

# Preface

*Next Generation Digital Tools and Applications for Teaching and Learning Enhancement* continues the exploration of how digital tools and applications are impacting current and future teacher education, and by implication, the preK-12 classroom. This book continues the exploration of the intersection of teacher education and the rapidly expanding landscape of technology. The various chapters represent the convergences of these two arenas, and the ways that teacher educators, teacher candidates and classroom teachers can navigate through and with these encounters. Just as importantly, they capture the ways these convergences have already impacted classrooms. The various authors take both an exploratory and practical approach to their topics, so that their current research illuminates, and current practices demonstrate the most promising opportunities to support student achievement and practitioner professional development.

This book's chapters are organized into four themes that explore teacher preparation and practice through critical examination of digital tools, development of technological competence and thoughtful use of technology by and with pre-service and inservice practitioners. All of the authors in this compilation present their research in such a way that balances both meaningful learning experiences for students and the skillful digital implementation by teachers.

## SECTION 1

In Section 1, "Technologies and New Learning Spaces," the contributors explore digital applications that facilitate positive learning opportunities for teacher candidates, particularly in the use of mixed reality simulation and digital literacies.

In Chapter 1, "Mixed Reality Simulation: A Next-Generation Digital Tool to Support Social Emotional Learning," Kristin Murphy and Amy Cook argue that implementing a social emotional learning (SEL) curriculum alongside academics is essential to the teaching and learning process. Through the lens of situated learning theory, the authors explore how mixed reality simulation (MRS) provides learners with active opportunities to develop SEL in conjunction with academics. Murphy and Cook describe MRS as, "approximations of practice that bring skills to life in a safe rehearsal space that are less complex than a real life setting." This interesting and informative chapter offers a glimpse into a fascinating new technology that has implications for academic learning and the development of essential SEL skills.

In Chapter 2, "The Evolution of Teacher Education through Emerging Technologies of Mixed Reality Simulation," Denise LaVoie Sargent provides a systematic literature review of studies using mixed reality simulation (MRS) in preservice and inservice teacher education. She examines how MRS is used to facilitate teacher development in classroom management and behavioral interventions. According to

LaVoie Sargent, MRS “can provide realistic situations that facilitate the connection or transfer of theory to practice.” Lastly, she offers suggestions for pedagogical and instructional strategies and opportunities for collaboration with adults and parents.

In Chapter 3, “Using Technology to Promote Student Ownership of Retrieval Practice,” Steven Courchesne and Stacy Cohen discuss the ways teachers can facilitate student practice of retrieval strategies through three select education technologies – Quizlet, Popplet, and Google Docs. The authors explore the value of retrieval practice and how teachers can use each of the aforementioned technologies to improve long term retention of information learned. Ideas for future research regarding the benefits of retrieval practice for different populations of students is discussed.

## **SECTION 2**

Section 2, “Technologies in Support of Content Acquisition,” presents a variety of ways that technology is harnessed on behalf of content area learning in the classroom.

In Chapter 4, “Using Geospatial Technology to Promote Middle School Students’ Critical Thinking on Socioscientific Issues,” Wardell Powell demonstrates how Geospatial Technologies promote middle school students’ abilities to think critically and to argue persuasively on socioscientific issues. Powell grounds his work within the Socioscientific Issues (SSI) framework and posits that the knowledge students gained through their interaction with geospatial technologies enhanced their abilities to develop and articulate arguments related to the socioscientific issues they investigated.

In Chapter 5, “Case Study of Urban 4<sup>th</sup> and 5<sup>th</sup> Grade Teachers and Students Engaged With E-Texts,” Sarita Belmont and Christine Woodcock explore the effect of an explicit teacher and student training model designed for reading with e-texts. Using case study methodology, the authors provide a rich description of the three themes that emerge from their study (agency, access, and engagement) and provide tangible instructional applications for the use of E-Texts in urban classrooms.

In Chapter 6, “Library Media Specialists Roles in the Implementation of Digital Tools, Applications, and Standards,” Kelly Paynter discusses the benefits for classroom teachers and school library media specialists when collaborating in the planning, differentiation, and assessment of content-area standards through technology and information literacy. Paynter provides school district administrators and inservice and preservice teachers with detailed recommendations on how to collaborate with library media specialists and ultimately impact the well-being of classroom teachers. Additionally, ideas for future research focused on student achievement are discussed.

