

Dimitrios Deslis

PhD, Mathematics Education

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Education

	University of Cambridge Faculty of Education, Jesus College Oct 2020 – Sep 2024	PhD in Mathematics Education, “Pass without corrections” supervisors: Prof. Andreas Stylianides & Prof. Mateja Jamnik PhD thesis: “ <i>Lakatos-style proving activity in primary school: A mixed-methods study to explore and support teachers’ mathematical knowledge and views</i> ”, scholarships: ESRC and Harding Distinguished Postgraduate Scholars Programme, Onassis Foundation.
	Faculty of Education, Girton College Oct 2019 – Sep 2020	MPhil- Educational Research, ‘Distinction’ , MPhil thesis: “ <i>Using examples and counterexamples to prove: Primary school teachers’ perceptions about Lakatos-style proof instruction</i> ”, scholarship: ESRC.
	Aristotle University Faculty of Education Oct 2016 – Dec 2018	MA- Didactics of Science & Mathematics, ‘Excellent, 9.75/10’ , MA thesis: “ <i>Judging the reasonableness of a computational result: 5th graders’ and adults’ capabilities and difficulties</i> ”.
	Faculty of Engineering Oct 2016 – Jul 2017	School of Electrical & Computer Engineering , attendance and successful examination in all courses of the 1st year, including: “Linear Algebra & Analytic Geometry” (10) and “Calculus” (10).
	Faculty of Education Oct 2011 – May 2015	BA- Primary Education, ‘Excellent, 8.96/10’ , BA thesis: “ <i>Equiprobable events and probability comparison in the primary school</i> ”.

Research & Teaching Experience

	Feb 2025– current	University of Crete, Greece Independent teaching of the undergraduate courses of the Faculty of Education: (1) <i>Introduction to Probability Theory and Statistics</i> , (2) <i>Alternative forms of Teaching Mathematics in Primary School</i> , (3) <i>Mathematical Games in Modern Mathematics Teaching</i> , (4) <i>Science, Technology, Engineering and Mathematics (STEM) in Education</i> , (5) <i>Applications in Educational Research</i> .
	Jul 2025– current	National and Kapodistrian University of Athens, Greece Postdoctoral Researcher: “ <i>Mathematics Education: Teacher Training and Digital Storytelling</i> ”.
	Sep 2025– Jan 2026	University of Ioannina, Greece Independent teaching of the undergraduate courses of the Faculty of Education: (1) <i>Topics in Teaching and Learning Mathematics in Primary School</i> , (2) <i>Basic Concepts of Mathematics</i> .
	Oct 2022 – Jun 2023	University of Oxford, UK Research Assistant (part-time), reporting to Professor Gabriel Stylianides. Research project topic: “ <i>Supporting secondary teachers to enhance their students’ proof competencies</i> ”.
	Sep 2016 – Jun 2019	Primary School Teacher.

Languages

English	IELTS, University of Michigan (C2 & B2)	Greek	mother tongue
German	GOEHTE-ZERTIFIKAT (B2 & B1)	Spanish	pre-intermediate (self-taught)

Recent Public Engagement & Lifelong Learning

Conference Organisation	IPC & Proceedings co-editor: ERME Topic Conference on Argumentation & Proof (Milan, 2026). TWG co-leader: CERME- Bratislava, 2027, Bolzano, 2025 & Budapest, 2023
Summer/ Winter schools & workshops	EERA summer school: Participatory Approaches in Educational Research (University of Porto, Portugal, 2023); BrEV Math: Storytelling in STEM (Free University of Bolzano, Italy, 2022); 12th Young European Researchers in Mathematics Education Summer School (Johannes Kepler University, Austria, 2022); Mythological Routes (Democritus University, Greece, 2022).
Non-formal education	Participated in 20 Erasmus+ training courses in 15 different countries on various subjects, including: critical/ logical mathematical thinking, AI, non-formal/ arts/ theatre/ digital education.

A. List of publications (with links)

25. Deslis, D., Stylianides, A. J., & Jamnik, M. (2026). Unpacking Primary Teachers' Knowledge of Counterexample Use in Lakatos-Style Proof: Insights from Dialogue-Based Focus Groups. In A. Moutsios- Rentzos et al., (Eds.) *Proceedings of MATHPIE2026: Argumentation and Proof in the Teaching and Learning of Mathematics and Interactions with Other Disciplines*. ERME and University of Milan.
24. Giakoumi, M., Moutsios-Rentzos, A., Kaskaouti, P., [Deslis, D.](#) (2026). Significant Experiences in Pre-Service Primary Teachers' Affective Relationship with Mathematics across Time: A Digital Storytelling Study. (2026). *Journal of Research in Mathematics Education*, 1-26. <https://doi.org/10.17583/redimat.19375>
23. Δεσλής, Δ., Στυλιανίδης, Α., & Jamnik, M. (2026). Γνώσεις και απόψεις δασκάλων της πρωτοβάθμιας για την αποδεικτική διερεύνηση τύπου Lakatos: προφίλ δασκάλων και δημογραφικά χαρακτηριστικά. Στο *Πρακτικά του 11ου Συνεδρίου της Ένωσης Ερευνητών Διδακτικής των Μαθηματικών*. Ηράκλειο: ΕΝΕΔΙΜ. [Deslis, D., Stylianides, A., & Jamnik, M. (2026). *Primary teachers' knowledge and views on Lakatos-style proving inquiry: Teacher profiles and demographic characteristics*. In *Proceedings of the 11th Conference of the Association of Researchers in Mathematics Education*. Heraklion: ENEDIM.]
22. Γουμενακης, Ε. & Δεσλής, Δ. (2026). «Μαθηματική Σαλάτα»: Ένα επιτραπέζιο παιχνίδι με 3d εκτυπωμένα αντικείμενα για την τάξη των μαθηματικών. Στο *Πρακτικά του 11ου Συνεδρίου της Ένωσης Ερευνητών Διδακτικής των Μαθηματικών*. Ηράκλειο: ΕΝΕΔΙΜ. [Goumenakis, E., & Deslis, D. (2026). *“Mathematical Salad”: A board game with 3D-printed objects for the mathematics classroom*. In *Proceedings of the 11th*

Conference of the Association of Researchers in Mathematics Education. Heraklion: ENEDIM.]

21. Kaskaouti, P., Moutsios-Rentzos, A., Giakoumi, M., Kyriakopoulos, G., **Deslis, D.** (2026). Pre-service primary teachers' relationship with mathematics: A content-focused digital storytelling approach. *Didactica Mathematicae*, 47. <https://doi.org/10.14708/dm.v47i0.7437>
20. Moutsios-Rentzos, A., **Deslis, D.**, Meimaris, M., Kalavasis, F. (2025). Voices Unveiled: Prospective Teachers' Mathematical Journeys through AI-Enhanced Multimodal Digital Stories. In *Proceedings of the 20th EUTIC International Conference*. Université La Manouba, Tunis.
19. **Deslis, D.**, Moutsios-Rentzos, A., Kaskaouti, P., Giakoumi, M. (2025). Digital Storytelling in Teaching and Learning Mathematics: A PRISMA Systematic Literature Review. *Education Sciences*, 15(11), 1548. <https://doi.org/10.3390/educsci15111548>
18. **Δεσλής, Δ.**, Στυλιανίδης, Α., & Jamnik, M. (2025). Μαθηματική Απόδειξη στην Πρωτοβάθμια: Η Γνώση Δασκάλων για το Περιεχόμενο, τους Μαθητές και τις Διδακτικές Πρακτικές στη Διερεύνηση τύπου Lakatos. Στο Μ. Γεωργούδη, Α. Μαλαφέκας, Σ. Μαραγκάκης, & Α. Χ. Χρονοπούλου (Επιμ.) *Πρακτικά του 40ου Πανελληνίου Συνεδρίου Μαθηματικής Παιδείας* (pp. 144-153). Ελληνική Μαθηματική Εταιρεία. [Deslis, D., Stylianides, A., & Jamnik, M. (2025). *Mathematical proof in primary education: Teachers' knowledge of content, students, and instructional practices in Lakatos-style inquiry*. In M. Georgoudi, A. Malafekas, S. Maragkakis, & A. Ch. Chronopoulou (Eds.), *Proceedings of the 40th Panhellenic Conference on Mathematical Education* (pp. 144-153). Hellenic Mathematical Society.]
17. **Deslis, D.**, Stylianides, A. J., & Jamnik, M. (2025). Examining teachers' motivational views on Lakatos-style investigation: A value-cost-expectancy approach. In M. Bosch, G. Bolondi, S. Carreira, C. Spagnolo, & M. Gaidoschik (Eds.), *Proceedings of the Fourteenth Congress of the European Society for Research in Mathematics Education (CERME14)*. Free University of Bozen-Bolzano and ERME. hal-05160948

