

# Education and Digital Societies for a Sustainable World

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## 1. Introduction

The Topic “Education and Digital Societies for a Sustainable World” falls within the Digital Society Topic, which materializes in various dimensions, considering distinct social contexts. If, on the one hand, these processes, already being implemented, raise profound challenges for social inclusion, they are, on the other hand, opportunities to transform educational processes for the global development of individuals (both in informal and formal educational contexts), enabling better preparation for digital societies that are truly based on a sustainable world, in accordance with the fulfilment of the global Sustainable Development Goals [1]. To achieve this, effective efforts must be made towards reducing old inequalities and not encouraging new ones in an all-inclusive society. This article collection emerges in this context and seeks—in a disciplinary, multidisciplinary, and transdisciplinary way, through different types of manuscripts, research articles, meta-analyses, or reasoned reflections—to add in a reasoned way to the promotion of scientific dialogue in order to contribute to paving the way towards education and digital societies for a sustainable world.

## 2. Presentation of the Publications

This Topic involves five MDPI participating journals (*Digital, Education Sciences, Societies, Social Sciences, and Sustainability*). The 28 papers published on this Topic (22 articles, 1 project report, 4 reviews, and 1 systematic review) in these journals (*Digital* (1), *Education Sciences* (6), *Social Sciences* (1), *Societies* (3), and *Sustainability* (17)), amounting to a total of 138 submissions, demonstrate aspects such as the demand for quality, internationalization, and cross disciplinarity, in line with Lyon [2] (p. 1), who advocates that “[...] sustainability as a science can be distilled into cross-disciplinary approaches that highlight the connections across natural sciences and human sciences”. This establishes the current relevance of this Special Issue for the global scientific community. We have a total of eighty-six authors, with a minimum of one author, a maximum of six authors, and an average of three authors per paper. The authors of the manuscripts are affiliated with various institutions in the following 22 countries: Australia, Canada, Chile, China, Estonia, France, Germany, Greece, Indonesia, Italy, Japan, Korea, Lithuania, Malaysia, Pakistan, Philippines, Portugal, Russia, Saudi Arabia, South Africa, Spain, and Turkey [1].

Albeit not exhaustive, as the reader will have the opportunity to deepen this knowledge by reading these publications in full, a brief presentation follows of the objectives of each of the publications that make up this Topic, by type of publication, making it possible to realize the great variety and richness of the areas studied.

### 2.1. Section I—Articles

Yandug et al.’s [3] article “A Conjoint Analysis Approach, Implications, and Mitigation Plans in Analyzing Students’ Preferences for Online Learning Delivery Types during the



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COVID-19 Pandemic for Engineering Students: A Case Study in the Philippines” examines the challenges faced by engineering students in the Philippines when the pandemic forced them to switch from face-to-face classes to online learning. The authors found that students struggled with the unfamiliar online environment and technical difficulties. This led to dissatisfaction and a negative impact on their academic performance.

The study “A Multidimensional Evaluation of Technology-Enabled Assessment Methods during Online Education in Developing Countries”, by Khattak et al. [4], delves into the challenges of using technology for assessments in online education in developing countries. Focusing on Pakistan, the authors analyze how well technology works to assess student learning. The researchers surveyed nearly 1000 students from over 100 public and private engineering universities. Subsequently, they narrowed down a list of possible assessment methods and the factors that influence those methods. To do this, they considered the perspectives of various stakeholders, including policymakers, faculty members, and students, using a method called multi-actor multi-criteria analysis (MAMCA).

According to Miranda et al. [5], in their study “An Investigation of Learning Needs in the Mining Industry” on training needs within the mining industry, mining is an inherently hazardous field with a significant risk of accidents. The authors emphasize that these accidents can be prevented through the implementation of proper safety measures. They argue that mining companies have a critical responsibility to prioritize these measures to safeguard the wellbeing of their workers and guarantee the long-term viability of the industry. Their research specifically focuses on training-related safety measures within the context of the ERASMUS+ project DigiRescueMe.

