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Adapting Science and Mathematics Instruction During the Coronavirus Pandemic

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Introduction

In March of 2020, our lives changed quickly and drastically. The COVID-19 pandemic had an impact on all aspects of our daily routines. Under shelter-in-place restrictions, we had minimal direct access to the outside world, beyond essential tasks like food shopping, and most interactions with others, beyond our household members, were virtual. With respect to our positions as educators, we also had to transition our instruction to a virtual environment in a short period of time. As the editors of EJRSME, we thought this was an opportunity for our colleagues to share their experiences, approaches, and innovations with others in the fields of science and mathematics education. Therefore, we put out a special call for articles that addressed instruction during this unique time. We purposefully requested brief articles so that authors could develop practitioner-oriented pieces within a fairly short time frame.

The first three of these articles were published in the previous issue (Vol 24 No 2). In the first article, *Harnessing Divine Nonchalance: Teaching Everyday Science in a Pandemic*, Madden (2020), a science teacher educator, describes the authentic science explorations that she conducted with her first-grade, twin sons at home as well as how she shared these experiences with others via social media. Nasr (2020), a secondary science teacher, wrote the second article, *Teachers as Students: Adapting to Online Methods of Instruction and Assessment in the Age of COVID-19*, in which she discusses how she incorporated technological tools, alternate forms of assessment, and a pedagogy of care into her practice. Finally, in *A Physics Lab Course in Times of COVID-19*, Pols (2020) reports how experiments requiring only materials and tools available at students' homes were created for a university first-year physics lab course. The students' work revealed that the pre-COVID-19 course did not sufficiently develop students' ability to design an inquiry-based experiment.

The Current Issue

Since we received a number of highly informative submissions responding to the call, we decided to create an issue solely dedicated to these articles. Hence, the current issue is a Special Issue focused on how science and mathematics educators have adapted their instruction in response to the COVID-19 pandemic. The Special Issue includes nine articles that range across various types of courses, including science methods courses and science content courses for preservice teachers (PSTs), a science content course at the secondary level, and lab courses. The first article, *Science Teacher Education in the Time of COVID-19: A Document Analysis*, serves as an introduction to the remaining articles in the issue. The authors, Fackler and Sexton, examined how science teacher educators moved from face-to-face to remote instruction via online forums. Their analysis revealed five overarching themes related to this transition: modification of teacher education, adoption of online interactive tools, ways to address emergent concerns, shifting foci of science methods courses, and collaboration

with the larger community. These themes are evident throughout the other articles in this Special Issue.

The next set of four articles address courses for PSTs. In *Teaching Science Methods Online During COVID-19: Instructor's Segue into Online Learning*, Brown purposefully planned assignments for PSTs to explore and observe their local outdoor environments to address a previously observed PST fear of interacting with nature. Gilles and Britton also describe new activities they created for their PSTs in their science methods course in *Moving Online: Creating a Relevant Learning Experience for Preservice Teachers in the Time of COVID-19*. The two-pronged assignment involved PSTs interviewing cooperating teachers about their experiences transitioning to online learning and using what they learned to design an online science activity that students could complete at home. In *Teaching Preservice Teachers About COVID-19 Through Distance Learning*, Graham, Tolar, and Hokayem addressed the content standards of their science content course for elementary PSTs through shifting the content focus of the course to COVID-19. Lastly, Wu, Pearce, and Price share an array of virtual engagement activities for a science methods course in *Creating Virtual Engagement for Preservice Teachers in a Science Methods Course in Response to the COVID-19 Pandemic.*

The remaining set of four articles pertain to science content and lab courses. In *Evolution in the Digital Age: Implementation of 5E and NGSS in the Virtual Biology Classroom*, Maulucci and Guffey describe how K-12 teachers can adapt their instruction to continue inquiry-based instruction in the "digital landscape." Vasquez offers guidance on how college science instructors can adapt laboratory experiences to an online platform in *Developing an Online Learning Environment for Community College Students Enrolled in Human Anatomy & Physiology and Microbiology Courses Amid the COVID-19 Pandemic.* In *A Pandemic-resilient Open-inquiry Physical Science Lab Course which Leverages the Maker Movement,* Bradbury and Pols identify qualities of a course that makes a transition to online delivery inherently much smoother - helpful information for planning future courses in light of uncertain times. Lastly, in *The Corona Research Super Project: A Virtual Transdisciplinary Research Project,* Sommers et al. describe how the COVID-19 quarantine led to the development of a collaborative transdisciplinary research project between a university medical center and various educational programs at another university, allowing students to fulfill their degree requirements while complying with the guidelines of institutions and the government.

Conclusion

We see the ideas presented in these articles as having several implications for science and mathematics educators. First, as the pandemic continues to impact instruction, the articles include innovative approaches for distance learning that can be incorporated into practice. The pandemic has also affected how we can safely conduct research. However, the situation lends itself to the possibility of integrating teaching and research responsibilities. By purposefully collecting and analyzing data, we can examine the practices presented in this issue and their implications for student learning. Finally, when we eventually transition back to more typical instructional circumstances, we can then make informed decisions about which of these practices we may want to continue using due to the benefits they afford.

References

Madden, L. (2020). Harnessing divine nonchalance: Teaching everyday science in a pandemic. *Electronic Journal for Research in Science & Mathematics Education, 24*(2), 158-167.

Nasr, N. (2020). Teachers as students: Adapting to online methods of instruction and assessment. *Electronic Journal for Research in Science & Mathematics Education, 24*(2), 168-171.

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SAVE THE DATE

We previously shared that the ICRSME XVI Consultation was planned for March 2021 in Panama City, Panama. After careful consideration of the current uncertainty regarding travel restrictions, budgets, and most importantly health and safety, we decided to delay ICRSME XVI until March 2022.

However, sometimes unfortunate situations reveal opportunities. In the unexpected interim, to continue the camaraderie and collaboration, hallmarks of ICRSME, we are excited to announce a virtual meeting, which will take place on **Saturday, March 20, 2021** from 9AM to 4:15PM CST. More details about participation and format will be forthcoming over the next couple of months.