surname awarded to the assessed person	Žilková
OCA2. - Name awarded to the assessed person	Katarína
OCA3. - Degrees awarded to the assessed person	prof., doc., PaedDr., Mgr., PhD.
OCA4. - Hyperlink to the entry of the person in the Register of university staff	https://www.portalvs.sk/regzam/detail/4985

1st evaluated output

OCA5.1 - Area of assessment
 Preschool and Elementary Pedagogy (1st and 3rd degree), Teaching for Primary Education (2nd degree), Teacher Education for Primary Schools (integrated 1st and 2nd degree)

OCA6.1 - Category of the research/ artistic/other output
 scientific output

OCA7.1 - Year of publication of the research/artistic/other output
 2025

OCA8.1 - ID of the record in the Central Registry of Publication Activity (CRPA) or the Central Registry of Artistic Activity (CRAA)
 ID = 1424288

OCA9.1 - Hyperlink to the record in CRPA or CRAA
<https://app.crep.sk/?fn=detailBiblioFormChildE1504S&sid=C7DA6C94B65F4BF8486E53FAED0E&seo=CREP%C4%8C-detail-%C4%8C%C3%A1nok>

Title of the publication to which the hyperlink points
 Analysis of the level of geometric thinking of pupils in Slovakia

Suggested output quality level
 A+

OCA10.1 - Hyperlink to the record in another publicly accessible register, catalogue of research/ artistic/other outputs
<https://www.webofscience.com/wos/woscc/full-record/WOS:001559604800001>

Title of the publication to which the hyperlink points
 Analysis of the level of geometric thinking of pupils in Slovakia

Suggested output quality level
 A+

OCA13.1 - Hyperlink to the webpage where the output is available (full text, other documentation, etc.)
<https://www.mdpi.com/2227-7102/15/8/1020>

OCA18.1 - Characteristics of the output's impact on socio-economic practice

This study is focused on the analysis of the level of geometric thinking of 15-year-old Slovak pupils in relation to the difficulty of geometric problems, their gender, and their assessment in mathematics. The main aim of this study was to determine the level of geometric thinking of 15-year-old Slovak pupils, to examine the relationship between their mathematics assessment and the level of geometric thinking, and to find out gender differences in relation to the different levels of geometric thinking. The van Hiele test was adapted and applied to a representative sample of 15-year-old Slovak pupils to determine the level of geometric thinking. We used reliability/item analysis. The reliability of the knowledge test (after adaptation) was assessed using Cronbach's alpha (0.64). The validity of the test was demonstrated by the correlation of the Usiskin test results with pupils' mathematics grades (Goodman–Kruskal's gamma, $p < 0.05$). Statistical analysis showed that 15-year-old Slovak pupils achieve different levels of geometric thinking depending on the difficulty of the tasks. Pupil achievement declined significantly as task difficulty increased. Pupils had the greatest difficulty with tasks classified as the fifth (rigorous) and partly the fourth (deductive) van Hiele level, which require a deep understanding of geometric systems and the ability to prove logically. The lower-level tasks (visualization, analysis, and abstraction) were able to differentiate students according to different levels of geometric thinking. The results showed a significant positive relationship (Goodman–Kruskal's gamma, $p < 0.05$) between the pupils' overall mathematics scores (expressed as a grade) and their level of geometric thinking as detected by the van Hiele test. The analysis of gender differences (Duncan's test, $p < 0.05$) showed that in the less challenging tasks, corresponding to the first three van Hiele levels (visualization, analysis, abstraction), girls performed statistically significantly better than boys. In the more challenging tasks, classified as the fourth (deductive) and fifth (rigorous) levels of geometric thinking, there were no statistically significant differences between boys and girls. In the more challenging tasks, the performances of both genders were comparable. The presented study identifies significant deficits in the development of higher levels of geometric thinking among 15-year-old Slovak pupils. These findings strongly imply the necessity for the transformation of the curriculum, textbooks, and didactic approaches with the aim of systematically developing deductive and rigorous reasoning, while it is essential to account for the demonstrated gender differences in performance.