16. Stylianides, G. J., Stylianides, A. J., Zhang, L., [Deslis, D.](#), & Seo, J. (2025) Exploring how affect-related constructs predict students' proof construction competence in algebra and geometry. In M. Bosch, G. Bolondi, S. Carreira, C. Spagnolo, & M. Gaidoschik (Eds.), Proceedings of the Fourteenth Congress of the European Society for Research in Mathematics Education (CERME14). Free University of Bozen-Bolzano and ERME. [hal-05161234](#)
15. Moutsios-Rentzos, A., Buchbinder, N., [Deslis, D.](#), Durand-Guerrier, V., & Reid, D. (2025). Introduction to Thematic Working Group 1: Argumentation and Proof. In M. Bosch, G. Bolondi, S. Carreira, C. Spagnolo, & M. Gaidoschik (Eds.), Proceedings of the Fourteenth Congress of the European Society for Research in Mathematics Education (CERME14). Free University of Bozen-Bolzano and ERME. [hal-05324839](#)
14. [Deslis, D.](#) (2024). *Lakatos-style proving activity in primary school: A mixed-methods study to explore and support teachers' mathematical knowledge and views.* (PhD thesis, University of Cambridge). <https://doi.org/10.17863/CAM.115816>
13. [Δεσλής, Δ.](#), Στυλιανίδης, Α., & Jamnik, M. (2024). Απόψεις εν ενέργεια και μελλοντικών δασκάλων της Πρωτοβάθμιας σχετικά με την ενασχόληση της σχολικής τάξης με τη μαθηματική απόδειξη στο πλαίσιο διερεύνησης τύπου Lakatos. Στο Χ. Σακονίδης (Επιμ.), *Πρακτικά του 10ου Συνεδρίου της Ένωσης Ερευνητών Διδακτικής των Μαθηματικών*. Αλεξανδρούπολη: ΕΝΕΔΙΜ. [Deslis, D., Stylianides, A., & Jamnik, M. (2024). *In-service and pre-service primary teachers' views on classroom engagement with mathematical proof within a Lakatos-style inquiry approach*. In Ch. Sakonidis (Ed.), Proceedings of the 10th Conference of the Association of Researchers in Mathematics Education. Alexandroupoli: ENEDIM.]
12. [Deslis, D.](#), Stylianides, A. J., & Jamnik, M. (2023). Primary school teachers' mathematical knowledge and views about Lakatos-style proving activity: a latent profile analysis. In P. Drijvers et al. (Eds.), Proceedings of the 13th Conference of the European Society for Research in Mathematics Education (pp. 104-111). Alfréd Rényi Institute of Mathematics and ERME. [hal-04408299](#)

11. Moutsios-Rentzos, A., Buchbinder, O., Azrou, N., Bredow, F., [Deslis, D.](#), Durand-Guerrier, V., Reid, D., & Yang, M. (2024). An introduction to TWG1: Argumentation and proof. In P. Drijvers et al. (Eds.), *Proceedings of the 13th Conference of the European Society for Research in Mathematics Education*. Budapest, Hungary: CERME13.
10. [Deslis, D.](#), & Desli, D. (2023). Does this answer make sense? Primary school students and adults judge the reasonableness of computational results in context-based and context-free mathematical tasks. *International Journal of Science and Mathematics Education*, 21, 71-91.
9. [Deslis, D.](#), Stylianides, A. J., & Jamnik, M. (2022). Two primary school teachers' mathematical knowledge of content, students, and teaching practices relevant to Lakatos-style investigation of proof tasks. In J. Hodgen et al. (Eds.), *Proceedings of the 12th Conference of the European Society for Research in Mathematics Education*. Bolzano, Italy: CERME12.
8. [Deslis, D.](#), Stylianides, A. J., & Jamnik, M. (2021). Primary school teachers' mathematical knowledge for Lakatos-style proof instruction. In M. Inprasitha, N. Chansgri, & N. Boonsena (Eds.), *Proceedings of the 44th Conference of the International Group for the Psychology of Mathematics Education* (pp. 209-217). Khon Kaen, Thailand: PME.
7. [Deslis, D.](#) (2020). *Using Examples and Counterexamples to Prove: Primary School Teachers' Perceptions about Lakatos-style Instruction of Proof*. (MPhil dissertation, University of Cambridge).
6. [Δεσλής, Δ.](#), & Δεσλή, Δ. (2019). Έλεγχος της λογικότητας ενός υπολογιστικού αποτελέσματος από παιδιά Ε' δημοτικού και ενήλικες: Ικανότητες και δυσκολίες. Στο Χ. Χρήστου (Επιμ.), *Πρακτικά του 8ου Συνεδρίου της Ένωσης Ερευνητών Διδακτικής των Μαθηματικών*. Λευκωσία: ΕΝΕΔΙΜ. [[Deslis, D.](#), & [Desli, D.](#) (2019). *Checking the reasonableness of a computational result by fifth-grade pupils and adults: Abilities and difficulties*. In Ch. Christou (Ed.), *Proceedings of the 8th Conference of the Association of Researchers in Mathematics Education*. Nicosia: ENEDIM.]