Tintori et al. [6] examine the increased risk of online dangers for children due to the surge in Internet usage during the COVID-19 pandemic. In their study “Children’s Online Safety: Predictive Factors of Cyberbullying and Online Grooming Involvement”, the authors analyze cyberbullying and online grooming among primary school students in Rome. Their research identifies factors that make children more vulnerable to these problems.

In the article “Chronological Progress of Blockchain in Science, Technology, Engineering and Math (STEM): A Systematic Analysis for Emerging Future Directions”, Dziatkovskii et al. [7] explore the transformative potential of blockchain technology in the context of Industry 4.0. The authors argue that this new digital landscape is shaping the future of humanity, which aligns perfectly with the United Nations Sustainable Development Goals (SDGs) on health and wellbeing (SDG3) and sustainable cities and communities (SDG11). Their primary goal is to shed light on how STEM fields are embracing blockchain technology.

The study by Sá et al. [8], entitled “Citizen Science in the Promotion of Sustainability: The Importance of Smart Education for Smart Societies”, explores the concept of Society 5.0, particularly in relation to digitization and sustainability. These authors argue that the achievement of Society 5.0 is not guaranteed. They point out that the changes it brings, along with its benefits, also carry risks. These include the widening of existing social inequalities within and between countries, as well as new inequalities in social, cultural, economic, and political spheres.

In the article “Connecting Classrooms with Online Interclass Tournaments: A Strategy to Imitate, Recombine and Innovate Teaching Practices”, Araya et al. [9] argue that online interclass tournaments can be a powerful tool for achieving the educational goals set by the United Nations Educational, Scientific and Cultural Organization (UNESCO) and modern curricula. The authors analyze four online interclass tournaments they have implemented over the past decade. This long-term perspective is essential to assess the long-term viability of new teaching methods. Their study found that interclass tournaments are practical for implementation in schools, promote a promising approach to teaching with a greater integration of subjects, and encourage the imitation, recombination, and innovation of teaching practices, and thus could present a viable strategy to promote educational innovation and improve the overall quality of education.

In the article “Game On, Reflection On: Reflection Diaries as a Tool for Promoting Reflection Skills in Geography Lessons”, by Baßeng and Budke [10], the researchers explore how reflection diaries could help students develop critical thinking skills in geography lessons that used digital games. The researchers found that the diary itself played a key role: by prompting reflection, it helped students step outside of the mindset of being a player and analyze the game more critically. The diary, integrated into the lessons, offered specific prompts to guide students’ reflections on the game’s content and challenge any geographical misconceptions they might have formed while playing.

Zhu et al. [11] introduce a new approach to finding relevant courses and jobs for students and employees, named the Graph-Community-Enabled (GCE) model, to address the challenge of matching the skills required for jobs with individuals educated in the relevant courses. In their article titled “Graph-Community-Enabled Personalized Course-Job Recommendations with Cross-Domain Data Integration”, the researchers use a technique called community detection to identify groups of related skills. This allows the model to link courses to relevant jobs based on the skills they target.

In the article “Making Urban Water Management Tangible for the Public by Means of Digital Solutions”, Stein et al. [12] explore the growing use of digital tools in water management, focusing on two case studies in Paris and Berlin. These solutions are seen as a promising way to improve decision making, automate processes, and ultimately achieve the United Nations SDGs related to water resources.

Davidavičius and Limba [13], in “Recognition of Digital Content Needs for Inbound Marketing Solutions”, set out to explore how people behave when consuming content in the context of inbound marketing. In this study, the authors are particularly interested in understanding why people need content and what motivates them to seek it out, especially for products that take a long time to use or consume.

In their study entitled “Relationship Recognition between Knowledge and Ability Based on the Modularity of Complex Networks”, Zou, Sun, and Zhou [14] introduce a new system for understanding how knowledge relates to an individual’s abilities. This system is based on the specific structure of modules within complex networks. The authors designed a model called the Knowledge Cognitive Interdependent Network (KCIN) to analyze these relationships.

