U.S. Department of Education

Advancing Educational Technology in Teacher Preparation: Policy Brief

DECEMBER 2016

U.S. Department of Education
John King
Secretary

Office of Educational Technology
Joseph South
Director

Katrina Stevens
Deputy Director

December 2016
Version 1.0

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Acknowledgements

This brief was developed under the guidance of Katrina Stevens, deputy director, and Joseph South, director, of the Office of Educational Technology (OET) at the U.S. Department of Education. Within OET, technical assistance was provided by Susan Bearden, Kristina Peters, Shelby Pleiss and Casandra Woodall.

Christine Stokes-Beverley and Ian Simoy (Office of Educational Technology) were the co-authors of the brief and led the development and drafting process. Zac Chase was instrumental in developing the guiding principles during his tenure in OET.

Susan Thomas served as the principal editor for this brief.

Formatting and graphics were provided by O2 Lab in Washington, D.C.

Vision

Our students deserve to have teachers, including novice teachers, who are fully prepared to meet their needs. In today's technology rich world, that means educators need to be prepared to meaningfully incorporate technology into their practice immediately upon entering the classroom. Our nation's motivated and committed pre-service teachers deserve to be trained by faculty using technology in transformative ways that thoughtfully support and measure learning gains.

Faculty at schools of education across the country should operate with a common language and set of expectations for effective and active use of technology in Prekindergarten-grade 12 (P-12) and at postsecondary education levels. Further, schools of education should work with P-12 schools and school districts to provide meaningful opportunities for pre-service teachers, in-service teachers, school and district leadership, and faculty to co-learn and collaborate to better understand and use technology as a tool to transform teaching and learning experiences for learners of all ages. Given the rapid pace at which technology evolves, faculty need regular opportunities to both refresh their capacity and share innovative tools and strategies with other professors and teachers in the field to ensure their technology use is contributing to learning and achievement.

The U.S. Department of Education believes it is important that all programs responsible for pre-service teacher training prepare all graduates to effectively select, evaluate, and use appropriate technologies and resources to create experiences that advance student engagement and learning.[1] We call upon leaders of teacher preparation programs to engage in concerted, programmatic shifts in their approach to pre-service teacher preparation.

STATES CAN ALSO BENEFIT FROM THIS POLICY BRIEF

While this policy brief is aimed primarily at pre-service teacher training programs, states can also benefit from its recommendations. For example, states can identify preparation programs in their respective areas that are examples of effective technology use in teacher preparation and share insights and strategies with other educator preparation programs statewide. Additionally, they can also consider how the use of technology in teacher preparation contributes to a program's effectiveness and can support the pursuit of continuous improvement by leaders of teacher preparation programs as they shift their approaches to incorporate technology.

This vision is becoming a reality at a number of teacher preparation programs across the country. Examples include:

- Pre-service educators participating in the Teaching Residents at Teachers College 2 (TR@TC2) teaching residency program at **Columbia University** participate in activities that engage them in determining how digital resources can be used to support and extend the curriculum. Through its U.S. Department of Education Teacher Quality Partnership grant,[2] TR@TC2 also provides teaching residents with opportunities to learn how to incorporate strategies and supports to better enhance students' abilities to use digital resources both inside and outside of the classroom.[3]

- In the Secondary Mathematics Teacher Education program at the **University of Virginia,** pre-service mathematics teachers have ongoing experiences with technology during their 5-year BA/MT program. Students gain experience in the use of math-focused technology applications and engage in a variety of model lessons that provide them with the opportunity to experience how technology provides instructional opportunities that were not feasible just a few years ago. They also have experiences that allow them to practice teaching mathematics with a variety of technological resources.[4]
- As more districts invest in 1-to-1 computer/tablet programs, **Dominican University of California School of Education and Counseling Psychology** is preparing faculty and pre-service teachers to integrate technology into lesson planning, instruction, and communication. The university is also building and maintaining partnerships with area K-12 school districts with whom they provide technology-oriented professional development to in-service educators, particularly those in lower income schools.[5]
- Recognizing the need to support their graduates once they become in-service educators, the **University of Michigan School of Education** created the 4T Virtual Conference to provide opportunities for both professors and alumni to learn about emerging movements in education technologies.[6]

As schools of education provide more meaningful integration of technology into teacher preparation programs, and provide sustained professional development for faculty, we need to work to ensure that every new teacher is prepared to select and use the most appropriate tools to support transformative teaching and learning.