5. [Deslis, D.](#), Kosmidis, C. V., & Tenta, E. (2019). Using a non-educational mobile game for learning in biology, geography and mathematics: “Pokémon Go” as a case study. In M. Tsitouridou & A. J. Diniz, (Eds.), *Technology and Innovation in Learning, Teaching and Education “TECH-EDU 2018”: Communications in Computer and Information Science* (Vol. 993, pp. 388-396). Springer.
4. [Δεσλής, Δ.](#) (2018). Έλεγχος της λογικότητας ενός υπολογιστικού αποτελέσματος από παιδιά Ε’ δημοτικού και ενήλικες: Ικανότητες και δυσκολίες (Μεταπτυχιακή εργασία, Α.Π.Θ.). [Deslis, D. (2018). *Checking the reasonableness of a computational result by fifth-grade pupils and adults: Abilities and difficulties* (Master’s thesis, Aristotle University of Thessaloniki).]
3. [Δεσλής, Δ.](#), & Δεσλή, Δ. (2018). «Αν όλα τα παιδιά της Γης πιάναν γερά τα χέρια», θα μπορούσαν να αγκαλιάσουν τη Γη; Η επίλυση προβλήματος συναντά τη λογοτεχνία σε μια τάξη Ε’ Δημοτικού. Στο Σ. Γρόσδος & Α. Τσιβάς (Επιμ.), *Πρακτικά του συνεδρίου «Σχολείο ανοιχτό στις κοινωνικές και παιδαγωγικές προκλήσεις»* (σελ. 179-188). Θεσσαλονίκη. [Deslis, D., & Desli, D. (2018). “If all the children of the Earth held hands tightly could they hug the Earth”: Problem solving meets literature in a fifth-grade classroom. In S. Grosdos & A. Tsivas (Eds.), *Proceedings of the Conference “The School Open to Social and Pedagogical Challenges”* (pp. 179-188). Thessaloniki.]
2. Papadopoulos, I., & [Deslis, D.](#) (2015). Equiprobable events and probability comparison in a primary school classroom. In J. Novotná & H. Moraová (Eds.), *Proceedings of the International Symposium on Elementary Maths Teaching: Developing mathematical language and reasoning* (pp. 257-266). Prague, the Czech Republic: Charles University.
1. [Δεσλής, Δ.](#) (2015). Πρώιμες αντιλήψεις των μαθητών της πρωτοβάθμιας εκπαίδευσης σχετικά με την έννοια των ισοπίθανων ενδεχομένων και της σύγκρισης πιθανοτήτων. (Πτυχιακή εργασία, Α.Π.Θ.). [Deslis, D. (2015). *Primary pupils’ early conceptions of equiprobable events and probability comparison* (Bachelor’s thesis, Aristotle University of Thessaloniki).]

B. Abstracts of Publications

25. Deslis, D., Stylianides, A. J., & Jamnik, M. (2026). Unpacking Primary Teachers' Knowledge of Counterexample Use in Lakatos-Style Proof: Insights from Dialogue-Based Focus Groups. In Proceedings of *MATHPIE2026 : Argumentation and Proof in the Teaching and Learning of Mathematics and Interactions with Other Disciplines*. ERME and University of Milan.

Abstract

This study examines primary teachers' understandings of counterexamples within the MaKTeLaP framework for teaching Lakatos-style proof. Four focus groups (N=22) engaged with comic-style classroom vignettes depicting conjecture formulation, testing, refutation, and modification. Participants' discussions revealed considerable variation in counterexample-related content knowledge, ranging from the recognition that a single counterexample suffices to beliefs that multiple counterexamples are required. Understandings about students' reasoning generally reflected moderate insight. Several participants articulated sophisticated teaching strategies, often aligned with the Lakatosian approach (e.g., conjecture refinement). Findings highlight both misconceptions and promising areas of teacher understanding, underscoring the need for targeted professional learning to support the productive use of counterexamples in inquiry-based proof instruction.

24. Giakoumi, M., Moutsios-Rentzos, A., Kaskaouti, P., [Deslis, D.](#) (2026). Significant Experiences in Pre-Service Primary Teachers' Affective Relationship with Mathematics across Time: A Digital Storytelling Study. (2026). *Journal of Research in Mathematics Education*, 1-26. <https://doi.org/10.17583/redimat.19375>

Abstract

The present study aimed to address the complex issue of pre-service primary school teachers' (PSTs') affective relationship with mathematics, conceptualising it as a dynamic relationship subject to shifts and fluctuations over time. Ninety primary school PSTs from a Greek university narrated their affective relationship with mathematics through digital storytelling (DST); including the significant experiences that marked this relationship, as well as the roles, circumstances, and educational levels that contributed to its formation. Results indicated that PSTs included one or more transformative and reinforcing experiences, which, together with interactions with teachers, family members, and classmates, attendance at different educational levels, and experiences such as written tests and online learning, shaped their affective relationship with mathematics. The study concludes with a discussion of implications for mathematics education and directions for future research.

23. Δεσλής, Δ., Στυλιανίδης, Α., & Jamnik, M. (2026). Γνώσεις και απόψεις δασκάλων της πρωτοβάθμιας για την αποδεικτική διερεύνηση τύπου Lakatos: προφίλ δασκάλων και δημογραφικά χαρακτηριστικά. Στο *Πρακτικά του 11ου Συνεδρίου της Ένωσης Ερευνητών Διδακτικής των Μαθηματικών*. Ηράκλειο: ΕΝΕΔΙΜ.

Περίληψη

Η παρούσα μελέτη εστιάζει στις γνώσεις και τις απόψεις δασκάλων πρωτοβάθμιας εκπαίδευσης σχετικά με την απόδειξη, συγκεκριμένα τη Διερεύνηση τύπου Lakatos (ΔΤΛ). Οι απαντήσεις 331 συμμετεχόντων (εν ενεργεία και μελλοντικών δασκάλων) σε ερωτηματολόγια αναλύθηκαν με πολυωνυμική λογιστική παλινδρόμηση. Εντοπίστηκαν σημαντικά δημογραφικά χαρακτηριστικά που συνδέονται με τα προφίλ δασκάλων, όπως προέκυψαν μέσω ανάλυσης λανθανόντων προφίλ. Τα ευρήματα έδειξαν πως χαρακτηριστικά όπως το φύλο, η ηλικία, το ακαδημαϊκό και επαγγελματικό υπόβαθρο συνδέονται με την πιθανότητα ένταξης σε κάθε προφίλ, οδηγώντας σε προτάσεις για στοχευμένα προγράμματα προετοιμασίας.

Abstract

This study focuses on primary school teachers' knowledge and views regarding mathematical proof, specifically Lakatos-style inquiry (LSI). Questionnaire responses from 331 participants (in-service and pre-service teachers) were analysed using multinomial logistic regression. Significant demographic characteristics associated with the identified teacher profiles—derived through latent profile analysis—were identified. The findings indicate that factors such as gender, age, and academic and professional background are associated with the likelihood of belonging to each profile, leading to recommendations for targeted teacher preparation programmes.

22. Γουμενακης, Ε. & Δεσλής, Δ. (2026). «Μαθηματική Σαλάτα»: Ένα επιτραπέζιο παιχνίδι με 3d εκτυπωμένα αντικείμενα για την τάξη των μαθηματικών. Στο *Πρακτικά του 11ου Συνεδρίου της Ένωσης Ερευνητών Διδακτικής των Μαθηματικών*. Ηράκλειο: ΕΝΕΔΙΜ.

Περίληψη

Η παρούσα διδακτική πρόταση αξιοποιεί το επιτραπέζιο παιχνίδι και την εκτύπωση για την κατανόηση μαθηματικών εννοιών. Δημιουργήσαμε το παιχνίδι «Μαθηματική Σαλάτα» και το αξιοποιήσαμε σε μια Ε΄ τάξη. Το παιχνίδι υποστήριξε την κατανόηση εννοιών όπως η αναλογία και η πολλαπλή αναπαράσταση αριθμών, καθώς και την καλλιέργεια δεξιοτήτων επιχειρηματολογίας και επίλυσης προβλήματος.

Abstract

This teaching intervention makes use of board games and 3D printing to support the understanding of mathematical concepts. We designed the game “Mathematical Salad” and implemented it in a fifth-grade classroom. The game supported pupils’ understanding of concepts such as ratio and multiple representations of numbers, as well as the development of argumentation and problem-solving skills.

21. Kaskaouti, P., Moutsios-Rentzos, A., Giakoumi, M., Kyriakopoulos, G., Deslis, D. (2025). Pre-service primary teachers' relationship with mathematics: A content-focused digital storytelling approach. *Didactica Mathematicae*, 47. <https://wydawnictwa.ptm.org.pl/index.php/didactica-mathematicae/article/view/7437/6746>.

