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 Mihajla Pupina 10i, 3. Sprat, Stan 133, 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

© 2005-2024. 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

February 2024 Volume 20 Issue 2



This page is intentionally left blank

# 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

#### **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 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

<b>User acceptance and adoption dynamics of ChatGPT in educational settings</b> <i>Paul Bazelais, David J. Lemay, Tenzin Doleck</i>	em2393
https://doi.org/10.29333/ejmste/14151	
A systematic literature review about local wisdom and sustainability: Contribution and recommendation to science education	em2394
Nurdiyah Lestari, Paidi, Slamet Suyanto	
https://doi.org/10.29333/ejmste/14152	
Analyzing the impact of collaborative learning approach on grade six students' mathematics achievement and attitude towards mathematics	em2395
Hans-Stefan Siller, Sagheer Ahmad	
https://doi.org/10.29333/ejmste/14153	
Evaluating problem-solving and procedural skills of first-year students in a Peruvian higher education institution	em2396
Edgar Michel Marin Ballon, Fiorella Luz Romero Gomez, Antonio Erick Linares Flores Castro, Miriam Rosario Flores Castro Linares	
https://doi.org/10.29333/ejmste/14154	
Inquiry skills teaching and its relationship with UAE secondary school students' critical thinking: Systematic review of science teachers' perspectives Othman Abu Khurma, Farah El Zein https://doi.org/10.29333/ejmste/14155	em2397
Assessing conceptual difficulties experienced by pre-service chemistry teachers in organic chemistry	em2398
Sakyiwaa Boateng	
https://doi.org/10.29333/ejmste/14156	
<b>Protist literacy: A novel concept of protist learning in higher education</b> <i>Hardianto Hardianto, Susriyati Mahanal, Hendra Susanto, Sitoresmi Prabaningtyas</i> https://doi.org/10.29333/ejmste/14157	em2399
A study of mathematical understanding levels in set theory based on the APOS framework by using python programming language for secondary school students	em2400
Khemjira Tiengyoo, Sayun Sotaro, Sermsri Thaithae	
https://doi.org/10.29333/ejmste/14158	
The impact of a training cycle on statistics and probability for future primary schoolteachers with a gender-focused approach within the framework of education for sustainable development	em2401
Chia Shih Su, Danilo Díaz-Levicoy, Chuan Chih Hsu	
https://doi.org/10.29333/ejmste/14177	

v

Mathematical argumentation of three-year-old children on a classroom experience based on two STEAM domains María Salgado, Ainhoa Berciano, Beatriz Abad-Villaverde https://doi.org/10.29333/ejmste/14187	em2402
The unified state examination in mathematics in urban and rural schools: The impact of the 2020-2021 pandemic Olga V. Korshunova, Nadezhda V. Telegina, Leila A. Petrova, Olga V. Pashanova, Valentina V. Latysheva, Alexey I. Prokopyev	em2403
https://doi.org/10.29333/ejmste/14240	
<b>Exploring the readiness of high school physics students for project-based hybrid learning in the Sultanate of Oman</b> <i>Fathiya Al-Kamzari, Norlidah Alias</i>	em2404
https://doi.org/10.29333/ejmste/14241	
The effect of PIQMAS application on the engagement processes of upper basic stage mathematics and science students Nardin Hamad, Asma Hussein, Bushra Allan, Nuha Karakra, Wajeeh Daher https://doi.org/10.29333/ejmste/14242	em2405
DECODE-based STEM workshop in improving academic resilience and teaching competency of pre-service teachers <i>Rajasekaran, P S Sreedevi, Chun-Yen Chang</i> https://doi.org/10.29333/ejmste/14243	em2406