In the article “Requirements of Modern Russian Agricultural Production for Digital Competencies of an Agricultural Specialist”, Khudyakova et al. [15] aim to identify the digital skills most in-demand in today’s Russian agricultural industry. The results stemming from their analysis of the existing curricula in Russian agricultural universities revealed the universities’ inadequacy in meeting the contemporary demands of agricultural production. This underscores the necessity for a thorough review of the curricula.

Li and Jiang, in their article “Research on the Teaching Reform of Inorganic Chemistry Based on SPOC and FCM during COVID-19”, ascertain that the pandemic has brought about a fundamental change in the Chinese education system, requiring teachers and students to adapt to online learning in a short period of time. The flipped classroom model can compensate for this deficiency. This study aimed to investigate the effectiveness of flipped learning based on small private online courses (SPOCs) and put forth explicit criteria for its reuse in higher education [16].

Based on data from the 2018 Teaching and Learning International Survey (TALIS), Jung and Woo [17] examine, in their article titled “Structural Model Analysis of Factors Affecting Sustainable Teacher Job Satisfaction in Korea: Evidence from TALIS 2018”, how factors such as preparedness, confidence in one’s abilities (self-efficacy), and career motivation influence teachers’ job satisfaction in Korea. Following the findings of their study, the authors put forth recommendations for enhancing sustainable job satisfaction, self-efficacy, and career motivation for teachers within teacher education programs.

The article “Students’ Environmental Care Attitude: A Study at Adiwiyata Public High School Based on the New Ecological Paradigm (NEP)” by Wibowo et al. [18] examines the environmental attitudes of students in Adiwiyata, Indonesia, in schools utilizing a

program known for promoting environmental responsibility. Their study emphasizes the importance of fostering positive environmental attitudes, examines how effectively these schools integrate environmental education into their curricula, and explores potential differences in environmental concerns between male and female students.

In their study titled “Students’ Perceptions towards the Role of Online Teaching Platforms in Enhancing Online Engagement and Academic Performance Levels in Palestinian Higher Education Institutions”, Tarazi and Ruiz-Cecilia [19] investigate how online teaching platforms affect learning and teaching from the perspective of undergraduate English students and explored the relationship between students’ engagement in online learning and their academic performance.

The article “Teachers’ Frequency of ICT Use in Providing Sustainable Opportunity to Learn: Mediation Analysis Using a Reading Database” by Hu and Hu [20] examines the relationship between how often teachers use information and communication technology (ICT) in their classrooms and how they provide learning opportunities that benefit students in the long term (sustainable learning opportunities). This article focuses on whether teachers’ confidence in their abilities (self-efficacy) and their ability to use different teaching methods to meet individual student needs (flexible strategy use/adaptive instruction) play a significant role in this relationship.

The article by Yu et al. [21], titled “The Cost of Caring: Compassion Fatigue Is a Special Form of Teacher Burnout”, explores the emotional toll that teaching can take. The authors surveyed over 1500 teachers in China, concluding that many experience compassion fatigue, a condition in which caring for students leads to emotional and professional burnout, as well as analyzing the differences in compassion fatigue between teachers from primary and secondary schools and its repercussions on students.

In their study “The Development and Evolution of Digital Leadership: A Bibliometric Mapping Approach-Based Study”, Karakose et al. [22] set out to explore the intellectual landscape and historical development of the field of digital leadership, with digital leadership acting as a broad term encompassing various leadership styles, and considered them as interchangeable concepts. The findings of their study unveil a gradual expansion and diversification in digital leadership research. This evolution enhances comprehension of the digital leadership research domain, offering insights into its conceptual framework and thematic progression.

Wang and Si [23], in their article “The Intersection of Public Policy and Public Access: Digital Inclusion, Digital Literacy Education, and Libraries”, explore how Chinese libraries can better serve the public in the digital age, focusing on the critical role that libraries play in bridging the digital divide by equipping people with the skills they need to participate fully in the digital world to build a more inclusive and equitable digital society. The findings highlight the policy framework, programs, and tactics aimed at advancing digital literacy and inclusion, stressing the pivotal role of libraries in spearheading efforts to promote digital inclusion and encourage active user participation.

