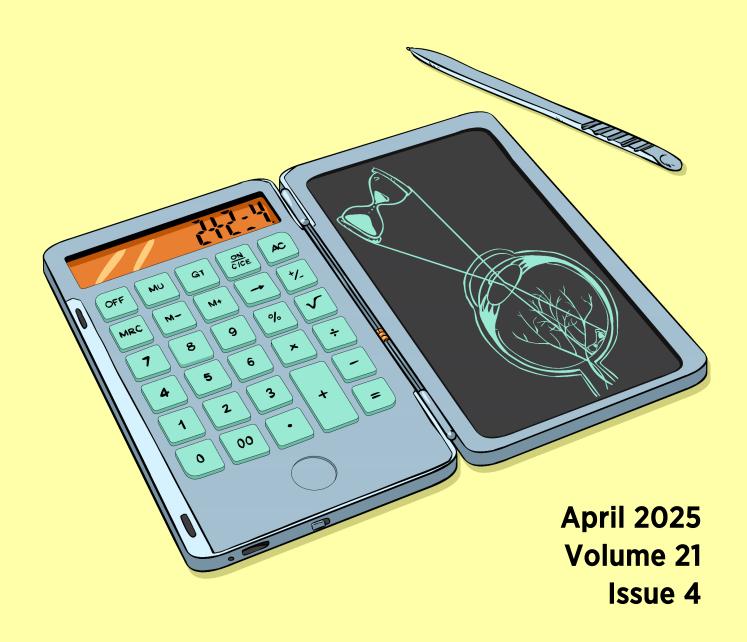
ISSN: 1305-8223

EURASIA JOURNAL OF MATHEMATICS, SCIENCE AND TECHNOLOGY EDUCATION



Published by: Modestum

Publication Office: Modestum LTD, 29 Gildredge Road, Eastbourne, East Sussex, BN21 4RU,

United Kingdom

Serbia Office: Modestum DOO, Bulevar Zorana Đinđića 125D, sprat 1, stan 12C, 11070

Belgrade, SERBIA

Phone: +381 61 6600107

Email: publications@modestum.co.uk

Publisher: https://modestum.co.uk

Journal Web: https://www.ejmste.com

Twitter: https://twitter.com/ejmste

Facebook: https://www.facebook.com/ejmste

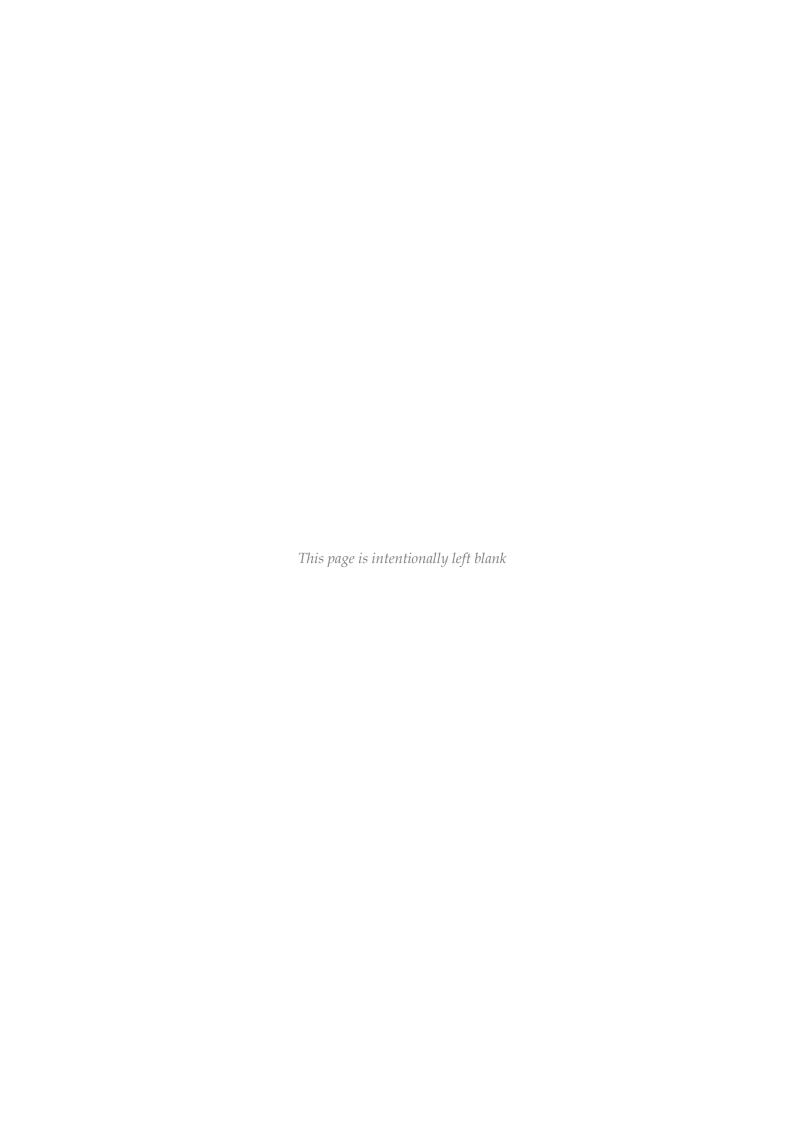
© 2005-2025. All rights reserved by Modestum. Copyright for Open Access Content is Retained by Authors. Also, authors continue to hold the copyrights of their own papers by acknowledging that their papers are originally published in the Eurasia Journal of Mathematics, Science and Technology Education. Hence, articles published are licensed under a "Creative Commons Attribution 4.0 International License."