Abstract

This study examines the mathematical contents recalled by first-year pre-service primary school teachers (PSTs) in their digital stories and situates these recollections within the curriculum thematic areas of the Greek national mathematics curriculum. Using qualitative content analysis, participants' references were analysed in relation to curriculum thematic area, educational level of experience, expressed affect, and PSTs' self-identification regarding mathematical ability. The findings indicate that PSTs' affective relationships with mathematics are domain-specific and predominantly linked to curriculum thematic areas associated with primary education. Numbers, Algebra and Analysis emerged as the most frequently referenced thematic area across affective experiences, while the thematic area of Geometry, Measurement and Analytic Geometry was often associated with negative or ambivalent affect. In contrast, references to the thematic area of Stochastics were almost entirely absent. The study highlights curriculum thematic areas as meaningful units for examining affect in mathematics teacher education.

20. Moutsios-Rentzos, A., **Deslis, D.**, Meimaris, M., Kalavasis, F. (2025). Voices Unveiled: Prospective Teachers' Mathematical Journeys through AI-Enhanced Multimodal Digital Stories. In *Proceedings of the 20th EUTIC International Conference*. Université La Manouba, Tunis.

Abstract

This study examines how prospective primary teachers interpret and reframe their emotional and cognitive experiences of mathematics through AI-enhanced multimodal digital storytelling. Many entering teacher preparation programmes carry lingering anxieties, negative memories, or diminished confidence in mathematics, often rooted in their school experiences. These affective dimensions can influence their beliefs about the subject and potentially shape their future teaching practices. Situated within the REMEDIATE project, the study invites small groups of pre-service teachers to create personal digital stories in any expressive form—written narrative, video, music, illustrations, or hybrid combinations—capturing their mathematical histories and relationships with the subject. The project unfolds in five stages. Initially, teachers independently craft digital stories, followed by a focus group where stories are shared and discussed, enabling empathy, perspective-taking, and reflexive dialogue. In a subsequent phase, participants are introduced to selected AI-based creative tools designed to extend their expressive possibilities. These are then used to revise or expand their stories, allowing exploration of how enhanced creative agency influences motivation, ownership, and authenticity. A second focus group facilitates comparative reflection between self-made and AI-supported versions, encouraging teachers to articulate changing emotional positions and evolving narratives. The research offers insight into how digital storytelling can legitimise personal and affective experiences in mathematics education. By linking individual creation with collaborative reflection, and by examining the role of AI in shaping expression, the study contributes to rethinking mathematics teacher education, highlighting creativity, emotional awareness, multimodality, and critical engagement with emerging technologies as vital components of teacher identity formation.

19. [Deslis, D.](#), Moutsios-Rentzos, A., Kaskaouti, P., Giakoumi, M. (2025). Digital Storytelling in Teaching and Learning Mathematics: A PRISMA Systematic Literature Review. *Education Sciences*, 15(11), 1548. <https://doi.org/10.3390/educsci15111548>

Abstract

Digital storytelling (DST) has emerged as a promising pedagogical approach in mathematics education, combining narrative and digital media to enhance conceptual understanding, engagement, and reflective practice. This systematic review synthesises recent research on how DST is conceptualised, implemented, and evaluated in mathematics education. Following PRISMA 2020 guidelines, four databases (ERIC, Scopus, HAL, Google Scholar) were searched in October 2025. Peer-reviewed studies (2015-2025) explicitly addressing DST in mathematics education were included. Screening and thematic synthesis were independently conducted by the two first authors to reduce bias. A total of 47 studies involving approximately 3000 participants across early childhood, school, and teacher education were included. DST was found to enhance mathematical reasoning, problem-solving, motivation, and self-efficacy, while supporting identity development and collaboration. For teachers, DST fostered reflective practice, emotional awareness, and technological-pedagogical- content integration. Challenges included limited preparation time, insufficient training, and unequal digital access, though emerging AI tools offered promising solutions for scalable DST creation. Evidence highlights DST's cognitive, affective, and pedagogical benefits, though small-scale and short-term designs limit generalisability. Further longitudinal and cross-context studies are needed.

18. Δεσλής, Δ., Στυλιανίδης, Α., & Jamnik, M. (2025). Μαθηματική Απόδειξη στην Πρωτοβάθμια: Η Γνώση Δασκάλων για το Περιεχόμενο, τους Μαθητές και τις Διδακτικές Πρακτικές στη Διερεύνηση τύπου Lakatos. Στο Μ. Γεωργούδη, Α. Μαλαφέκας, Σ. Μαραγκάκης, & Α. Χ. Χρονοπούλου (Επιμ.) *Πρακτικά του 40ου Πανελληνίου Συνεδρίου Μαθηματικής Παιδείας* (pp. 144-153). Ελληνική Μαθηματική Εταιρεία.

Περίληψη

Η παρούσα μελέτη εξετάζει τη μαθηματική γνώση δασκάλων της Πρωτοβάθμιας σχετικά με τη διερεύνηση τύπου Lakatos (ΔτΛ). 331 συμμετέχοντες απάντησαν σε ερωτηματολόγια με επεισόδια από τάξεις σε μορφή κόμικς. Τα αποτελέσματα έδειξαν ότι το συνολικό επίπεδο γνώσης ήταν μέτριο ($M=.54$), με θετικές συσχετίσεις μεταξύ των διαφόρων συνιστωσών γνώσης και ελάχιστες διαφορές μεταξύ εν ενεργεία και μελλοντικών δασκάλων.

Abstract

This study examines the mathematical knowledge of primary school teachers regarding Lakatos-style investigation (Lsl). A total of 331 participants responded to questionnaires featuring comic-style classroom episodes. The results showed that the overall knowledge level was moderate ($M=.54$), with positive correlations across the different knowledge components and minimal differences between in-service and pre-service teachers.

17. [Deslis, D.](#), Stylianides, A. J., & Jamnik, M. (2025). Examining teachers' motivational views on Lakatos-style investigation: A value-cost-expectancy approach. Paper presented at the 14th Conference of the European Society for Research in Mathematics Education. Free University of Bozen-Bolzano- CERME. [hal-05160948](#)

Abstract

Despite the affordances of Lakatos-style investigation (LSI) for mathematics instruction, research has focused on students, and left a gap in understanding teachers' perspectives. To address this gap, we explore primary teachers' views on incorporating LSI in the classroom, focusing on perceived value, cost, and expectancy for themselves and their students. Through a survey with 331 participants, we found a generally positive inclination towards LSI, though perceptions vary by demographic factors. Female teachers perceive higher personal costs but also higher personal value, while older teachers report lower personal costs and reduced expectations of students. Academic background relates to teacher views, with stronger mathematical foundations linked to higher personal expectancy and lower perceived personal costs. These findings underscore that tailoring teacher education to demographic-specific factors may be crucial for promoting teachers' openness to LSI.

Keywords: Proof and proving, Lakatos-style investigation, primary school teachers, teacher views, value-cost-expectancy framework.

16. Stylianides, G. J., Stylianides, A. J., Zhang, L., [Deslis, D.](#), & Seo, J. (2025) Exploring how affect-related constructs predict students' proof construction competence in algebra and geometry. Paper presented at the 14th Conference of the European Society for Research in Mathematics Education. Free University of Bozen-Bolzano-CERME. [hal-05161234](#)

Abstract

Research suggests that proof construction, an important proof competence, is not an isolated cognitive construct but rather may relate with certain affect-related constructs including students' productive disposition beliefs towards proof construction. Yet there is a scarcity of research on how proof construction competence may relate with such beliefs. In this paper, we take a step towards addressing this research gap. Based on analysis of survey data from 226 English Year 10 students (14-15-year-olds), we report an empirically-based and theoretically-meaningful model depicting how certain student beliefs concerning proof construction (affect-related constructs) predict, in isomorphic ways in algebra and geometry, students' proof construction competence (cognitive construct). Implications for research/practice and limitations are discussed in light of these findings.