In the study by Sofwan, Habibi, and Yaakob [24], titled “TPACK’s Roles in Predicting Technology Integration during Teaching Practicum: Structural Equation Modeling”, the researchers showcase the results of their research on the influence of a specific type of knowledge, namely technological pedagogical and content knowledge (TPACK), on how teacher candidates integrate technology into their students’ learning experiences.

## 2.2. Section II—Project Report

In their study “Okanagan Waterways Past, Present and Future: Approaching Sustainability through Immersive Museum Exhibition”, Dulic et al. [25] describe a research project and exhibition designed to raise awareness of the connection between people and water. This project, located in the Okanagan Syilx area, aims to inspire sustainable water use. It demonstrates how combining scientific research, academic knowledge, and practical applications can provide a deeper understanding of water sustainability specific to a particular place.

### 2.3. Section III—Reviews

Sá and Serpa [26], in their review “Metaverse as a Learning Environment: Some Considerations”, explore the potential of the metaverse to revolutionize education. The authors examine the challenges and opportunities of this virtual world, focusing on how it can create a more relevant and effective learning experience. Their discussion emphasizes the importance of conducting and monitoring research studies to track the impact of the metaverse on education.

In the review titled “Reconceptualizing Disabilities and Inclusivity for the Postdigital Era: Recommendations to Educational Leaders”, Uleanya [27] emphasizes the critical role of inclusive education in achieving global sustainable development. Uleanya’s research examines how scientific publications in South Africa represent the concept of inclusive education. The paper suggests that, in distance education, a shortage of technological resources can be seen as a form of technological disadvantage. Therefore, there is a need to consider inclusive education in relation to technological disadvantages.

Siddiqui and Schultze-Krumbholz [28] conducted a review titled “Successful and Emerging Cyberbullying Prevention Programs: A Narrative Review of Seventeen Interventions Applied Worldwide”. Their research focuses on evaluating existing cyberbullying prevention programs. These programs achieved success by engaging teachers through professional development and implementing a comprehensive, school-wide approach.

Dron’s [29] review, “The Human Nature of Generative AIs and the Technological Nature of Humanity: Implications for Education”, explores the implications of widely deployed generative AIs (GAIs) for education and society as a whole. It examines how GAIs might influence and even reshape our collective intelligence and analyzes various approaches to mitigating the potential drawbacks of GAIs while maximizing their potential benefits in education.

### 2.4. Section IV—Systematic Review

Finally, Falcón-Linares et al. [30], in their review “Impact of Social Media on Adolescence: Mapping Emerging Needs to Build Resilient Skills”, point to a growing body of research demonstrating the link between social media use and adolescent mental health, examining the factors that make adolescents more vulnerable, potential risks, comorbidity, and elements that can predict either a decline or an improvement in their mental wellbeing.

## 3. Conclusions

We would like to reiterate our deepest thanks to everyone who, in various ways, contributed to the success of this Special Issue. First of all, we would like to thank all of the authors who submitted their manuscripts, showing their confidence in our editorial work as Guest Editors. We would also like to thank the Editors-in-Chief and Editors of the journals involved, as well as the reviewers, who devoted their time and expertise to providing rigorous, constructive, and highly pertinent assessments, contributing significantly to improving the scientific quality of the manuscripts submitted. Last but not least, we would like to thank the Editorial Office for its invaluable support throughout the development of this Special Issue.

In summary, this set of high-quality publications made available to the reader has the potential to contribute to a rigorous and well-founded discussion on the Topic “Education and Digital Societies for a Sustainable World”. As Lyon [2] rightly points out, cross-disciplinary work is essential if sustainability is to be approached in a fruitful way, and we agree with his position as someone who emphasizes that, in addition to the three traditional pillars of sustainability—environmental, social, and economic—there may be a need to add other pillars, such as those relating to human, culture, or security aspects, considering that “The presence of more pillars aids in the shift from science to application to strategy for management” [2] (p. 1). Ultimately, by integrating this complementarity between these dimensions, heuristic capacities for the scientific apprehension of reality can be expanded.



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