Purpose of the Brief

The purpose of this policy brief is to:

- Identify key challenges and solutions to the effective integration of technology in teacher preparation
- Provide guiding principles on how to move the field toward effective integration of technology in teacher preparation programs
- Identify areas of opportunity and collaboration for stakeholders across the field

DIGITAL AGE CLASSROOMS: ALBEMARLE COUNTY ENCOURAGES STUDENTS AND TEACHERS TO LEARN WITH TECH TOGETHER

Elementary school students and teachers in Albemarle County Public Schools near Charlottesville, Virginia, are learning together as they use an immersive "sandbox" computer game that allows students to use building blocks and resources they discover to create in a virtual environment. Students and teachers use the immersive and social aspects of the environment to develop thinking, research, and communication skills to solve complex problems. For example, third-grade students in one classroom worked collaboratively in this virtual environment with students at another school to build and connect a bridge that was started at opposite ends by groups of students in classrooms that were miles apart. Teachers might feel uncomfortable using new technology tools like this one, but Ira Socol, the district's Director of Learning Technologies and Innovation, says that teachers do not need to know everything about the technology to create meaningful learning experiences for students. As long as teachers provide students with guidance and coaching, and are confident enough in their digital literacy skills to let students explore the technology, third-graders can figure things out as part of the learning process.

Middle school students don't just consume content through technology; they actively create it. For example, students in Albemarle County engineered and built their own virtual reality headsets. The students initially created a virtual, interactive tour for incoming sixth-graders to the middle school by using a digital media editing tool to record and stitch together video. Since then, students began to work on a virtual tour of Thomas Jefferson's Monticello, which did not previously have one. The students are leading the effort to create a public-facing virtual tour.

At the high school level, the district endeavors to create a learning experience where technology is part of a seamless real world experience. For example, physical education teachers envisioned a health center where students could learn and integrate habits of health into their everyday lives. Working collaboratively with the University of Virginia, students and teachers have been using mobile fitness technology to collect and track health and fitness data to help students learn how to improve their quality of life.

DIGITAL AGE CLASSROOMS: HOWARD-WINNESHIEK ADDS PROFESSIONAL LEARNING TO ENSURE TRANSFORMATIVE USE OF TECH

At Howard-Winneshiek Community School District in Cresco, Iowa, district leaders, educators, and the surrounding community realized the need for an innovative 21st-century learning system and partnered to develop a vision and action plan for a digital learning initiative that would embed technology in instruction and professional learning by 2020. The district first implemented a 1:1 program where every K-6 student in receives a tablet and every secondary student receives a laptop. The district also increased professional learning opportunities for teachers, including adding a district-facilitated Edcamp, to ensure that teachers could incorporate the tablets and computers into classrooms in transformative ways. Howard-Winn noticed an immediate, marked improvement in the way students and teachers engaged with technology. For example, students and teachers are now regular creators of their own digital content, not just consumers, and through the #2020HowardWinn hashtag, interact more frequently and more productively with other learners, experts, and practitioners.

DIGITAL AGE CLASSROOMS: SCIENCE LEADERSHIP ACADEMY IMPLEMENTS PROJECT-BASED LEARNING SUPPORTED BY TECH

High school students at the Science Leadership Academy (SLA) in Philadelphia, Pennsylvania, learn in an inquiry-driven, project-based magnet school focused on 21st-century learning. Since its inception in 2006, SLA has been a 1:1 laptop school, providing all students with the tools they need to fully engage in the pedagogical model. SLA has since added a middle school that provides a learning environment similar to that available in the high school.

Technology use at SLA is now ubiquitous, necessary, and presumed. Every teacher views the available technology tools as essentials for engagement and empowerment of students in a modern educational setting, and students never view its use as a special moment in class. During one recent learning activity, for example, students designed a digital moisture monitoring system for an outdoor rain garden. Their design allowed them to monitor soil temperature and moisture levels to determine when plants needed watering. Another learning activity, a capstone project, culminated in the creation of a "smart beehive" that uses sensors to monitor the behavior and health of bees inside.

CHALLENGES

The remarkable pace of the transition to digital learning in America's schools has made it challenging for teacher preparation programs to stay ahead of the curve. For example, three years ago, just one third of districts had access to high-speed broadband in their schools and classrooms. Now, 81% of schools have access.[7] The pervasiveness of broadband dramatically increases technology-based learning opportunities for students and professional learning opportunities for in-service teachers. But it also underscores the need for teacher preparation programs to reflect the current educational technology use in today's P-12 schools, so teachers arrive confident, experienced, and ready to lead.