OCA19.1 - Characteristics of the output and related activities' impact on the educational process

This study is focused on the analysis of the level of geometric thinking of 15-year-old Slovak pupils in relation to the difficulty of geometric problems, their gender, and their assessment in mathematics. The main aim of this study was to determine the level of geometric thinking of 15-year-old Slovak pupils, to examine the relationship between their mathematics assessment and the level of geometric thinking, and to find out gender differences in relation to the different levels of geometric thinking. The van Hiele test was adapted and applied to a representative sample of 15-year-old Slovak pupils to determine the level of geometric thinking. We used reliability/item analysis. The reliability of the knowledge test (after adaptation) was assessed using Cronbach's alpha (0.64). The validity of the test was demonstrated by the correlation of the Usiskin test results with pupils' mathematics grades (Goodman–Kruskal's gamma, $p < 0.05$). Statistical analysis showed that 15-year-old Slovak pupils achieve different levels of geometric thinking depending on the difficulty of the tasks. Pupil achievement declined significantly as task difficulty increased. Pupils had the greatest difficulty with tasks classified as the fifth (rigorous) and partly the fourth (deductive) van Hiele level, which require a deep understanding of geometric systems and the ability to prove logically. The lower-level tasks (visualization, analysis, and abstraction) were able to differentiate students according to different levels of geometric thinking. The results showed a significant positive relationship (Goodman–Kruskal's gamma, $p < 0.05$) between the pupils' overall mathematics scores (expressed as a grade) and their level of geometric thinking as detected by the van Hiele test. The analysis of gender differences (Duncan's test, $p < 0.05$) showed that in the less challenging tasks, corresponding to the first three van Hiele levels (visualization, analysis, abstraction), girls performed statistically significantly better than boys. In the more challenging tasks, classified as the fourth (deductive) and fifth (rigorous) levels of geometric thinking, there were no statistically significant differences between boys and girls. In the more challenging tasks, the performances of both genders were comparable. The presented study identifies significant deficits in the development of higher levels of geometric thinking among 15-year-old Slovak pupils. These findings strongly imply the necessity for the transformation of the curriculum, textbooks, and didactic approaches with the aim of systematically developing deductive and rigorous reasoning, while it is essential to account for the demonstrated gender differences in performance.

2nd evaluated output

OCA5.2 - Area of assessment

Preschool and Elementary Pedagogy (1st and 3rd degree), Teaching for Primary Education (2nd degree), Teacher Education for Primary Schools (integrated 1st and 2nd degree)

OCA6.2 - Category of the research/ artistic/other output

scientific output

OCA7.2 - Year of publication of the research/artistic/other output

2025

OCA8.2 - ID of the record in the Central Registry of Publication Activity (CRPA) or the Central Registry of Artistic Activity (CRAA)

ID: 1304215

OCA9.2 - Hyperlink to the record in CRPA or CRAA

<https://app.crepc.sk/?fn=detailBiblioFormChildM157LG&sid=9B87F0FC7A1D7917BBA3A202251C&seo=CREP%C4%8C-detail-%C4%8C%C3%A1nok>

OCA13.2 - Hyperlink to the webpage where the output is available (full text, other documentation, etc.)

https://www.researchgate.net/publication/332548753_Visualisation_as_a_Method_for_the_Development_of_the_Term_Rectangle_for_Pupils_in_Primary_School

