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EDITORIAL

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Adoption of learning technologies in times of pandemic crisis

The transition of our world from analogue to digital affects all aspects of society, including the educational sector. Digital technologies change workflows for teachers' and learners and make educational logistics more efficient and flexible and digital technology providers are becoming an ever-growing market segment. Educational institutions are increasingly developing learning and teaching concepts that rely on the extensive use of digital technologies to transform traditional learning offer towards more blended and flexible learning experiences.

Despite the promises made and the many and varied national and international projects to adopt and roll out new educational technologies and interventions for elementary, secondary, and higher education, long-lasting institutional technology adoption has been hampered by a lack of continuous funding and resources to achieve the continued buy-in of stakeholders. The real impact of daily learning and teaching practices has been rather small and quickly fades out after a project has been completed.

The COVID-19 crisis forced all education providers to move their complete teaching concepts online. This rapid change was also coined as Emergency Remote Teaching (ERT). In this Special Issue, we put a finger on the pulse of this rapid change from traditional to ERT and online learning. We aimed to collect empirical data about behavioural and organizational change in the adoption of learning technologies due to the COVID-19 crisis. While many people have suffered both from and through the pandemic, it has also been a time of major behavioural change and quick adoption of digital means for learning and teaching. Many things that were not possible in the past due to data security, privacy, quality, or other higher goods were thrown overboard. Instead, a rather quick-and-dirty adoption of learning technologies was carried out. In that sense, the COVID-19 pandemic crisis may have had more impact on the adoption of learning technologies than all previous research projects together.

The special issue's non-exhaustive call asked for studies:

- investigating the impact of newly adopted learning technologies on students' learning processes;
- comparing staff members' use of learning technologies before and during the pandemic;
- investigating the organizational change due to digitalization of learning and teaching;
- investigating learning and teaching at all levels of education as well as from professional and informal learning scenarios in times of COVID-19.

We received an overwhelming response of 82 manuscripts that have been carefully reviewed and selected. In the current special issue, we have collected 15 articles from various backgrounds and clustered them into four main fields that have been reported during the pandemic. Those are: C.1 Knowledge exchange among scholars, C.2 Student motivation and engagement, C.3 Differences to traditional teaching, and C.4 School teacher professionalization. In the following section, we summarize and report the four clusters and there allocate articles in more detail.

1 | C.1: KNOWLEDGE EXCHANGE AMONG SCHOLARS

With the worldwide series of lockdowns starting from mid-March 2020, teachers had to rely on social media and events like workshops and conferences held online to interact with their professional networks and get support for ERT. Cluster 1 summarizes the changes during the first lockdown on social media (e.g., Twitter, Facebook) and the first online conferences that became the standard to meet and exchange ideas with the other professionals.

Alwafi (2021) observed the changes in teachers' professional learning network structure on Twitter before and during the COVID-19 pandemic. The study sample included 31,009 English language Tweets from 10 March 2020 to 25 July 2020. The author monitored changes in teachers' professional networks before and during the COVID-19 pandemic. Content analysis revealed that teachers' cognitive and affective posts increased significantly. Thematic analysis showed that, during COVID-19, teachers' tweets focused on issues around digital transformation, such as the use of digital tools, pedagogic aspects of technology, and student monitoring and assessment. Although the study finds that teachers interacted with individuals both within and outside their discipline and country, most teachers' interactions were with teachers from similar disciplines in the same country. The study underlines the need for educational systems, government agencies, and other stakeholders to practically implement online learning measures and strategies for ERT. However, in many countries, the needed technology adoption has also not been achieved after this second lockdown phase.

Luik and Lepp (2021) describe the changes in the activity and content of messages of a Facebook group during the transition to ERT at the beginning of the COVID-19. The results help to capture the changes in teaching and learning situations caused by the pandemic in

order to learn from these quick changes and be prepared for such situations in the future.

Asare, Yap, Truong & Sarpong (2021) examined the public perception about online learning for ERT. The authors collected a sample of included 31,009 English language Tweets Twitter API, Python libraries and NVivo, from 10 March 2020 to 25 July 2020. The study findings and recommendations underline the need for educational systems, government agencies, and other stakeholders to practically implement online learning measures and strategies for ERT.

Finally, Seidenberg et al. (2021) investigated how the new reality of social distancing and limited international travel affected the organization of academic conferences. Among disadvantages for social networking, results show satisfaction with social interaction, topics of interest, the perceived importance of learning, and getting an overview on the research topic. For some researchers, virtual participation might be a valuable alternative to attending a conference in person and we might also learn from the COVID-19 pandemic for future challenges like the climate crisis.

2 | C.2 STUDENT MOTIVATION AND ENGAGEMENT

The literature knows that students' motivation is positively related to their behaviour, academic achievement, and perception of learning environments. With the COVID-19 pandemic, there is a need to understand how ERT are related to students' motivation.