ISSN: 1305-8223 (Online)

EURASIA JOURNAL OF MATHEMATICS, SCIENCE AND TECHNOLOGY EDUCATION

April 2025 Volume 21 Issue 4





EURASIA JOURNAL OF MATHEMATICS, SCIENCE AND TECHNOLOGY EDUCATION

The Eurasia Journal of Mathematics, Science and Technology Education (Abbrev. EURASIA J. Math., Sci Tech. Ed. or EJMSTE) is an English Open Access peer-reviewed journal publishing articles on all aspects of Mathematics, Science and Technology Education with ISSN: 1305-8223 (online). The journal is published 12 times in a year, and strictly adheres to the principles of the peer review process.

EURASIA Journal of Mathematics, Science and Technology Education encourages submissions from all authors throughout the world. Manuscripts are judged by two experts solely on the basis of their contribution of original data, ideas and their presentation. All manuscripts must comply with Manuscript Preparation Guidelines. Submitted manuscripts must not have been published, accepted for publication or be under consideration elsewhere.

Submissions: EJMSTE has a fully online review system. This system offers authors the convenience of submitting their manuscripts via **EditorialPark**. Please send your manuscripts an MS Word attachment to the editors via the following address: https://www.editorialpark.com/ejmste/

Eurasia Journal of Mathematics, Science and Technology Education (EJMSTE) is a monthly journal published online 12 times annually in January, February, March, April, May, June, July, August, September, October, November, and December.

EJMSTE is indexed and/or abstracted in

- EBSCO
- ERIH PLUS
- Google Scholar
- Genamics JournalSeek
- PsycINFO
- PSYNDEX
- ROAD
- SafetyLit
- SCOPUS
- Scimago

All articles are archived by:

- The British Library
- Portico

Publication of any material submitted by authors does not necessarily mean that the journal, publisher, editors, or any of the editorial board members endorse or suggest the content. Publishing decisions are based and given only on scholarly evaluations. Apart from that, decisions and responsibility for adopting or using partly or in whole any of the methods, ideas or the like presented in EJMSTE pages solely depends on the readers' own judgment.

EDITORIAL BOARD

Editors-in-Chiefs

Chun-Yen CHANG, National Taiwan Normal University (NTNU), TAIWAN

Lianghuo FAN, University of Southampton, UNITED KINGDOM & East China Normal University, CHINA

Philipp BITZENBAUER, Universität Leipzig, GERMANY

Editors

Engineering Education

Teen-Hang MEEN, National Formosa University, TAIWAN

Xiangyun DU, Qatar University, QATAR & UNESCO PBL Center for Engineering and Science Education, Aalborg University, DENMARK

Mathematics Education

Chunxia QI, Beijing Normal University, CHINA

Der-Ching YANG, National Chiayi University, TAIWAN

Joohi LEE, University of Texas at Arlington, USA

Lianghuo FAN, University of Southampton, UNITED KINGDOM & East China Normal University, CHINA