Keywords: Proof construction, affect, beliefs, cognition, secondary mathematics, algebra, geometry.

15. Moutsios-Rentzos, A., Buchbinder, N., [Deslis, D.](#), Durand-Guerrier, V., & Reid, D. (2025). Introduction to Thematic Working Group 1: Argumentation and Proof. Paper presented at the 14th Conference of the European Society for Research in Mathematics Education. Free University of Bozen-Bolzano- CERME. [hal-05324839](#)

Abstract

Building upon the rich tradition established in previous CERME conferences, TWG1 has consistently attracted the interest of researchers investigating the multifaceted nature of mathematical argumentation and proof across all educational levels. The group's focus encompasses both theoretical investigations into the nature of mathematical proof and empirical studies of how students and teachers engage with reasoning and argumentation in classroom settings. At CERME14, TWG1 brought together 32 participants from 15 countries who engaged in in-depth discussions around 26 contributions: 24 papers and 2 posters. The contributions spanned a range of methodologies and educational levels, reflecting the field's diversity, depth, and international scope. The TWG1 sessions featured three whole-group and four split sessions, which fostered critical, collaborative, and respectful engagement among participants while also ensuring the coherence and unity of the TWG1 spirit in the split groups. The main points of interest from each split-group session were reported in a whole-group session for a comprehensive overview of all TWG1 contributions. In this introductory paper, drawing upon the discussions of our group, the TWG1 papers are organised in four themes: a) Argumentation and Proof in School and Teacher Education, b) Cognitive, Affective, and Metacognitive Dimensions, c) Evaluative Practices, Contextual influences and Epistemological Perspectives, and d) Technological and Collaborative Dimensions.

14. [Deslis, D.](https://doi.org/10.17863/CAM.115816) (2024). *Lakatos-style proving activity in primary school: A mixed-methods study to explore and support teachers' mathematical knowledge and views*. (PhD thesis, University of Cambridge). <https://doi.org/10.17863/CAM.115816>

Abstract

Proof has long been central to mathematics and is increasingly recognised as an important element in school mathematics. This PhD research focuses on the development and refinement of conjectures based on the examination of supportive examples and counterexamples, which is a core aspect of Lakatos' (1976) philosophical account of the role of proof in mathematics. While prior research indicates the feasibility and benefits of students' engagement with Lakatos-style proving activity, little is known about teachers' readiness and willingness to incorporate it into their teaching, especially at the primary school level.

Addressing this research gap, this mixed-methods study explores two research questions:

- RQ1 *What are the characteristics of primary school teachers' mathematical knowledge and views related to Lakatos-style activity?*
- RQ2 *What can be the affordances of primary school teachers' interaction as a group with an environment featuring comic-style classroom episodes about Lakatos-style activity?*

Guided by theoretical frameworks on teachers' mathematical knowledge (regarding content, students, and teaching practices) and views (regarding perceived value, cost, and expectancy) relevant to Lakatos-style activity, developed for the purposes of this study, I designed and implemented a two-stage study involving both quantitative and qualitative methods of data collection and analysis.

To address RQ1, a vignette-based survey was conducted with 331 participants, comprising both pre- and in-service primary teachers. I designed 16 comic-style episodes representing a wide range of classroom situations, teaching approaches,

conjecture modification techniques, and student understandings relevant to Lakatos-style activity. Survey participants engaged with these episodes and responded to 66 Likert-scale items. The findings indicate that teachers generally hold moderate knowledge levels, with some variation across different knowledge components. Participants generally expressed high perceived value, manageable perceived cost, and cautiously optimistic expectations about incorporating Lakatos-style activity into their teaching. Six teacher profiles emerged, each representing a unique combination of knowledge and view characteristics, underscoring the importance of considering teacher backgrounds when designing teacher preparation programmes. Furthermore, intriguing correlations among, and predictors for, teachers' knowledge, views and profile membership were also identified and discussed.

To address RQ2, a vignette-based focus groups study was conducted with two pre-service and two in-service teacher groups, comprising a total of 22 participants. The results of the previous stage's profile analysis guided the formation of groups, in which each member represented a different teacher profile. This ensured heterogeneity and group standardisation, enabling comparability within and across groups. Participants engaged in alternating rounds of individual and group work on comic-style classroom episodes and Likert-scale items, different from, yet equivalent to those used in the survey. The findings suggest that discourse-based collaborative environments featuring comic-style classroom episodes can create a productive space for preparing teachers to teach Lakatos-style activity. This environment not only helped uncover varying teacher perspectives, but also enabled shifts in teachers' knowledge and views. The important roles played by teacher profiles, pre- or in-service teacher status, and group size and composition were explored, revealing their potential influence on group dynamics, interactions, and outcomes. Participants noted numerous advantages in both the preparation environment they engaged with and Lakatos-style activity itself, expressing willingness to incorporate it into their classrooms, if adequately supported.

Lakatos-style proving activity can create opportunities for the classroom to work on meaningful and authentic mathematical tasks. This research contributes to the literature by illuminating the previously uncharted territory of teacher knowledge and

views relevant to this type of activity, and by showcasing the potential of using discourse-based collaborative environments with comic-style classroom episodes to support their development. Therefore, this research takes a step forward in promoting the role of Lakatos-style activity in the primary school classroom and beyond.

13. [Δεσλής, Δ.](#), Στυλιανίδης, Α., & Jamnik, M. (2024). Απόψεις εν ενεργεία και μελλοντικών δασκάλων της Πρωτοβάθμιας σχετικά με την ενασχόληση της σχολικής τάξης με τη μαθηματική απόδειξη στο πλαίσιο διερεύνησης τύπου Lakatos. Στο Χ. Σακονίδης (Επιμ.), *Πρακτικά του 10ου Συνεδρίου της Ένωσης Ερευνητών Διδακτικής των Μαθηματικών*. Αλεξανδρούπολη: ΕΝΕΔΙΜ.

[Deslis, D., Stylianides, A., & Jamnik, M. (2024). *In-service and pre-service primary teachers' views on classroom engagement with mathematical proof within a Lakatos-style inquiry approach*. In Ch. Sakonidis (Ed.), **Proceedings of the 10th Conference of the Association of Researchers in Mathematics Education**. Alexandroupoli: ENEDIM.]

Περίληψη

Σκοπός της παρούσας έρευνας είναι η διερεύνηση των απόψεων των δασκάλων αναφορικά με την ενασχόληση της σχολικής τάξης με τη μαθηματική απόδειξη στο πλαίσιο διερεύνησης τύπου Lakatos (ΔτΛ). Με τη χρήση ενός ερωτηματολογίου βασισμένο σε επεισόδια από μια σχολική τάξη σε μορφή κόμικς συλλέξαμε δεδομένα από 331 εν ενεργεία και μελλοντικούς δασκάλους αναφορικά με τις προσδοκίες τους από την ενασχόληση με τη ΔτΛ, καθώς και την αξία και το κόστος που εκτιμούν πως έχει για τους ίδιους και για τους μαθητές. Τα αποτελέσματα δείχνουν πως υπάρχουν λίγες διαφορές μεταξύ μελλοντικών και εν ενεργεία δασκάλων, οι οποίοι συνολικά βλέπουν θετικά την ενσωμάτωση της ΔτΛ στο μάθημά τους.