OCA16.2 - Annotation of the output in English

The purpose of this study was to predict an academic achievement model based on cardiorespiratory fitness (CRF) and body mass index (BMI) in ninth-graders. The study sample included 6 530 adolescents from 341 public schools in Slovakia. Criterion-referenced competency tests measuring academic performance in mathematics and mother language (Slovak), CRF, and BMI were assessed in the academic year 2022–2023. The results from the Random Forest Regression (RFR) machine learning algorithm suggest that adolescents who meet the international CRF and BMI criterion-referenced standards have a higher probability of getting a higher academic achievement score than unfit students with overweight or obesity. The chances of achieving the highest level of academic performance rose by 165% in mathematics and by 484% in mother language for boys who were fit and of normal weight compared to unfit boys with obesity. Unfit boys with obesity and unfit overweight girls had significantly lower odds of having the highest level of academic achievement compared to fit and normal-weight adolescents in mathematics (OR = 0.38; 95% CI, 0.20–0.71; $p = 0.003$; OR = 0.32; 95% CI, 0.18–0.55; $p < 0.001$) and mother language, respectively (OR = 0.17; 95% CI, 0.09–0.34; $p < 0.001$; OR = 0.17; 95% CI, 0.08–0.38; $p < 0.001$). Our results suggest that CRF is a significant predictor, with fit and normal-weight boys showing higher odds of better academic performance, but the model's modest predictive power suggests other factors also play a role.

3rd evaluated output

OCA5.3 - Area of assessment

Preschool and Elementary Pedagogy (1st and 3rd degree), Teaching for Primary Education (2nd degree), Teacher Education for Primary Schools (integrated 1st and 2nd degree)

OCA6.3 - Category of the research/ artistic/other output

scientific output

OCA7.3 - Year of publication of the research/artistic/other output

2023

OCA8.3 - ID of the record in the Central Registry of Publication Activity (CRPA) or the Central Registry of Artistic Activity (CRAA)

ID = 442205

OCA9.3 - Hyperlink to the record in CRPA or CRAA

<https://app.crepc.sk/?fn=detailBiblioFormChildAA947&sid=449A78BFE483A8EAFDF249C553&seo=CREP%C4%8C-detail-kapitola-/pr%C3%ADspevok>

Title of the publication to which the hyperlink points

The impact of online education on the student's success in the course "teaching geometry in primary education"

Suggested output quality level

A+

OCA17.3 - List of maximum 5 most significant citations corresponding to the output

O[1]. (SCOPUS:2-s2.0-85161509284) 1048175: Online Learning in Teaching Initial Math Education / Pokorný, Milan [Autor, 100%] ; International Conference on Recent Innovations in Computing, 5 [13.05.2022-14.05.2022, Jammu, India]. – [recenzované]. – DOI 10.1007/978-981-19-9876-8_50. – SCO In: Proceedings of International Conference on Recent Innovations in Computing (Volume 1) [textový dokument (print)] [elektronický dokument] : ICRIC 2022 / Singh, Yashwant [Zostavovateľ, editor] ; Singh, Pradeep Kumar [Zostavovateľ, editor] ; Kolekar, Maheshkumar H. [Zostavovateľ, editor] ; Kar, Arpan Kumar [Zostavovateľ, editor] ; Gonçalves, Paulo J. Sequeira [Zostavovateľ, editor]. – 1. vyd. – Singapore (Singapur) : Springer Nature, 2023. – (Lecture Notes in Electrical Engineering, ISSN 1876-1100, ISSN 1876-1119 ; Volume 1001). – ISBN 978-981-19-9875-1. – ISBN (elektronické) 978-981-19-9876-8, s. 657-667 [tlačaná forma] [online]

O[1]. (Norwegian Register for Scientific Journals, Series and Publishers:Nordic List Level 1; SCOPUS:2-s2.0-85148241157) 1016841: Experience with Online Learning of Mathematics in Primary Education / Pokorný, Milan [Autor, 100%]. – [recenzované]. – DOI 10.3991/ijet.v18i02.35401. – SCO In: International Journal of Emerging Technologies in Learning [textový dokument (print)] [elektronický dokument] . – Viedeň (Rakúsko) : International Association of Online Engineering. – ISSN 1863-0383. – ISSN (online) 1868-8799. – Roč. 18, č. 2 (2023), s. 203-213 [0,75 AH] [tlačaná forma] [online]

OCA18.3 - Characteristics of the output's impact on socio-economic practice

The potential of online learning: The results of the study suggest that online learning can be an effective tool for teaching and assessing students, even in challenging subjects such as geometry. This has significant implications for the future of education, especially in the context of potential crises or the need for flexible education.