Kwok Cheung CHEUNG, University of Macau, MACAU

Mei-Shiu CHIU, National Chengchi University, TAIWAN

Oh Nam KWON, Seoul National University, SOUTH KOREA

Sandra NITE, Texas A&M University, USA

Science Education

Hayat HOKAYEM, Texas Christian University, USA

Jan Alexis NIELSEN, University of Copenhagen, DENMARK

Jana FANCOVICOVA, University of Trnava, SLOVAKIA

Jing LIN, Beijing Normal University, CHINA

Mariusz PANCZYK, Medical University of Warsaw, POLAND

Milan KUBIATKO, Jan Evangelista Purkyně University, CZECH REPUBLIC

Onofrio Rosario BATTAGLIA, University of Palermo, ITALY

Ozcan GULACAR, University of California, Davis, USA

Sarantos PSYCHARIS, School of Pedagogical and Technological Education, GREECE

Silvija MARKIC, University of Education Ludwigsburg, GERMANY

Vanda JANSTOVA, Charles University, Prague, CZECH REPUBLIC

STEM Education

Eila JERONEN, University of Oulu, FINLAND

Federica VALLONE, University of Naples Federico II, Naples, ITALY

Technology Education

M. Shane TUTWITER, University of Rhode Island, USA

Tzu-Hua WANG, National Tsing Hua University, TAIWAN

Yi-Shun WANG, National Changhua University of Education, TAIWAN

Zacharia ZACHARIAS, University of Cyprus, CYPRUS

Editorial Board Members

Agustin ADÚRIZ-BRAVO, Universidad de Buenos Aires, ARGENTINA

Alipasa AYAS, Bilkent University, TURKEY

Anjum HALAI, Aga Khan University, PAKISTAN

Anna Maria GRUGNETTI, University of Pavia, ITALY

Carlos HERVÁS-GÓMEZ, University of Seville, SPAIN

Charis VOUTSINA, University of Southampton, UNITED KINGDOM

Chin-Chung TSAI, National Chiao Tung University, TAIWAN

Colleen T. DOWNS, University of KwaZulu-Natal, SOUTH AFRICA

Do-Yong PARK, Illinois State University, USA

Fouad ABD-EL-KHALICK, University of Illinois at Urbana-Champaign, USA

Gert KADUNZ, University of Klagenfurt, AUSTRIA

Gregory J. KELLY, The Pennsylvania State University, USA

Gurol IRZIK, Sabanci University, TURKEY

Ingo EILKS, University of Bremen, GERMANY

Jan H. VAN DRIEL, University of Melbourne, AUSTRALIA

Jari LAVONEN, University of Helsinki, FINLAND

Kamisah OSMAN, Universiti Kebangsaan Malaysia, MALAYSIA

Kenneth TOBIN, The Graduate Center of CUNY, USA

Eurasia Journal of Mathematics, Science and Technology Education

Kyriacos ATHANASIOU, National and Kapodistrian University of Athens, GREECE

Lung Hsiang WONG, Nanyang Technological University, SINGAPORE

Lyn ENGLISH, Queensland University of Technology, AUSTRALIA

Lynn A. BRYAN, Purdue University, USA

Mailizar MAILIZAR, Syiah Kuala University, INDONESIA

Marika KAPANADZE, Ilia State University, GEORGIA

Martin RUSEK, Charles University, CZECH REPUBLIC

Michael ALLEN, Kingston University, UK

Monika Szczygieł, Pedagogical University of Krakow, POLAND

Nélio BIZZO, Universidade de São Paulo, BRAZIL

Pavol PROKOP, Comenius University Bratislava, SLOVAKIA

Paul PACE, University of Malta, MALTA

Pernilla NILSSON, Halmstad University, SWEDEN

Peter C. CORMAS, California University of Pennsylvania, USA

Rachel MAMLOK-NAAMAN, Weizmann Institute of Science, ISRAEL

Rohaida Mohd. SAAT, University of Malaya, MALAYSIA

Rolf V. OLSEN, University of Oslo, NORWAY

Sarantos PSYCHARIS, School of Pedagogical and Technological Education - ASPETE, GREECE