Abstract

The aim of this study is to investigate teachers' views regarding classroom engagement with mathematical proof within a Lakatos-style inquiry (LSI) framework. Using a questionnaire based on classroom episodes presented in comic-strip form, data were collected from 331 in-service and pre-service teachers concerning their expectations of engaging with LSI, as well as the value and cost they perceived for themselves and for their pupils. The results indicate few differences between pre-service and in-service teachers, who overall view the integration of LSI into classroom practice positively.

12. [Deslis, D.](#), Stylianides, A. J., & Jamnik, M. (2023). Primary school teachers' mathematical knowledge and views about Lakatos-style proving activity: a latent profile analysis. In P. Drijvers et al. (Eds.), Proceedings of the 13th Conference of the European Society for Research in Mathematics Education (pp. 104-111). Alfréd Rényi Institute of Mathematics and ERME. [\(hal-04408299\)](#)

Abstract

Despite the importance of proving across all school years, little is known about primary teachers' knowledge and views about a special form of proving activity described as Lakatos-style and associated with authentic engagement with mathematics even in primary school. We aimed to identify profiles of primary teachers based on their mathematical knowledge (of content, students, and teaching practices) and views (related to value, cost, and expectancy) about Lakatos-style proving activity. 331 participants responded to a vignette-based survey with 66 Likert-scale items referring to comic-style classroom episodes. Latent profile analysis revealed six teacher profiles reflecting a wide range of views, various levels of knowledge, and combinations thereof. Future research and teacher education practice can consider the unique characteristics of each profile to provide appropriate support to teachers based on each profile's strengths and needs.

Keywords: Lakatos-style proving activity, conjecture refinement, primary school teachers' mathematical knowledge and views, comic-style vignettes, latent profile analysis

11. Moutsios-Rentzos, A., Buchbinder, O., Azrou, N., Bredow, F., [Deslis, D.](#), Durand-Guerrier, V., Reid, D., & Yang, M. (2024). An introduction to TWG1: Argumentation and proof. In P. Drijvers et al. (Eds.), *Proceedings of the 13th Conference of the European Society for Research in Mathematics Education*. Budapest, Hungary: CERME13.

Abstract

Argumentation and proof is a research area that continues to attract the wide interest of the mathematics education research community, which was also evident in CERME13. CERME13 was the first in-person conference after a period of online meetings, which was reflected on the great interest of the participants who were actively engaged in practicing and promoting communication, cooperation, and collaboration. In Thematic Working Group 1 (TWG1; “Argumentation and proof”), 48 participants from 20 different countries discussed and reflected upon the 34 papers and 6 posters presented in TWG1. The papers of TWG1 were organized in four topics: a) Argumentation and proof in teacher training and education, b) Argumentation and proof in school and university mathematics, c) Theoretical and epistemological perspectives about argumentation and proof, and d) Argumentation and proof in mathematical activity, modelling, and problem solving. The work of TWG1 was organized in whole-group sessions and (parallel) split-group sessions to maximize active participation and to ensure the coherence and unity of the TWG1 spirit in the split-groups. The main points of interest of each split-group session were reported in a whole-group session, so that an overview of all TWG1 papers would be obtained. In this introductory chapter, drawing upon the discussions of our group, the TWG1 papers are organized in three themes: a) Theoretical and epistemological perspectives about argumentation and proof, b) Argumentation and proof in teacher education and training, and c) Argumentation and proof in school and university.

10. [Deslis, D.](#), & Desli, D. (2023). Does this answer make sense? Primary school students and adults judge the reasonableness of computational results in context-based and context-free mathematical tasks. *International Journal of Science and Mathematics Education*, 21, 71-91.

Abstract

This study investigates students' and adults' performance in judging reasonableness, namely reflecting on whether computational results qualify as acceptable answers to mathematical tasks. Data was gathered via task-based questionnaires from 160 participants, evenly divided between fifth-graders and adults. Their responses to a systematically varied collection of context-free and context-based items enabled inferences to be made about their performance and strategies in relation to two interrelated aspects of reasonableness: number relationships and the effect of operations (*internal reasonableness*) and the practicality of answers (*external reasonableness*). The results revealed that students were better at utilising the former criterion compared to the latter, while for adults the opposite was found. However, adults clearly outperformed students in both aspects. Task characteristics such as the involved numbers and operations, and the correctness or incorrectness of computation results, were found to be associated with fluctuations in performance, although the effect tended to be different in context-free and context-based items. Algorithm- and rule-based strategies were more popular than sense-making ones especially among students, although only the latter type was correlated with increased correct response rates. Students often failed to obtain results that made sense in relation to real-life situations or the involved numbers and operations. Instead, they blindly trusted algorithms and rules, even when their use was inappropriate or insufficient. The findings highlight that to help students refine their ability to judge reasonableness, mathematics classrooms should prioritise the development of number sense and promote the search for connections between school mathematics and everyday life.

Keywords: Computational Estimation · Context-based and Context-free Tasks · Judging Reasonableness · Mental Computation · Routine and Adaptive Expertise · Sense Making in Primary School Mathematics

9. [Deslis, D.](#), Stylianides, A. J., & Jamnik, M. (2022). Two primary school teachers' mathematical knowledge of content, students, and teaching practices relevant to Lakatos-style investigation of proof tasks. In J. Hodgen et al. (Eds.), *Proceedings of the 12th Conference of the European Society for Research in Mathematics Education*. Bolzano, Italy: CERME12.

Abstract

Despite recognition of the importance of Lakatos-style proving activity in the mathematics classroom, we know little about whether teachers' relevant mathematical knowledge is conducive to supporting it in their classrooms. We take a step towards addressing this research gap by reporting the results of an exploration of two primary teachers' mathematical knowledge of content, students, and teaching practices relevant to Lakatos-style investigation of proof tasks. Through vignettes-based, semi-structured interviews, we presented the participants with 19 illustrated classroom episodes covering a range of Lakatosian techniques and a range of student ways of engaging with supportive examples and counterexamples to formulate, validate, refute, and refine conjectures of different types. Participants' responses revealed both productive and counterproductive understandings highlighting that although Lakatos-style proof lies within teachers' reach, supporting their preparation is crucial.

Keywords: Primary school mathematics, Mathematical knowledge for teaching Lakatos-style proof, Conjectures, Supportive examples, Counterexamples.

8. [Deslis, D.](#), Stylianides, A. J., & Jamnik, M. (2021). Primary school teachers' mathematical knowledge for Lakatos-style proof instruction. In M. Inprasitha, N. Chansgri, & N. Boonsena (Eds.), *Proceedings of the 44th Conference of the International Group for the Psychology of Mathematics Education* (pp. 209-217). Khon Kaen, Thailand: PME.

Abstract

In this paper we conceptualise Lakatos-style proof instruction (LSI) as a teaching approach based on the formulation and refinement of conjectures through the examination of supportive examples and counterexamples. We identify aspects of mathematical knowledge that LSI requires from teachers (MaKTeLaP) in relation to content, student perceptions and teaching practices, and we report findings of ten primary school teachers' MaKTeLaP based on in-depth, vignette-based interviews. Participants' responses indicate satisfactory content knowledge, intermediate knowledge of teaching practices, and weak knowledge of students. This study offers a theoretical basis for further research on the incorporation of LSI into the classroom and on the provision of support for the development of teachers' MaKTeLaP.

7. Deslis, D. (2020). *Using Examples and Counterexamples to Prove: Primary School Teachers' Perceptions about Lakatos-style Instruction of Proof*. (MPhil dissertation, University of Cambridge).