Optimization of teaching methods: The study can contribute to the optimization of teaching methods and testing. The findings can be used in the creation of curricula and the development of new educational tools.

Informative decisions: The results of the study can be useful for decision-making processes at the level of universities and educational institutions. They can help make decisions about investments in IT infrastructure and the development of online learning programs.

The future of education: The study can contribute to the debate about the future of education and how new technologies can improve the quality and accessibility of education.

OCA19.3 - Characteristics of the output and related activities' impact on the educational process

Equivalence of online and face-to-face learning: The study confirmed that online learning can be equivalent to traditional face-to-face learning, at least in terms of students' knowledge level. This opens up new possibilities for more flexible and individualized education.

Adaptability of the education system: The COVID-19 pandemic has shown that the education system is able to quickly adapt to changed conditions and use new technologies.

Development of digital competences: The transition to online teaching required both students and teachers to develop digital competences, which can have a positive impact on their future employment on the labor market.

New evaluation options: E-testing offers new options for evaluating students' knowledge, which can be more objective and effective.

4th evaluated output

OCA5.4 - Area of assessment

Preschool and Elementary Pedagogy (1st and 3rd degree), Teaching for Primary Education (2nd degree), Teacher Education for Primary Schools (integrated 1st and 2nd degree)

OCA6.4 - Category of the research/ artistic/other output

scientific output

OCA7.4 - Year of publication of the research/artistic/other output

2021

OCA8.4 - ID of the record in the Central Registry of Publication Activity (CRPA) or the Central Registry of Artistic Activity (CRAA)

ID = 512121

OCA9.4 - Hyperlink to the record in CRPA or CRAA

<https://app.crepc.sk/?fn=detailBiblioFormChildOABTR&sid=94F575F835BC0A0EB6BD90D1B3&seo=CREP%C4%8C-detail-kapitola-/pr%C3%ADspevok>

Title of the publication to which the hyperlink points

Perception of elementary geometry e-test from the perspective of future preservice primary teachers

Suggested output quality level

A

OCA17.4 - List of maximum 5 most significant citations corresponding to the output

[o1]. (SCOPUS:2-s2.0-85161509284) 1048175: Online Learning in Teaching Initial Math Education / Pokorný, Milan [Autor, 100%] ; International Conference on Recent Innovations in Computing, 5 [13.05.2022-14.05.2022, Jammu, India]. – [recenzované]. – DOI 10.1007/978-981-19-9876-8_50. – SCO In: Proceedings of International Conference on Recent Innovations in Computing (Volume 1) [textový dokument (print)] [elektronický dokument] : ICRIC 2022 / Singh, Yashwant [Zostavovateľ, editor] ; Singh, Pradeep Kumar [Zostavovateľ, editor] ; Kolekar, Maheshkumar H. [Zostavovateľ, editor] ; Kar, Arpan Kumar [Zostavovateľ, editor] ; Gonçalves, Paulo J. Sequeira [Zostavovateľ, editor]. – 1. vyd. – Singapore (Singapur) : Springer Nature, 2023. – (Lecture Notes in Electrical Engineering, ISSN 1876-1100, ISSN 1876-1119 ; Volume 1001). – ISBN 978-981-19-9875-1. – ISBN (elektronické) 978-981-19-9876-8, s. 657-667 [tlačaná forma] [online]

[o1]. (Norwegian Register for Scientific Journals, Series and Publishers:Nordic List Level 1; SCOPUS:2-s2.0-85148241157) 1016841: Experience with Online Learning of Mathematics in Primary Education / Pokorný, Milan [Autor, 100%]. – [recenzované]. – DOI 10.3991/ijet.v18i02.35401. – SCO In: International Journal of Emerging Technologies in Learning [textový dokument (print)] [elektronický dokument] . – Viedeň (Rakúsko) : International Association of Online Engineering. – ISSN 1863-0383. – ISSN (online) 1868-8799. – Roč. 18, č. 2 (2023), s. 203-213 [0,75 AH] [tlačaná forma] [online]