Sarika KEWALRAMANI, Monash University, AUSTRALIA

Sonya N. MARTIN, Seoul National University, REPUBLIC OF KOREA

Uwe GELLERT, Freie Berlin University, GERMANY

Vanessa KIND, Durham University, UK

Vincentas LAMANAUSKAS, University of Siauliai, LITHUANIA

CONTENTS

Ethnomathematical connections between the production of coastal cheese, geometric solids, measurements, and proportionality: A study with a Colombian merchant	em2608
Ronaldo Rafael Olivero-Acuña, Camilo Andrés Rodríguez-Nieto, Vicenç Font Moll, Benilda María Cantillo-Rudas, Flor Monserrat Rodríguez-Vásquez	
https://doi.org/10.29333/ejmste/16081	
Identity and experience matter: Differences between secondary STEM teachers' self-efficacy and commitment in integrated STEM teaching activities	em2609
Kai-Lin Yang, Hsin-Kai Wu, Jen-Yi Wu, Kuen-Yi Lin, Ying-Shao Hsu	
https://doi.org/10.29333/ejmste/16082	
Exploring pedagogical content knowledge of the concept of heat among Indonesian primary school teachers	em2610
Nurhairani, Suyanta, Haryanto	
https://doi.org/10.29333/ejmste/16083	
Integrating design thinking into STEM education: Enhancing problem- solving skills of high school students	em2611
Le Chi Nguyện, Ho Quang Hoa, Le Hoang Phuoc Hien	
https://doi.org/10.29333/ejmste/16084	
Unveiling the roots of botanical literacy: A systematic literature review on its concepts and domains	em2612
Wiwin Pramita Arif, Murni Sapta Sari, Sri Rahayu Lestari	
https://doi.org/10.29333/ejmste/16121	
Trends and emerging themes in the effects of generative artificial intelligence in education: A systematic review	em2613
Trang Ngoc Nguyen, Hoa Thi Truong	
https://doi.org/10.29333/ejmste/16124	
Implementation of ESD in school geography: Bibliometric analysis of 2015-2024 publications in scientific databases	em2614
Aizhan Bazilova, Kulyash Kaimuldinova, Nurzhanat Shakirova, Bakhadurkhan Abdimanapov, Duman Aliaskarov, Ayzhan Satybaldieva	
https://doi.org/10.29333/ejmste/16169	
Literacy skills through the use of digital STEAM-inquiry learning modules: A comparative study of urban and rural elementary schools in Indonesia	em2615
Agus Susanta, Edi Susanto, Rusnilawati, Hari Sumardi, Siti Rahaimah Binti Ali	
https://doi.org/10.29333/ejmste/16170	

Specializing the scientific creativity survey for subjects "our foods" and "human and environment" in grade 4 science curriculum	em2616
Tekin Güler, Muammer Çalık	
https://doi.org/10.29333/ejmste/16171	
Exploring synergies in Euclidean geometry and isometric drawing: A snapshot on grade 12 mathematics and engineering graphics & design	em2617
Philani Brian Mlambo, Douglas Thembinkosi Sibusiso Sotsaka	
https://doi.org/10.29333/ejmste/16172	
Enhancing remedial learning outcomes using micro-lecture videos: The case of trigonometry	em2618
Mailizar Mailizar, Rahmah Johar, Mukhlis Hidayat	
https://doi.org/10.29333/ejmste/16173	
Mathematical connections promoted in multivariable calculus' classes and in problems-solving about vectors, partial and directional derivatives, and applications	em2619
Camilo Andrés Rodríguez-Nieto, Vicenç Font Moll	
https://doi.org/10.29333/ejmste/16187	
Anticipated and implemented questioning in mathematical discussions by prospective teachers	em2620
JeongWon Kim	
https://doi.org/10.29333/ejmste/16219	
The effect of digital storytelling on middle school students' interests in STEM fields and stereotyping	em2621
Maya El Chaabi, Rayya Younes	
https://doi.org/10.29333/ejmste/16220	
Applying the Rasch model to measure students' critical thinking skills on the science topic of the human circulatory system	em2622
Sigit Sujatmika, Sutarno, Mohammad Masykuri, Baskoro Adi Prayitno	
https://doi.org/10.29333/ejmste/16221	
A systematic review of artificial intelligence in high school STEM education research	em2623
Aigul I. Akhmetova, Damira M. Sovetkanova, Lyazzat K. Komekbayeva, Assan E. Abdrakhmanov, Daniyar Yessenuly, Oral S. Serikova	
https://doi.org/10.29333/ejmste/16222	
Advances in the characterization of university students' visual thinking through inspection heuristics and representation	em2624
Ángela María Sánchez-Ossa, Osvaldo Jesús Rojas Velázquez, Camilo Andrés	
Rodríguez-Nieto	