Abstract

An increasing number of researchers and educators have argued that mathematical proof should be a central part of students' engagement with mathematics from primary school. However, teachers usually find it difficult to effectively teach proof to their students, who typically have several misconceptions. Aiming to address some of students' and teachers' pedagogical needs, this study conceptualises Lakatos-style proof instruction, a mode of investigation that is driven by the formulation and refinement of conjectures through the examination of examples, and explores primary school teachers' relevant perceptions. Ten teachers participated in semi-structured vignette-based interviews. They were presented with a set of classroom scenarios that reflected a broad spectrum of student conceptions and misconceptions, conjecture types, phases of instruction, and Lakatosian techniques. The participants were asked to evaluate students' arguments and explain how they would support their learning. The thematic and statistical analyses indicated that the teachers generally appreciated the contribution of examples to the investigation of conjectures, but sometimes misperceived the limits of their use, believing that under certain circumstances examples can also prove. In contrast, most teachers were aware that a single counterexample is enough to prove a conjecture wrong. Yet, they were unsure about what is a sensible step for a student to take after the refutation of a conjecture. Finally, the proposed feedback and questioning practices were found to be compatible with the Lakatosian mode of investigation.

Overall, the results revealed teachers' intuitive perceptions of some key processes embedded in Lakatos-style reasoning, but also pointed to some potential difficulties teachers could encounter if they attempted to incorporate this mode of investigation into their classrooms. This study offers a robust theoretical context that enables further research on Lakatos-style instruction and facilitates the development of a simulated

environment that will give teachers the opportunity to engage with it and refine relevant teaching skills.

Keywords: Mathematics Education, Proof, Proving, Refutation, Lakatos-style Investigation, Primary School, *Example-based reasoning*, *Supportive Examples*, *Counterexamples*.

6. [Δεσλής, Δ.](#), & Δεσλή, Δ. (2019). Έλεγχος της λογικότητας ενός υπολογιστικού αποτελέσματος από παιδιά Ε' δημοτικού και ενήλικες: Ικανότητες και δυσκολίες. Στο Χ. Χρήστου (Επιμ.), *Πρακτικά του 8ου Συνεδρίου της Ένωσης Ερευνητών Διδακτικής των Μαθηματικών*. Λευκωσία: ΕΝΕΔΙΜ.

[Deslis, D., & Desli, D. (2019). *Checking the reasonableness of a computational result by fifth-grade pupils and adults: Abilities and difficulties*. In Ch. Christou (Ed.), *Proceedings of the 8th Conference of the Association of Researchers in Mathematics Education*. Nicosia: ENEDIM.]

Περίληψη

Σκοπός της παρούσας εργασίας ήταν να διερευνήσει την ικανότητα για την πραγματοποίηση ελέγχου λογικότητας σε ένα υπολογιστικό αποτέλεσμα. Συγκεκριμένα, μέσα από δύο έργα εξετάστηκε η ικανότητα 80 μαθητών Ε' δημοτικού και 80 ενηλίκων σε δύο πτυχές του ελέγχου λογικότητας του αποτελέσματος: α) στις σχέσεις μεταξύ των αριθμών και την επίδραση των πράξεων (Έργο 1) και β) στην πρακτικότητα της απάντησης (Έργο 2). Ενώ οι μαθητές είχαν καλύτερη επίδοση στο Έργο 1 (74,55%), οι ενήλικες είχαν καλύτερη επίδοση στο Έργο 2 (92%). Οι στρατηγικές που αναδείκνυαν στήριξη σε αλγοριθμικά χαρακτηριστικά χρησιμοποιήθηκαν και από τις δύο ηλικιακές ομάδες συχνότερα σε σχέση με τις στρατηγικές που σχετίζονταν με νοερούς και κατ' εκτίμηση υπολογισμούς ή με την πρακτικότητα της απάντησης.

Abstract

The purpose of this study was to investigate individuals' ability to check the reasonableness of a computational result. Through two tasks, the abilities of 80 fifth-grade pupils and 80 adults were examined with respect to two aspects of reasonableness checking: (a) relationships between numbers and the effect of operations (Task 1), and (b) the practicality of the answer (Task 2). While pupils performed better on Task 1 (74.55%), adults showed higher performance on Task 2 (92%). Strategies relying on algorithmic features were used more frequently by both age groups than strategies

involving mental or estimation-based calculations or considerations of the practicality of the result.

5. [Deslis, D.](#), Kosmidis, C. V., & Tenta, E. (2019). Using a non-educational mobile game for learning in biology, geography and mathematics: “Pokémon Go” as a case study. In M. Tsitouridou & A. J. Diniz, (Eds.), *Technology and Innovation in Learning, Teaching and Education “TECH-EDU 2018”: Communications in Computer and Information Science* (Vol. 993, pp. 388-396). Springer.

Abstract

ICT offers new perspectives in teaching and learning. In this paper a popular non-educational mobile game, “Pokémon Go”, is used as a background for the design of educational activities in Biology, Geography and Mathematics and as a means of informal learning. Five secondary level students (14-15 years old) participated in this study. Data were collected through observation, field notes and interviews. The participants described the activities as attractive, pleasant and creative and stated that there is a lack of engaging learning and technology use in school. The results show that an effective integration of mobile technologies can enhance learning and students’ attitude.

4. [Δεσλής, Δ.](#) (2018). Έλεγχος της λογικότητας ενός υπολογιστικού αποτελέσματος από παιδιά Ε' δημοτικού και ενήλικες: Ικανότητες και δυσκολίες (Μεταπτυχιακή εργασία, Α.Π.Θ.).

[Deslis, D. (2018). *Checking the reasonableness of a computational result by fifth-grade pupils and adults: Abilities and difficulties* (Master's thesis, Aristotle University of Thessaloniki).]

Περίληψη

Έλεγχος λογικότητας ενός αποτελέσματος στα Μαθηματικά είναι η διαδικασία κατά την οποία ο λύτης εξετάζει ένα αποτέλεσμα και αποφαινεται για το αν αυτό είναι πιθανό να αποτελεί μια αποδεκτή απάντηση. Σκοπός της παρούσας εργασίας ήταν να εξετάσει την ικανότητα μαθητών και ενηλίκων να πραγματοποιήσουν έλεγχο λογικότητας σε ένα υπολογιστικό αποτέλεσμα. Για τον σκοπό αυτό, πραγματοποιήθηκε έρευνα στην οποία πήραν μέρος συνολικά 160 συμμετέχοντες, ισάριθμοι προερχόμενοι από τα δύο φύλα και από δύο ηλικιακές ομάδες: μαθητές Ε' δημοτικού και ενήλικες. Σχεδιάστηκαν και παρουσιάστηκαν με τη χρήση ερωτηματολογίων σε όλους τους συμμετέχοντες δύο Έργα που εξετάζαν την ικανότητα των συμμετεχόντων σε δύο πτυχές του ελέγχου λογικότητας του αποτελέσματος: (α) τις σχέσεις μεταξύ των αριθμών και την επίδραση των πράξεων (Έργο 1) και (β) την πρακτικότητα της απάντησης (Έργο 2). Η επίδοση των μαθητών ήταν μέτρια (66,93%), ενώ η επίδοση των ενηλίκων και στις δύο παραπάνω πτυχές ήταν πολύ καλή (89,75%). Οι μαθητές της Ε' τάξης είχαν καλύτερη επίδοση στις σχέσεις μεταξύ των αριθμών και την επίδραση των πράξεων (Έργο 1) (74,5%) σε σύγκριση με την πρακτικότητα της απάντησης (Έργο 2) (59,38%). Αντιθέτως, οι ενήλικες είχαν καλύτερη επίδοση στο Έργο 2 (91,88%) σε σχέση με το Έργο 1 (87,63%). Οι στρατηγικές που αναδείκνυαν στήριξη σε αλγοριθμικά χαρακτηριστικά χρησιμοποιήθηκαν και από τις δύο ηλικιακές ομάδες συχνότερα σε σχέση με τις στρατηγικές που σχετίζονταν με νοερούς και κατ' εκτίμηση υπολογισμούς ή με την πρακτικότητα της απάντησης. Οι μαθητές δεν επιδίωκαν τα αποτελέσματά τους να είναι ρεαλιστικά ή έδειχναν υπερβολική εμπιστοσύνη σε αλγοριθμικές στρατηγικές και οδηγούνταν σε λάθη. Τα

παραπάνω εγείρουν προβληματισμούς σχετικά με τον τρόπο με τον οποίο προσεγγίζεται ο αλγόριθμος στα σχολικά Μαθηματικά αλλά και για το αν οι μαθητές υποστηρίζονται επαρκώς, ώστε να αντιληφθούν τη στενή σχέση ανάμεσα στα Μαθηματικά και τη Λογική.