OCA18.4 - Characteristics of the output's impact on socio-economic practice

The study deals with erroneous geometric ideas of students of teachers for pre-primary and primary education. From the point of view of their professional training, it is important to identify erroneous geometric ideas and eliminate them so that they are not transferred to children of preschool and younger school age. Misconceptions form natural barriers in mathematics education, which make it impossible to move within other cognitive levels. This aspect is one of the potential causes of lack of interest in STEM unions, which has a negative impact on socio-economic practices. / Informative decisions for educational institutions: The results of the study provide educational institutions with valuable information about the perception of e-testing by future teachers. This information can help in deciding on the introduction and use of e-testing in the learning process. Optimization of educational processes: The study can contribute to the optimization of educational processes by identifying areas where e-testing needs to be improved. For example, if students perceive an e-test as too difficult or unfair, steps can be taken to modify it. Promotion of quality education: The study can contribute to the promotion of quality education by identifying factors that influence student stress during e-testing. These factors can be addressed to improve the overall learning experience. The future of education: The study can contribute to the debate about the future of education and how new technologies such as e-testing can improve the quality and accessibility of education.

OCA19.4 - Characteristics of the output and related activities' impact on the educational process

Quality of assessment: The findings of the study can contribute to improving the quality of student assessment. Identified problems, such as unclear assignments or technical problems, can be addressed and eliminated, increasing the reliability and validity of e-tests. Student motivation: Students' perception of e-testing can affect their motivation to learn. If students perceive e-tests as unfair or too demanding, this can lead to a decrease in their motivation. Therefore, it is important that e-tests are designed in such a way that they are understandable and fair for students. Teacher-student relationship: The study suggests that the relationship between students and teachers can influence the stress students experience during e-testing. A strong relationship with a teacher can give students more support and reduce their anxiety. Adaptability of the educational system: The study emphasizes the need for continuous adaptation of the educational system to new technologies and the needs of students. E-testing can be an effective tool.

5th evaluated output

OCA5.5 - Area of assessment

Preschool and Elementary Pedagogy (1st and 3rd degree), Teaching for Primary Education (2nd degree), Teacher Education for Primary Schools (integrated 1st and 2nd degree)

OCA6.5 - Category of the research/ artistic/other output

scientific output

OCA7.5 - Year of publication of the research/artistic/other output

2024

OCA8.5 - ID of the record in the Central Registry of Publication Activity (CRPA) or the Central Registry of Artistic Activity (CRAA)

ID: 1268745

OCA9.5 - Hyperlink to the record in CRPA or CRAA

<https://app.crepc.sk/?fn=detailBiblioFormChildQ14NT7&sid=23E35B476CDBF92DB123BEA28BDF&seo=CREP%C4%8C-detail-kapitola/-pr%C3%ADspevok>

Title of the publication to which the hyperlink points

Augmented Reality for exploring solids : a study on improving pre-service teachers

Suggested output quality level

A+

OCA13.5 - Hyperlink to the webpage where the output is available (full text, other documentation, etc.)

<https://papers.academic-conferences.org/index.php/ecel/article/view/2892>

OCA17.5 - List of maximum 5 most significant citations corresponding to the output

2024 01	(SCOPUS:2-s2.0-85218356620) 1291826: SPARC : a framework for enhancing early childhood reading through augmented reality, conversational AI, and IDC theory / Azhar, Masood [Autor, 33.334%] ; Hew, Soon Hin [Autor, 33.333%] ; Neo, Tse Kian [Autor, 33.333%] ; International Conference on TVET Excellence & Development [16.12.2024-17.12.2024, Melaka, Malajzia]. – [recenzované]. – DOI 10.1109/ICTeD62334.2024.10844644. – SCO.	In: 2024 International Conference on TVET Excellence & Development (ICTeD) [elektronický dokument] / [bez zostavovateľa] [Zostavovateľ, editor]. – 1. vyd. – Piscataway (USA) : Institute of Electrical and Electronics Engineers, 2024. – ISBN 979-8-3315-1641-3, s. 103-106 [online]
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Date of last update

02.10.2025