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Editorial: A Report on the 2021 National Technology Leadership Summit

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with Glen Bull, Marie Heath, Dan Krutka, and Elizabeth Langran

On September 23-24, 2021, national teacher education leaders, editors of educational technology journals, and representatives from the nonprofit sector and industry convened again in person (after last year's virtual meeting) for the annual National Technology Leadership Summit (NTLS). NTLS serves as a unique venue for cross-disciplinary dialog among teacher education leaders representing core content areas and educational technology associations. The summit moved to a new location this year at the National Press Club, Washington, DC, and was generously supported by the Society for Information Technology and Teacher Education (SITE), the Chan Zuckerberg initiative, and the National Education Association.

NTLS featured presentations and updates by leading agencies and organizations in the field of educational technology, including the Office of Educational Technology (U.S. Department of Education), the National Science Foundation, and EdTech Evidence Exchange. In addition, NTLS has two staple events every year: (a) a panel featuring presidents of teacher educator associations discussing contemporary and pressing issues at the intersection of technology and teacher education, and (b) a panel featuring editors of educational technology journals. This year's editors' panel, hosted by Chrystalla Mouza (*CITE Journal*) and Tristan Johnson (*Educational Technology Research & Development*) focused on best practices in academic publishing based on the unique experiences of the editors. This was prompted by a recent publication supported by the Association for the Advancement of Computing in Education (AACE), titled "What Journal Editors Wish Authors Knew About Academic Publishing" (Hartshorne et al., 2021), where many of the panel editors contributed chapters focusing on their respective journals.

The 2021 NTLS was again organized around three strands: (a) Moving Forward With Ed Tech Policy; (b) Technoethics in Educational Technology; and (c) Art, Music, and Coding.

The Moving Forward With Ed Tech Policy strand was facilitated by Elizabeth Langran (SITE) in collaboration with Chris Rush and Ji Soo Song (U.S. Department of Education's Office of Educational Technology). This group focused specifically on ways policy can be leveraged to address barriers in the way of innovation in education. A starting place for the conversation was simply defining "innovation." Working through, first, a problem-identification and then problem-solving phase, the small group conversations dug deep into equity and access gaps, standardized testing pressure that discourages trying out new strategies and technologies, and the wide range of support needed to allow teachers, families, and other stakeholders to feel assured that they can engage in innovative practices and try out new technologies.

The group concluded that inclusive and equitable national education research must be continuously driven by diverse stakeholders on the ground, including researchers, educators and administrators, families/caregivers, communities, and federal/state/local policymakers. To sustain the work of the strand, a roundtable with representation from a wider range of these stakeholders would be necessary to create actionable policy recommendations, which may be part of conference panel presentations or a grant-supported project. The conversation will continue with the Office of Educational Technology and other interested strand participants.

The Technoethical and Critical Strand of NTLS centered around the notion that "technologies are not neutral and neither are the societies to which they are introduced" (Krutka et al., 2020, p. 108). The strand facilitators — Marie Heath and Dan Krutka (*CITE Journal* Social Studies Education Editors) — facilitated discussion of two readings: the first chapter of Audrey Watter's 2021 book, *Teaching Machines: The History of Personalized Learning*. and the 2020 Netflix documentary, *Coded Bias*. These readings were intended to orient teacher educators' thinking and action around the ways that technology can cause harm in schools and society.

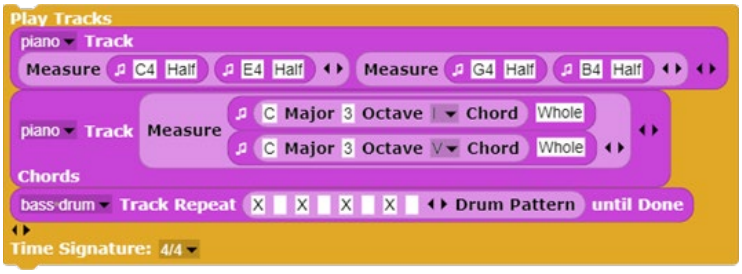
Participants in the strand produced a proposal submitted to the annual SITE conference calling for educational technology researchers to reflect upon and declare their orientations toward technology. To encourage this reflection, the authors proposed a framework to consider positionality, ethics, and technology.