Abstract

Checking the reasonableness of a result in mathematics refers to the process by which a solver examines an outcome and judges whether it is likely to be an acceptable answer. The aim of this study was to investigate the ability of pupils and adults to check the reasonableness of a computational result. A total of 160 participants took part, equally distributed by gender and across two age groups: fifth-grade pupils and adults. Two tasks were designed and administered via questionnaires, examining two aspects of reasonableness checking: (a) relationships between numbers and the effect of operations (Task 1), and (b) the practicality of the answer (Task 2). Pupils' overall performance was moderate (66.93%), whereas adults' performance on both aspects was very high (89.75%). Pupils performed better on Task 1 (74.5%) than on Task 2 (59.38%), while adults performed better on Task 2 (91.88%) than on Task 1 (87.63%). Algorithm-based strategies were used more frequently by both groups than strategies involving mental or estimation-based calculations or considerations of practicality. Pupils often failed to seek realistic results or showed excessive reliance on algorithmic strategies, leading to errors. These findings raise important questions regarding how algorithms are approached in school mathematics and whether pupils are adequately supported in understanding the close relationship between mathematics and logic.

3. [Δεσλής, Δ.](#), & Δεσλή, Δ. (2018). «Αν όλα τα παιδιά της Γης πιάναν γερά τα χέρια», θα μπορούσαν να αγκαλιάσουν τη Γη; Η επίλυση προβλήματος συναντά τη λογοτεχνία σε μια τάξη Ε' Δημοτικού. Στο Σ. Γρόσδος & Α. Τσιβάς (Επιμ.), *Πρακτικά του συνεδρίου «Σχολείο ανοικτό στις κοινωνικές και παιδαγωγικές προκλήσεις»* (σελ. 179-188). Θεσσαλονίκη.

[Deslis, D., & Desli, D. (2018). "If all the children of the Earth held hands tightly...": Problem solving meets literature in a fifth-grade classroom. In S. Grosdos & A. Tsivas (Eds.), *Proceedings of the Conference "The School Open to Social and Pedagogical Challenges"* (pp. 179-188). Thessaloniki.]

Περίληψη

«Αν όλα τα παιδιά της Γης πιάναν γερά τα χέρια, κορίτσια αγόρια στη σειρά και στήνανε χορό, ο κύκλος θα γινότανε πολύ πολύ μεγάλος, κι ολόκληρη τη Γη μας θα αγκάλιαζε θαρρώ». Το γνωστό ποίημα γίνεται αφορμή για μια μαθηματική δραστηριότητα επίλυσης προβλήματος. Είναι τα παιδιά αρκετά για να αγκαλιάσουν τη Γη; Μπορούν να αγκαλιάσουν τον Ήλιο ή τους πλανήτες; Μαθητές Ε' Δημοτικού επιχειρούν να προσδιορίσουν και να διαχειριστούν δεδομένα προκειμένου να προσεγγίσουν με μαθηματικό τρόπο τα παραπάνω ερωτήματα. Η παρούσα διδακτική εφαρμογή επιχειρεί να αναδείξει αφενός τη δυνατότητα σύζευξης Μαθηματικών και Λογοτεχνίας και αφετέρου τα θετικά αποτελέσματα αυτής της σύζευξης στις στάσεις των μαθητών και στην ικανότητά τους για επίλυση προβλήματος.

Abstract

"If all the children of the Earth held hands tightly, girls and boys in a row and danced in a circle, the circle would become very, very large, and I believe it would embrace the whole Earth." This well-known poem serves as the starting point for a mathematical problem-solving activity. Are there enough children to embrace the Earth? Could they embrace the Sun or the planets? Fifth-grade pupils attempt to identify and manage data in order to approach these questions mathematically. This teaching intervention aims

to highlight both the potential of integrating mathematics and literature and the positive effects of this integration on pupils' attitudes and their problem-solving abilities.

2. Papadopoulos, I., & [Deslis, D.](#) (2015). Equiprobable events and probability comparison in a primary school classroom. In J. Novotná & H. Moraová (Eds.), *Proceedings of the International Symposium on Elementary Maths Teaching: Developing mathematical language and reasoning* (pp. 257-266). Prague, the Czech Republic: Charles University.

Abstract

In this paper seven 4th graders cope with a collection of tasks on probability given they do not possess any formal relevant knowledge. The aim was to study their reasoning about equiprobable events and probability comparison. The findings give evidence that, although no child followed the right rule consciously, their effort to describe mathematically a chance situation leads them to intuitive perception of these aspects of probability.

1. Δεσλής, Δ. (2015). *Πρώιμες αντιλήψεις των μαθητών της πρωτοβάθμιας εκπαίδευσης σχετικά με την έννοια των ισοπίθανων ενδεχομένων και της σύγκρισης πιθανοτήτων*. (Πτυχιακή εργασία, Α.Π.Θ.).

[Deslis, D., & Desli, D. (2018). “If all the children of the Earth held hands tightly...”: Problem solving meets literature in a fifth-grade classroom. In S. Grosdos & A. Tsivas (Eds.), *Proceedings of the Conference “The School Open to Social and Pedagogical Challenges”* (pp. 179-188). Thessaloniki.]

Περίληψη

Σε αυτή την έρευνα επτά μαθητές της Δ' τάξης εμπλέκονται σε μια συλλογή μαθηματικών προβλημάτων σχετικά με τις πιθανότητες. Πριν την έρευνα οι μαθητές δεν είχαν διδαχθεί ποτέ πιθανότητες και δεν είχα καμία επίσημη σχετική γνώση. Στόχος ήταν να μελετηθεί η συλλογιστική τους σχετικά με ισοπίθανα γεγονότα και σύγκριση πιθανοτήτων. Τα ευρήματα δίνουν ενδείξεις ότι, παρόλο που κανένας μαθητής δεν ακολούθησε συνειδητά τον σωστό κανόνα, η προσπάθειά τους να περιγράψουν μαθηματικά μια τυχαία κατάσταση αναδεικνύει μια διαισθητική αντίληψη αυτών των πτυχών της πιθανότητας.

Abstract

“If all the children of the Earth held hands tightly, girls and boys in a row and danced in a circle, the circle would become very, very large, and I believe it would embrace the whole Earth.” This well-known poem serves as the starting point for a mathematical problem-solving activity. Are there enough children to embrace the Earth? Could they embrace the Sun or the planets? Fifth-grade pupils attempt to identify and manage data in order to approach these questions mathematically. This teaching intervention aims to highlight both the potential of integrating mathematics and literature and the positive effects of this integration on pupils' attitudes and their problem-solving abilities.