



MEDA3 Mathematics Education in Digital Age 3. Proceedings of the 13th ERME Topic Conference (ETC13) held on 7 – 9 September 2022 in Nitra, Slovakia

Hans-Georg Weigand, Ana Donevska-Todorova, Eleonora Faggiano, Paola Iannone, Janka Medová, Michal Tabach, Melih Turgut

► To cite this version:

Hans-Georg Weigand, Ana Donevska-Todorova, Eleonora Faggiano, Paola Iannone, Janka Medová, et al.. MEDA3 Mathematics Education in Digital Age 3. Proceedings of the 13th ERME Topic Conference (ETC13) held on 7 – 9 September 2022 in Nitra, Slovakia. 2022. hal-03925304

HAL Id: hal-03925304

<https://hal.science/hal-03925304>

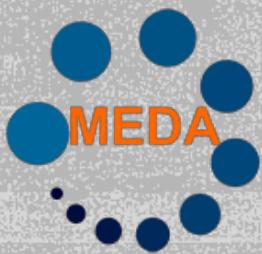
Submitted on 13 Feb 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



CONSTANTINE
THE PHILOSOPHER
UNIVERSITY
IN NITRA



ERME Topic Conference
Mathematics Education in the Digital Age

MEDA3 Mathematics Education in Digital Age 3

Proceedings of the **13th ERME Topic Conference (ETC13)**
held on **7 – 9 September 2022** in Nitra, Slovakia



Edited by:
Hans-Georg Weigand
Ana Donevska-Todorova; Eleonora Faggiano; Paola Iannone
Janka Medová; Michal Tabach; Melih Turgut

Nitra 2022

International Programme Committee

Chair

Hans-Georg Weigand, Germany

Co-chairs

Ana Donevska-Todorova, Germany/Macedonia

Eleonora Faggiano, Italy

Paola Iannone, UK

Michal Tabach, Israel

Melih Turgut, Norway/Turkey

Members

Andreas Eichler, Germany

Ghislaine Gueudet, France

Gülay Bozkurt (YR), Turkey

Alison Clark-Wilson, UK

Janka Medová, Slovakia

Morten Misfeldt, Denmark

Jana Trgalová, France

Local Organizing Committee

Chair

Janka Medová, Slovakia

Members

Gabriela Pavlovičová, Slovakia

Kitti Páleníková, Slovakia

Lubomíra Valovičová, Slovakia

Veronika Bočková (YR), Slovakia

Silvia Haringová (YR), Slovakia

Conference webpage: <https://www.meda.fpvai.ukf.sk>

Mathematics Education in Digital Age 3 (MEDA3)

Proceedings of the 13th ERME Topic Conference (ETC13)

held on 7 – 9 September 2022 in Nitra, Slovakia

Editors: Hans-Georg Weigand, Ana Donevska-Todorova, Eleonora Faggiano,
Paola Iannone, Janka Medová, Michal Tabach, Melih Turgut

Publisher: Constantine the Philosopher University in Nitra

Place: Nitra, Slovakia

Year: 2022

Edition: Príroovedec, no 783

ISBN: 978-80-558-1912-9

The contributions were not subjected to language check.

All contributions were peer-reviewed.

© Copyright left to authors.



Faculty of Natural Sciences and Informatics
Constantine the Philosopher University in Nitra

MEDA3

Mathematics Education in Digital Age 3

Proceedings of the 13th ERME Topic Conference (ETC13)
held on 7 – 9 September 2022 in Nitra, Slovakia

Editors: Hans-Georg Weigand, Ana Donevska-Todorova, Eleonora Faggiano,
Paola Iannone, Janka Medová, Michal Tabach, Melih Turgut

Table of Contents

Ana Donevska-Todorova, Eleonora Faggiano, Paola Iannone, Janka Medová,
Melih Turgut, Michal Tabach, and Hans-Georg Weigand
Mathematics Education in Times of Exponential Change: New trends and new debates v

Plenary Lectures

Annalisa Cusi
Formative assessment in Mathematics in the digital age: teachers' practices and roles 2

Jana Trgalová
Design of digital resources by and for mathematics teachers 12

Ivan Kalaš, Iveta Kohanová, Piers Saunders, Alison Clark-Wilson, and Eirini Geraniou
Computational thinking and mathematics education: Debating synergies and tensions 21

Full Papers

Ismael Almahdi and Osama Swidan
Mathematics teachers as designers e-textbook: resources and professional development 46

Sara Bagossi, Nadia Shifrin, Otman Jaber and Osama Swidan
Interactions and meaning-making in an AR learning environment 51

Marita Barabash and Elena Naftaliev
Technology-based mathematics teaching environment as a factor affecting mathematical definitions: a challenge for teachers 56

Daniela Bímová, Petra Pirklová, Jiří Břehovský, Klaus-Peter Eichler and Asif Mushtaq
Developing visuospatial ability by creating the virtual models of cubic solids for 3D printing 64

Maxim Brnic and Gilbert Greefrath
Teacher's recommendations for distance learning compared to student's actual use of digital textbooks and other (digital) resources 72

Roberto Capone and Eleonora Faggiano
Using and designing digital mathematical resources: teachers' beliefs on their professional needs 76

Roberto Capone, Mario Lepore and Federica Mennuni
Characterising paraboloids using Augmented Reality 80

Cecilie Carlsen Bach, Ewa Bergqvist and Uffe Thomas Jankvist
Mathematical communication when using DGE: Balancing between object and representations 88

