



sustainability

Special Issue Reprint

Rebuilding Education

STEM Education Practices and Research
during the Post-COVID-19 Era

Edited by
Noora J. Al-Thani and Zubair Ahmad

www.mdpi.com/journal/sustainability



Rebuilding Education: STEM Education Practices and Research during the Post-COVID-19 Era

Rebuilding Education: STEM Education Practices and Research during the Post-COVID-19 Era

Editors

Noora J. Al-Thani

Zubair Ahmad

MDPI • Basel • Beijing • Wuhan • Barcelona • Belgrade • Manchester • Tokyo • Cluj • Tianjin



Editors

Noora J. Al-Thani
Qatar University
Doha, Qatar

Zubair Ahmad
Qatar University
Doha, Qatar

Editorial Office

MDPI
St. Alban-Anlage 66
4052 Basel, Switzerland

This is a reprint of articles from the Special Issue published online in the open access journal *Sustainability* (ISSN 2071-1050) (available at: https://www.mdpi.com/journal/sustainability/special_issues/STEM_Education_COVID).

For citation purposes, cite each article independently as indicated on the article page online and as indicated below:

LastName, A.A.; LastName, B.B.; LastName, C.C. Article Title. <i>Journal Name</i> Year , <i>Volume Number</i> , Page Range.
--

ISBN 978-3-0365-8118-7 (Hbk)

ISBN 978-3-0365-8119-4 (PDF)

© 2023 by the authors. Articles in this book are Open Access and distributed under the Creative Commons Attribution (CC BY) license, which allows users to download, copy and build upon published articles, as long as the author and publisher are properly credited, which ensures maximum dissemination and a wider impact of our publications.

The book as a whole is distributed by MDPI under the terms and conditions of the Creative Commons license CC BY-NC-ND.

Contents

About the Editors vii

Zubair Ahmad

Rebuilding Education—Contributions to STEM Education Practices and Research during the Post-COVID-19 Era

Reprinted from: *Sustainability* **2023**, *15*, 7861, doi:10.3390/su15107861 1

Guillermo M. Chans, Mireille E. Bravo-Gutiérrez, Angelica Orona-Navar and Elvia P. Sánchez-Rodríguez

Compilation of Chemistry Experiments for an Online Laboratory Course: Student’s Perception and Learning Outcomes in the Context of COVID-19

Reprinted from: *Sustainability* **2022**, *14*, 2539, doi:10.3390/su14052539 4

Amith Khandakar, Muhammad E. H. Chowdhury, Md. Saifuddin Khalid and Nizar Zorba

Case Study of Multi-Course Project-Based Learning and Online Assessment in Electrical Engineering Courses during COVID-19 Pandemic

Reprinted from: *Sustainability* **2022**, *14*, 5056, doi:10.3390/su14095056 30

Elena Jiménez Sánchez, María Jesús Santos Sánchez and Estrella Montes-López

Impact of the COVID-19 Confinement on the Physics and Chemistry Didactic in High Schools

Reprinted from: *Sustainability* **2022**, *14*, 6754, doi:10.3390/su14116754 48

Sálvora Feliz, María-Carmen Ricoy, Juan-Andrés Buedo and Tiberio Feliz-Murias

Students’ E-Learning Domestic Space in Higher Education in the New Normal

Reprinted from: *Sustainability* **2022**, *14*, 7787, doi:10.3390/su14137787 66

Yuta Taniguchi, Tsubasa Minematsu, Fumiya Okubo, and Atsushi Shimada

Visualizing Source-Code Evolution for Understanding Class-Wide Programming Processes

Reprinted from: *Sustainability* **2022**, *14*, 8084, doi:10.3390/su14138084 81

Lama Soubra, Mohammad A. Al-Ghouti, Mohammed Abu-Dieyeh, Sergio Crovella and Haissam Abou-Saleh

Impacts on Student Learning and Skills and Implementation Challenges of Two Student-Centered Learning Methods Applied in Online Education

Reprinted from: *Sustainability* **2022**, *14*, 9625, doi:10.3390/su14159625 98

Seong-Won Kim and Youngjun Lee

Developing Students’ Attitudes toward Convergence and Creative Problem Solving through Multidisciplinary Education in Korea

Reprinted from: *Sustainability* **2022**, *14*, 9929, doi:10.3390/su14169929 120

Elizabeth Acosta-Gonzaga and Elena Fabiola Ruiz-Ledesma

Students’ Emotions and Engagement in the Emerging Hybrid Learning Environment during the COVID-19 Pandemic

Reprinted from: *Sustainability* **2022**, *14*, 10236, doi:10.3390/su141610236 139

Jie Li, Heng Luo, Leilei Zhao, Min Zhu, Lin Ma and Xiaofang Liao

Promoting STEAM Education in Primary School through Cooperative Teaching: A Design-Based Research Study

Reprinted from: *Sustainability* **2022**, *14*, 10333, doi:10.3390/su141610333 153

Linda Daniela, Silvija Kristapsone, Gunta Kraġe, Ludmila Belogradova, Aleksandrs Vorobjovs and Iona Krone

Searching for Pedagogical Answers to Support STEM Learning: Gender Perspective

Reprinted from: *Sustainability* **2022**, *14*, 14598, doi:10.3390/su142114598 **169**

Abdellatif Sellami, Mohammad Ammar and Zubair Ahmad

Exploring Teachers’ Perceptions of the Barriers to Teaching STEM in High Schools in Qatar

Reprinted from: *Sustainability* **2022**, *14*, 15192, doi:10.3390/su142215192 **184**

**Gustavo Morán-Soto, Aradaryn Marsh, Omar Israel González Peña, Matthew Sheppard,
José Isabel Gómez-Quiñones and Lisa C. Benson**

Effect of the COVID-19 Pandemic on the Sense of Belonging in Higher Education for STEM Students
in the United States and Mexico

Reprinted from: *Sustainability* **2022**, *14*, 16627, doi:10.3390/su142416627 **207**

About the Editors

Noora J. Al Thani

Prof. Noora J. Al Thani is the director of the Qatar University Young Scientists Center (QUYSC) and the founder of the Al-Bairaq program (<http://www.qu.edu.qa/research/ysc/al-bairaq-program>) at Qatar University. Al-Bairaq program is the first Qatari program honored with the World Innovation Summit for Education (WISE) Award 2015 for youth empowerment and national capacity building in STEM disciplines through innovative educational programs. Prof. Noora pioneered advancing research and innovation skills in Qatar's K-12 & UG STEM education. She has published over 60 articles in well-reputed international journals, and six book chapters.

Zubair Ahmad

Dr. Zubair Ahmad is the section head of module development and publications at the Qatar University Young Scientists Center (QUYSC). He leads several STEM education and capacity-building research projects funded by Qatar National Research Fund (QNRF) and Qatar University. He has published over 200 research articles in well-reputed international journals besides five international patents (filled) and two book chapters.

