



## The editorial of special issue on education, IT, and the COVID-19 pandemic

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Since the mid-March of 2020 when the World Health Organization declared COVID-19 a pandemic, the world has been fighting the virus for well over a year. Although much progress has also been made in vaccination and medical therapeutics, much of the world is still battling more deadly COVID-19 variants. Meanwhile, education systems in every country have experienced unprecedented challenges in delivering education through remote or online means at all levels of learning. Educators around the world have been resilient and creative in finding ways to teach classes and make learning happen by overcoming not only the difficult circumstances they encountered due to the pandemic, but also the limitation of local education and information technology infrastructures. This Special Issue of the Journal of Education and Information Technology is devoted to research studies that were based on what educators had experienced during the first eight months of the pandemic. The studies were designed to better understand the difficulties in remote learning, to investigate more effective delivery of education contents, and to find ways to improve remote-learning outcomes. As the pandemic continues, new educational technologies are emerging, as are new uses of existing digital tools. Furthermore, educators are gaining new capacities to teach remotely with technology, and even new understandings of how they might make best use of the pandemic-tested teaching methods they have developed going forward beyond the pandemic. We hope that the research articles gathered in this Special Issue are inspirational and practically useful. They may also help readers reflect on their own experiences, successes, and inevitable failures.

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More importantly, these articles carry the shared spirit of the educators around the world as we continue to navigate the current and prepare for future health crises.

We have received a total of 241 manuscripts and accepted 75 of them to be included in this Special Issue. Given the page limitation of this Special Issue, the decisions we made on submission acceptance were difficult. The published articles represent the authors' collective understanding about learning and teaching during the pandemic. In many ways, this understanding is also shared by the authors whose submissions were not included in this special collection. This understanding is not about what we might do in remote learning consistently across education districts or geographical boundaries, neither is it about technologies that can be effective in any virtual learning environments. It is an understanding of how education at all levels can be effectively delivered virtually, given geographical differences, the diversity of disciplinary constraints, and the variations in technology use. This understanding represents educators' collective wisdom, discovery, and diligence in delivering the education contents to students despite the impact of the pandemic. Perhaps more importantly, it is an understanding of how our education systems will be able to respond to future health crises – the systems that can weather emergencies, disruptions, and disparities in education environments.

The current pandemic has limited the role of physical classrooms, especially during its early stages when remote learning became necessary. The first theme of this Special Issue with, by far, the most articles is about how well students, at different levels, had engaged in remote learning.

- To what extent were students satisfied with their remote learning experiences?
- Can remote learning be collaborative or interactive?
- Are there gender differences in terms of learning efficiency and effectiveness in a remote learning environment?
- How would remote learning be connected to students' behavioral intentions to engage in learning with technology?
- How might students' socioeconomic status, language abilities, and life challenges affect their attitudes towards remote learning, their engagement in learning, and the learning outcomes?
- Is there a linkage between students' emotional dimensions and their acceptance of using new technologies in remote learning?
- In what way might students' demographic, use of digital devices, and habit of using the Internet be consequential to the levels of students' pandemic anxiety in a remote learning environment?
- What might be more effective learning strategies and pedagogies for certainly subjects where remote learning can be challenging, such as performing arts education, English language for non-native speakers, or physical education?
- What are the similarities and differences in acceptance and use of remote learning among students in different countries, or even in two different regions of the same country?

Readers will find discussions about, if not answers to, these questions, and many more in this Special Issue. Even with the shared educational objectives,

education systems around the world are different in terms of their service capacities, financial support, and levels of technology integration, and therefore are facing different challenges. However, students, no matter where they are in the world, are more common than they are different. But, because of disparities of local learning environments, what students felt and experienced in one local school can be very different in another even within the same locality. During the early stages of the pandemic, remote learning was emergent whether a school was ready or not. Thus, many of the problems students and teachers had experienced were inevitably associated with the level of readiness for remote learning of a local education environment. The problems demonstrated the vulnerability of education to the way lessons are delivered without a thorough preparation. As the pandemic evolved, some of the problems were alleviated, but new ones had surfaced. Meanwhile, remote learning also offered people opportunities to discover new ways of effective teaching and learning, and construct new models to test existing education theories. As the pandemic has persisted, the perspectives and just-in-time practices reported in this Special Issue, we hope, would provide readers not only valuable information to reflect upon their own experiences, but also resources to advance their own teaching practices.

Another theme in this Special Issue is about the wellbeing of teachers at all levels of education during remote teaching. Though information and communication technology (ICT) has been penetrating education at all levels for years, teachers around the globe can still be hesitant to embrace digital tools for a variety of reasons. However, the pandemic has left teachers with no choice but to use those digital technologies.

- What might be the factors that could influence teachers' acceptance and use of digital tools?
- How well were teachers prepared for taking full advantages of digital technologies?
- How were female teachers in handling the challenges when they were, at the same time, mothers with children studying remotely, educators, and novices of learning to teach using technology?
- Did teachers fully understand why students were struggling during remote learning?

The authors, like many of us, were trying to understand the answers to these questions and many more. To help with the investigations, they asked additional questions such as: Did students fully understand the challenges teachers were facing? Could some of the issues stem from inadequate mutual understanding between students and teachers when they viewed things differently? What were the perspectives of parents and the roles they play that could influence the process of remote learning and the outcomes? The authors also expanded their research capacities by taking advantages of the social media to gather data from user groups across a nation or the globe to understand the difficulties of emergent remote learning. Through a regional or even a global context, readers might be able to better view teachers' perceptions, pedagogical successes, and lessons learned to compare with their own.

A third theme of this Special Issue is about mechanisms of teaching and learning in a remote setting. For example, remote proctoring of exams is a complex mechanism in terms of ensuring the integrity of assessment. A few studies in this Issue provided analyses about appropriate technological architectures of remote proctoring systems, the types of exams that might be appropriate to be online-proctored, and the challenges remote proctoring may endure including privacy concerns. The studies also provided discussions about the issues associated with remote assessment mechanisms, which include various environmental factors that could be linked to psychological ramifications that could affect students' performances. Meanwhile, a technological bright spot reported was the use of mobile technologies, which, the authors believed, have significantly expanded the available digital learning capacities, and played a positive role in remote learning, particularly during the initial phase of the pandemic. They concluded that the ways mobile technologies can be used in remote learning can impact not only our pedagogy built on student interactions, but also concrete pedagogical strategies such as mobile-game based learning. Studies also explored the possibilities of integrating Massive Open Online Courses (MOOC) into remote teaching and learning, given the maturity of some MOOC platforms. The exploration seemed to suggest the potential to create learning models that would integrate MOOC to provide students complimentary ways of learning when local resources were limited.

There are certainly more themes than we can summarize in a short editorial. Collectively, these 75 papers illustrate a diverse range of topics and issues related to teaching and learning during the pandemic. They will appeal to both the researchers in the field and educators in general who might want to validate what they have done in emergent remote teaching to improve their own practices. As we continue to experience and evaluate the use of ICT in education to which this Journal is dedicated, we embrace the reality that ICT-featured remote or online education is here to stay. Despite the challenges, the pandemic has made educators around the world stronger in working towards the common goal of delivering the best education possible regardless of the means, the platforms, or the technologies we use.

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