Scott Courtney, Mary Miller and Michael Gisondo Exploring mathematics teachers' utilization of digital resources throughout, and after, the Covid pandemic	96
Marcantonio de Candia, Giulia Marchese, Federica Mennuni and Eleonora Faggiano Experiencing collaborative task design and video analysis to develop digital teaching practices.....	103
Frederik Dilling and Rebecca Schneider CSC Model – Learning mathematics on the basis of (digital) empirical settings	111
Frederik Dilling, Rebecca Schneider and Kevin Hörnberger Subject-related implementation of (digital) media by mathematics teachers: A theoretical framework	116
Ana Donevska-Todorova Digital quiz activities for personalization of learning paths in mathematics education	121
Raimundo Elicer and Andreas Lindenskov Tamborg Networking the theoretical constructs of computational thinking and techno-mathematical fluency through a geometrical task	125
Houssam Elkasti and Zsolt Lavicza Developing an innovation pyramid framework to reflect on the digitalization of mathematics education	133
Maria Fahlgren and Mats Brunström Example-generating tasks in a computer-aided assessment system: Redesign based on student responses	141
Julie Færch, Linda Marie Ahl and Uffe Thomas Jankvist Utilizing the notion of scheme in task design for an online assignment portal	145
Eirini Geraniou and Jeremy Hodgen A case study of an expert in computational thinking in the context of mathematics education research	153
Eirini Geraniou, Uffe Thomas Jankvist, Raimundo Elicer, Andreas Lindenskov Tamborg and Morten Misfeldt On mathematical digital competency for teaching: The case of an expert teacher	161
Silvia Haringová and Janka Medová Identification of domains of mathematics teachers' knowledge addressed in reflection on technology-supported math trails.....	169
Ingí Heinesen Højsted, Erla Olsen, Páll Isholm and Laufey Blaavær Computers for all – what happens? The case of Tórshavn	177

Otman Jaber, Sara Bagossi and Osama Swidan Augmented reality for conceptualizing covariation through connecting virtual and real worlds	182
Stine Gerster Johansen and Uffe Thomas Jankvist The potential role of digital tools in students' development of Bildung: An illustrative case of statistical distributions	188
Antoine Julien, Elisabeth Romijn and Alexander Schmeding Peer and self-assessment to improve mathematics competence in pre-service middle-school teachers	196
Odd Tore Kaufmann, Marianne Maugesten and Tamsin Meaney Views of pre-service teachers in Norway on the value of programming in teaching mathematical and pedagogical topics	200
Katrin Klingbeil, Fabian Rösken, Bärbel Barzel and Florian Schacht Potential and challenges of SMART as an online diagnostic tool in comparison to diagnostic interviews using the example of understanding variables	208
Manolis Mavrikis, Stefanie Vanbecelaere, Fien Depaepe and Eirini Geraniou Primary school teachers meet learning analytics dashboards: from dispositions to situation- specific digital competence in practice	216
Filip Moons, Alexander Holvoet and Ellen Vandervieren Comparing atomic feedback with classic feedback on a linear equations task using text mining techniques	224
Elena Naftaliev and Marita Barabash Teachers' engagement with experimental mathematics and interactive resources	232
Norbert Noster, Arnon Hershkovitz, Hans-Stefan Siller and Michal Tabach Students' strategies for identifying reflective symmetry of extra-mathematical shapes in a digital environment	240
Julia Pirklbauer and Robert Weinhandl Experiences of mathematics teachers with the use of GeoGebra Classroom in remote teaching during the COVID-19 pandemic in Austria.....	248
Ana Isabel Sacristán, Marisol Santacruz-Rodríguez, Chantal Buteau, Joyce Mgombelo and Eric Muller Future teachers' appropriation of computer programming as a mathematical instrument and a resource for teaching	256
Ulises Salinas-Hernández, Birgit Pepin, Ayse Kılıç and Zeger-Jan Kock Towards a new understanding of 'agency' in innovative learning environments	264

Michal Tabach and Jana Trgalova What does virtual learning environments afford to mathematics teachers?	268
Mathias Tejera, Shereen El Bedewy, Gonzalo Galván and Zsolt Lavicza 3D Printing and GeoGebra as artefacts in the process of studying mathematics through architectural modelling	276
Athina Thoma, Paola Iannone and Gihan Marasingha Engaging with lean Interactive Theorem Prover: Solving a logic task	284
Eva Ulbrich, Shereen El Bedewy, Martin Ertl, Ingrid Graz and Zsolt Lavicza Connecting hybrid teaching to hybrid manipulatives by 3D modelling	288
Laura Wirth and Gilbert Greefrath Working with a heuristic worked example video – upper secondary students' perceived advantages and challenges	296

Poster Annotations

Brigitta Bekesi, Tony Houghton and Zsolt Lavicza Digitalisation through the students' eyes: collaborative creative tasks with iPads	305
Klaus-Peter Eichler, Jiří Břehovský, Daniela Bímová, Moritz Seibold and Asif Mushtaq Software-supported development of visuospatial abilities	307
Yanjun Hong The application of micro-video clips in mathematical teaching in primary school.....	309
Péter Körtesi and Zsuzsanna Katalin Szabó Inverse of a function - mathematical and GeoGebra approach.....	311
Katarína Laššová and Veronika Bočková Support the development of spatial ability of future teachers for primary education through GeoGebra.....	313
Asif Mushtaq, Klaus-Peter Eichler, Daniela Bímová, Petra Pirklová and Jiří Břehovský Educating pre-service teachers in programming for schools: Block-based programming initiative in the teacher education program.....	315
Hoang Nguyen The influence of dynamic visualizations on learning derivatives.....	317
Siri Krogh Nordby, George Gadanidis and Immaculate Namukasa Resources to teach Computational Thinking in primary mathematics education.....	319