Rahman et al. (2021) investigated the mediating role of online learning motivation in the COVID-19 pandemic situation in Bangladesh by observing and comparing direct lectures, instructor–learner interaction, learner-learner interaction, and internet self-efficacy as predictors of online learning motivation and online learning satisfaction. The study shows a significant mediating role of online learning motivation between the independent variables and learning satisfaction. In addition, direct lectures, instructor–learner interaction, and internet self-efficacy are shown to be significant predictors of student satisfaction.

Göksu et al. (2021) investigated which psycho-demographic variables affect students in higher education during the pandemic. They measured how stress, anxiety, depression and intolerance of uncertainty were correlated with distance learning motivation and frequency of distance learning attendance. Findings highlight the need for analysis of psycho-demographic variables while designing and implementing distance education programmes especially in times of a crisis like the pandemic.

Heo et al. (2021) researched self-efficacy in time management, technology use, and online learning environments during the pandemic. The study shows a strong correlation between the various elements with self-efficacy. Self-efficacy in technology use had a significant but negative influence on learning engagement and positively impacted self-efficacy in an online learning environment. Self-efficacy in time management had a significant positive impact on Self-efficacy in an online learning environment and learning engagement.

Stevanović et al. (2021) also carried out research on motivation of starting students versus more advanced students. Results demonstrate that students' demographic characteristics such as year of study, academic performance, and previous experience with distance learning can be related to the perception of motivation.

Su and Guo (2021) explored the role of six factors, namely, system quality, course design, learner-learner interaction, learner-instructor interaction, learner-content interaction, and self-discipline during the pandemic with a structural equation modelling method. The results demonstrated that these determinants had a positive effect on satisfaction and learning outcomes, whereas learner-instructor interaction had no significant effect.

3 | C.3 DIFFERENCES TO TRADITIONAL TEACHING

The quick transition from traditional teaching to ERT had various drawbacks in teacher-to-student communication and how starting and more advanced students could handle the situation. Cluster 3 aims to describe differences from traditional teaching to ERT and shows how the pandemic forced Universities to adopt technologies like virtual reality for the training of nurses to prevent further COVID-19 infections in the hospital.

Al Shlowiy et al. (2021) investigated the teacher-student miscommunication and discrepancies between language learners and their teachers' during emergency remote teaching. The results showed that teachers believed that students required additional training on using learning management systems, that students did not take online teaching seriously, and that emergency remote teaching would encourage students to cheat. Students disagreed with these statements. The authors discuss the implications of these teacher-learner discrepancies in light of the need for explicit guidelines and clearer expectations of students during online learning and assessment during ERT.

Among teacher-learner communication, the examination of differences between starting students and more advanced students in the pandemic received close attention during ERT. Because the starting students missed all traditional face-to-face introduction sessions by the universities, and were also unable to build up their network of peers due to distancing regulations. Baruth et al. (2021) found well-known benefits of distance learning, like flexibility and personalized learning pace. Nevertheless, the findings revealed that ERT posed challenges and difficulties, mainly concerning the readiness of students and instructors for this form of teaching and learning.

There were various papers on specific interventions that have been conducted during summer 2020. For instance, Liu and Butzlaff (2021) faced the challenge that nurses in education were no longer allowed to enter the simulation training for patient treatments. In the meantime, there were high demands on qualified medical staff to fight the COVID-19 cases in the hospitals. In their article, they report the adoption of virtual reality for the training of nurses to prevent infection in the hospital.

4 | C.4 SCHOOL TEACHER PROFESSIONALIZATION

The school sector received special attention during the COVID-19 pandemic. On the one hand, the lockdown limited the natural development of young kids and their families and put them into difficult situations. On the other hand, the school sector was less digitalized than the higher education system in many countries and therefore had more difficulties establishing ERT. Cluster 4, therefore, focuses on the training and adoption of educational technologies by teachers during the pandemic.

Menabò et al. (2021) investigated how the two main factors of the Technology Acceptance Model (TAM), namely perceived usefulness and perceived ease of use, combined with online teaching self-efficacy, were associated with using technology to teach. They identified particular training needs of teachers in countries where integration of technology into teaching is low. These trainings are particularly crucial in encouraging teachers to manage distance and blended learning scenarios after the pandemic.

Similarly, Dindar et al. (2021) reported that teachers should not be regarded as unified when managing school technology adoption. They compared Learning Management System (LMS) acceptance of Finnish K-12 teachers who have been using a specific LMS as part of their regular teaching before the COVID-19 pandemic (experienced group) and teachers who started using it for emergency remote teaching during the pandemic (inexperienced group). Their findings revealed no differences between the two groups of teachers regarding performance expectancy, effort expectancy, Learning Management System self-efficacy and satisfaction. For the experienced group, the most significant predictor of satisfaction with the LMS was performance expectancy, whereas, for the inexperienced group, it was the effort expectancy. Further, support was also a significant predictor of behavioural intention for the inexperienced group.

Sung et al. (2021) describe how a secondary school chemistry teacher adopted a scalable remote laboratory (i.e., Telelab) to give online-learning students unlimited access to investigate everyday phenomena of inquiry-based learning in Summer 2020. The result implies that inquiry via Telelab is a promising method for the era of remote labs 2.0. Learners are empowered to co-design experimentations with lab hosts, a paradigm shift from a traditional centralized and staged remote lab model. Such synchronous student-teacher-lab interactions would promote telepresence, which is especially desirable during physical distancing amid global pandemics.