Another group is, as of this writing, still creating a critical inquiry unit for secondary students and teacher candidates that mirrors many of the themes of the *Coded Bias* documentary. The participants in this strand hope this work provokes teacher educators to advance educational and just pedagogies in their work as teachers and scholars.

The Art, Music, and Coding strand of this year's NTLS, facilitated by Glen Bull, Jo Watts, and Rachel Gibson (University of Virginia), explored ways in which technology can be used in the arts and humanities. This year is

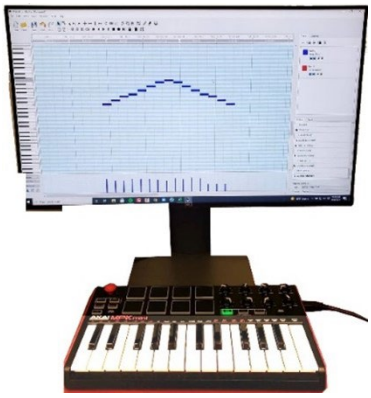
the 50th anniversary of "Twenty Things to Do with a Computer," a paper by Seymour Papert and Cynthia Solomon (197X). Many of the activities suggested in this groundbreaking work involved art and music. Advances in technology make an even broader array of activities in the arts feasible today. Participants in this strand explored activities in the arts, including creation of music using TuneScope (www.TuneScope.org), a code-based system for composing music. Separate music tracks for the melody, backing track chords, and drums can be composed (Figure 1).

Figure 1
Sample Music Tracks for a Tune Created in TuneScope



Music tracks can be constructed directly in TuneScope by entering notes through the computer keyboard or they can be composed by using an external device such as Musical Instrument Digital Interface (MIDI) keyboard (Figure 2). These capabilities provide the equivalent of a code-based Digital Audio Workstation (DAW). The melody, chord track, drum track, and individual instruments to be isolated in separate tracks to be independently adjusted to create a final mix. Introducing coding and computing concepts in the context of music has proven to be broadly appealing to diverse audiences.

Figure 2
Music Can Be Composed in Tunescope Using a MIDI Keyboard



In addition to engaging with hands-on activities, participants in this strand discussed their rationale for incorporating coding into the curriculum through arts and music. Specifically, two rationales for incorporating these types of activities in K-12 classes were discussed. One rationale is that the broad appeal of the arts can broaden participation in

coding and computer science, leading to greater diversity in STEM fields. Blake West, a senior policy analyst at the National Education Association, discussed how he used music as a context for exploring mathematical concepts in high school classes that he taught. A second rationale is that art and music are worthwhile topics for exploration in their own right and can be enriched by the use of technology. As follow up, the group agreed to collaborate on a paper exploring contexts in which the arts and technology might be appropriately incorporated in formal and informal learning environments.

Description of Current Issue

This issue of *CITE Journal* includes a collection of articles examining the role of professional development (PD) in helping preservice and in-service educators learn about and integrate different types of emerging technologies in teaching and learning, including technologies that support learning to understand and create (e.g., coding, virtual reality), technologies that support learning by collaborating (e.g., video-based discussions), and mobile technologies (e.g., geospatial tools) that support anytime-anyplace learning (Mouza & Lavigne, 2013). Collectively, these articles demonstrate the important role of PD in supporting teacher understanding of emerging technologies while simultaneously helping readers re-envision the role of technology in creating new opportunities for teacher and student learning and identity development.

The CITE-Science Education article, "Assessing STEM identities in Intergenerational Informal STEM Programming," examines the development of a survey instrument that characterizes and quantifies STEM identity development. The work is conducted in the context of an National Science Foundation funded project aimed at studying STEM identification in teens and adults working in intergenerational partnerships on authentic conservation projects. The focus is on five identity constructs for science and technology, including competence, performance, external recognition, self-recognition, and ways of seeing and being. Through repeated survey administration the authors examined differences in identity development among adult and teens as well as improvements over time. They also examined the reliability of the instrument using data over a 2-year period. This work is important as it provides instruments for revealing and monitoring identity development as well as documenting outcomes in informal science learning experiences. It also provides a unique model for supporting science in informal settings while leveraging intergenerational learning.