All of these researchers re-envisioned new pedagogical practices that aligned technology with the development of content knowledge, both of which mutually support student learning.

## **SECTION 3**

In this section, “Technologies in the Education of Teachers,” the three chapters provide a lens into addressing educational inequities through the use of digital tools and applications.

Nicholas Wilson’s Chapter 7, “New Barriers to Technology Integration and Digital Education Equity,” examines the barriers to technology integration in the classroom and proposes a re-focusing on students’ identity development and agency to overcome social and educational inequities. Wilson’s literature review

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highlights three areas in need of further research when considering digital inequalities – technology integration, institutional structures, and the cultivation of opportunities for equitable engagement. This primer on technology integration provides a backdrop for researchers to delve more deeply into the issues and challenges associated with technology integration.

In Chapter 8, “Universal Design for Learning: Culturally Responsive UDL in Teacher Education,” James Cressey, proposes a re-envisioning of universal design for learning (UDL) through framing accessibility as an equity goal that provides a lens to examine ableism, racism, and other structural inequities in the classroom. Cressey highlights four reasons UDL should be used in teacher education and offers a window into his use of UDL with preservice teachers. Looking inside Dr. Cressey’s classroom provides teacher educators with ideas and practices they can use when implementing with UDL with preservice teachers. Lastly, Cressey examines the future of UDL in teacher education.

In Chapter 9, “Disability, Culture, and Technology: Issues, Challenges, and Applications in the Ghanaian Classroom,” Sefakor Grateful-Miranda Ama Komabu-Pomeyie,” explores the cultural responsiveness of technology within the Ghanaian disability community through two lenses – disability law in Ghana and global social protection policies. She argues that to be effective for persons with disabilities new technologies must be culturally orientated and diverse. Grateful-Miranda Ama Komabu-Pomeyie concludes with recommendations to educators and policy makers on how to address the inequalities that exists within the Ghanaian educational system for persons with disabilities and how technology, although important to those with disabilities, has the potential to be exploitive.

These three chapters underscore the possibilities and challenges inherent in the adoption of technology to increase equity and access for all members of our communities.

## **SECTION 4**

The three chapters in this final section, Section 4, under the theme “Technologies Across the Professional Lifespan,” offer models of professional development that develop further competence in the use of digital tools and applications for inservice teachers.

In Chapter 10, “A Typology for Professional Development,” Gary Ackerman describes how one school district improved the efficiency and effectiveness of its professional development activities around teachers’ use of technology through a design process that summarized past efforts and created plans for future professional learning. Ackerman provides an interesting typology, which highlights three aspects of the professional development model – training, planning, and design and describes how technology was conceptualized at each stage of the model.

In Chapter 11, “Makerspaces and 3D Printing: A Learning by Doing Professional Development Model for Preservice and Inservice Teachers,” Torey Trust, Robert Malloy, and Sharon Edwards present a growth-in-practice model for introducing makerspaces and 3D printing to inservice and preservice teachers. The professional development focused on projects organized around topics in history/social studies or science/mathematic. Trust, Malloy, and Edwards conclude that there is a complexity to using new technologies in the classroom; however, using a growth-in-practice framework can serve to mitigate many of the issues and challenges experienced by pre and inservice teachers.

In Chapter 12, “Addressing Beginning STEM Teachers’ Needs to Teach in High-Needs School Districts,” Anne Marie Seitsinger, Jay Fogleman, Kathy Peno, and Cornelis de Groot demonstrate how beginning STEM teachers benefited from three specific induction supports. University based mentoring,

opportunities to use of strategies learned in their teacher preparation program, and continued professional development all contributed to early career STEM teachers' success teaching in high-needs schools.

All of the authors in this section identified ways and offered research-based recommendations for professional development of inservice teachers, to assist them to continue to improve their competence and access to technology for their current classrooms.

To conclude, this book explores encouraging ways that pre-service teacher preparation and in-service professional development can continue to leverage the advances in technology and digital applications that can be integrated in meaningful ways to support learning, advance equity, and expand the professional skills and knowledge of both educators and students. Educational professionals at all levels can benefit from a consideration of the findings of these leaders at the forefront of the convergence of education and technology, and our preK-12 students will benefit from the increased reflection on the impact of the findings on their own learning.

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