We are confident that these four clusters of articles have at least partly contributed to curating rapid behavioural changes that were demanded due to the COVID-19 pandemic between March 2020 and October 2021. This historical phase showed us that rapid behavioural changes and adoption are also possible in so-called normal times. We hope that some of the positive experiences we made in these extraordinary circumstances will last longer than the COVID-19 emergency and finds a sustainable way into the new normal of a post-corona education system.

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REFERENCES

Al Shlowiy, A., Al-Hoorie, A. H., & Alharbi, M. (2021). Discrepancy between language learners and teachers concerns about emergency remote teaching. *Journal of Computer Assisted Learning*, *37(6)*, 1528–1538. https://doi.org/10.1111/jcal.12543

Alwafi, E. (2021). Tracing changes in teachers' professional learning network on Twitter: Comparison of teachers' social network structure and content of interaction before and during the COVID-19 pandemic. *Journal of Computer Assisted Learning*, *37(6)*, 1653–1665. https://doi.org/10.1111/jcal.12607

Asare, A. O., Yap, R., Truong, N., & Sarpong, E. O. (2021). The pandemic semesters: Examining public opinion regarding online learning amidst COVID-19. *Journal of Computer Assisted Learning*, *37(6)*, 1591–1605. https://doi.org/10.1111/jcal.12574

Baruth, O., Gabbay, H., Cohen, A., Bronshtein, A., & Ezra, O. (2021). Distance learning perceptions during the coronavirus outbreak: Freshmen versus more advanced students. *Journal of Computer Assisted Learning*, *37(6)*, 1666–1681. https://doi.org/10.1111/jcal.12612

Dindar, M., Suorsa, A., Hermes, J., Karppinen, P., & Näykki, P. (2021). Comparing technology acceptance of K-12 teachers with and without prior experience of learning management systems: A COVID-19 pandemic study. *Journal of Computer Assisted Learning*, *37(6)*, 1553–1565. https://doi.org/10.1111/jcal.12552

Göksu, İ., Ergün, N., Özkan, Z., & Sakız, H. (2021). Distance education amid a pandemic: Which psycho-demographic variables affect students in higher education? *Journal of Computer Assisted Learning*, *37(6)*, 1539–1552. https://doi.org/10.1111/jcal.12544

Heo, H., Bonk, C. J., & Doo, M. Y. (2021). Enhancing learning engagement during COVID-19 pandemic: Self-efficacy in time management, technology use, and online learning environments. *Journal of Computer Assisted Learning*, *37(6)*, 1640–1652. https://doi.org/10.1111/jcal.12603

Liu, Y., & Butzlaff, A. (2021). Where's the germs? The effects of using virtual reality on nursing students' hospital infection prevention during the COVID-19 pandemic. *Journal of Computer Assisted Learning*, *37(6)*, 1622–1628. https://doi.org/10.1111/jcal.12601

Luik, P., & Lepp, M. (2021). Changes in activity and content of messages of an Estonian Facebook group during the transition to distance learning at the beginning of the COVID-19 pandemic. *Journal of Computer Assisted Learning*, *37(6)*, 1629–1639. https://doi.org/10.1111/jcal.12602

Menabò, L., Sansavini, A., Brighi, A., Skrzypiec, G., & Guarini, A. (2021). Promoting the integration of technology in teaching: An analysis of the factors that increase the intention to use technologies among Italian teachers. *Journal of Computer Assisted Learning*, *37(6)*, 1566–1577. https://doi.org/10.1111/jcal.12554

Rahman, M. H. A., Uddin, M. S., & Dey, A. (2021). Investigating the mediating role of online learning motivation in the COVID-19 pandemic situation in Bangladesh. *Journal of Computer Assisted Learning*, *37(6)*, 1513–1527. https://doi.org/10.1111/jcal.12535

Seidenberg, N., Scheffel, M., Kovanovic, V., Lynch, G., & Drachsler, H. (2021). Virtual academic conferences as learning spaces: Factors associated with the perceived value of purely virtual conferences. *Journal of Computer Assisted Learning*, *37(6)*, 1694–1707. https://doi.org/10.1111/jcal.12614

Stevanović, A., Božić, R., & Radović, S. (2021). Higher education students' experiences and opinion about distance learning during the Covid-19 pandemic. *Journal of Computer Assisted Learning*, *37(6)*, 1682–1693. https://doi.org/10.1111/jcal.12613

Su, C.-Y., & Guo, Y. (2021). Factors impacting university students' online learning experiences during the COVID-19 epidemic. *Journal of Computer Assisted Learning*, *37*(6), 1578–1590. https://doi.org/10.1111/jcal.12555

Sung, S. H., Li, C., Huang, X., & Xie, C. (2021). Enhancing distance learning of science impacts of remote labs 2.0 on students' behavioural and cognitive engagement. *Journal of Computer Assisted Learning*, *37(6)*, 1606–1621. https://doi.org/10.1111/jcal.12600