In the CITE-English Language Arts Education section, "Going the Distance: Using Flipgrid to Mediate Race Discussions Across Two Young Adult Literature Courses" examines the discursive moves preservice teachers made while engaging in discussions on racial injustice using a video based application called Flipgrid. Participants included preservice teachers (N = 21) enrolled in two young adult literature courses in two separate institutions. Participants engaged in reading and subsequent conversations in Flipgrid using cultural and political vignettes. The authors analyzed short videos focusing on participants' use of language, critical racial literacy, and discursive moves when discussing racial dilemmas. Further, the authors conducted semiformal interviews with a

small set of participants. Findings indicated that participants were able to move toward challenging peers and to reflect on cultural assumptions and racial bias. In this work, technology supported collaboration and the opportunity to examine alternative perspectives across distance. As the authors eloquently concluded, "Expecting future ELA teachers to be able to talk about racial injustice without practice is unrealistic. How one goes about preparing teachers to have these difficult conversations is not easy but is essential." Technology may provide the means of facilitating those difficult conversations in preservice contexts.

Also in this journal section, "Leveraging Virtual Professional Development to Build Computational Thinking Literacies in English Language Arts Classrooms" focuses on the transition to virtual PD for English language arts teachers around the infusion of computational thinking (CT) in disciplinary teaching. Participants included 14 middle school and 13 high school teachers. Data were collected from multiple sources including pre- and postsurveys on participants' beliefs and self-efficacy toward CT, teacher interviews, PD artifacts, and reports on classroom implementation. Findings from this study demonstrate that participants were able to leverage learning successfully from virtual PD to understand the manner in which CT connects to their own standards and curriculum. Further findings indicated that teachers pursued different pathways in the way they applied learning into practice. The authors, in particular, point to some important lessons learned from this work, such as connecting CT with familiar content and identifying different pathways for CT infusion as teachers appropriate and adapt PD learning into practice. These are valuable lessons for PD providers as we seek to advance computer science for all initiatives.

The CITE-Math Education article, "The Effects of Robotics Professional Development on Science and Mathematics Teaching Performance and Student Achievement in Underserved Middle Schools," also focuses on PD related to computing, but in this case with an explicit focus on robotics. Specifically, the authors examine the impact of robotics PD on middle school science and mathematics robotics instruction and its subsequent impacts on students' mathematics achievement. Data were collected through different sources including pre/post robotics teaching competency surveys, teaching observations using an observation protocol, and student mathematics achievement data using a control sample to determine growth that could be attributed to the robotics PD. Findings indicate modest gains in teachers' competencies and performance. Although students in the robotics group experienced learning growth at a higher percentage than the control sample, results were not statistically significant. Although clearly the study cannot establish a direct link between PD and student achievement, this work points to the promise of PD and robotics in supporting mathematics teaching and learning in underserved contexts. Establishing a direct link between PD and student outcomes has been a major challenge for the field, and studies like this can help us get one step closer to understanding the complex relationship among PD, teacher outcomes, and student achievement.

The CITE-General section article, "Using Virtual Reality During Remote Learning to Change the Way Teachers Think about Geometry, Collaboration and Technology," offers new ways of using an emerging

technology to help mathematics teachers understand both pedagogy and the mathematics itself. The study was conducted with a small sample of in-service teachers who explored a virtual reality (VR) simulation for learning about geometric shapes in the context of an education course delivered virtually. The authors examine participants' perceptions of the affordances and limitations of VR technology for learning mathematics before and after their experience. Data were collected through a survey focusing on attitudes about gesture for learning and instruction as well as a technology autobiography. Further video from participants' interactions with the simulation as well as end of class discussion was also collected and analyzed. Findings indicate that teachers identified VR affordances related to engagement, tangibility, collaboration and dynamicity. Concerns focused around space, cost, and physical issues. This work is critical as we seek new ways of supporting learning with emerging technologies and identifying disciplinary content most suited for different tools.

I hope *CITE Journal* readers enjoy these articles over the winter break. Please consider submitting a commentary!

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