However, even though educator preparation programs that hold accreditation from agencies such as the Council for the Accreditation of Educator Preparation (CAEP) are required to provide evidence that they are meeting specific technology standards, many pre-service graduates feel unprepared to use technology effectively in their classroom practice on their first day of in-service teaching.[8] P-12 districts and schools have tried to address the issue by providing rapid remediation to their newest teachers by teaching standardized basic technology practices and modeling effective instructional strategies that seamlessly integrate educational technology to support student learning.[9] High rates of teacher turnover and the subsequent cycle of rapid remediation of new teachers makes it difficult for districts to keep up.[10]

WORKING DEFINITIONS

Pre-Service Teacher Preparation Program
A sequential set of coursework and field experience, most often at institutions of higher education, that prepare teacher candidates to become in-service teachers.

Pre-Service Teaching
Period in which teachers are matriculating through traditional teacher preparation program and teaching regularly in classrooms under the direction of a mentor teacher, but are not yet in an official teacher capacity in P-12.

In-Service Teacher
Certified, matriculated teachers who are in an official teacher capacity in P-12.

GUIDING PRINCIPLES

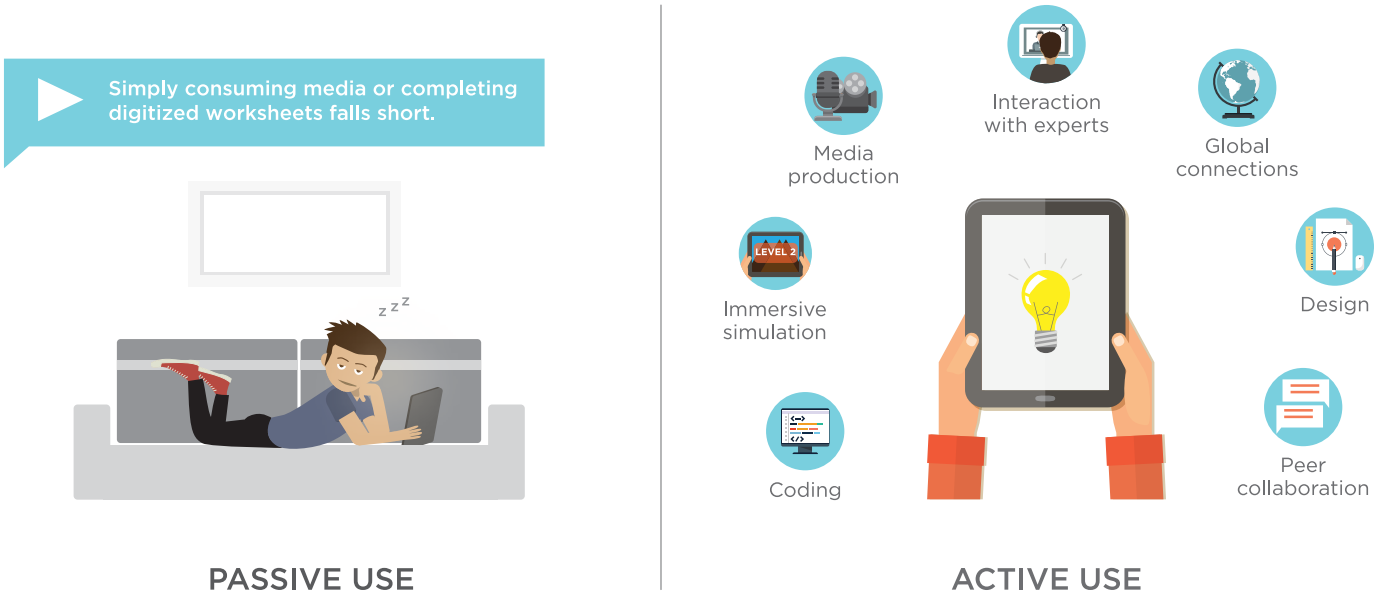
The U.S. Department of Education's Office of Educational Technology (OET) National Educational Technology Plan (NETP) is the flagship educational technology policy document for the United States. The 2016 NETP, *Future Ready Learning: Reimagining the Role of Technology in Education*,[11] articulates a vision of equity, active use, and collaborative leadership to make everywhere, all-the-time learning possible. This policy document specifically recommends that teacher preparation programs consider how to better prepare pre-service teachers, in-service teachers, and those who prepare teachers to design and implement transformational learning experiences enabled by technology in the classroom.

Based on the recommendations of the NETP and the work of teacher preparation innovators who participated in an Educational Technology in Teacher Preparation Innovation Summit convened by OET and ASCD, OET developed four guiding principles for the use of technology in pre-service teacher preparation programs. While we recognize that every community has different capacities and resources related to technology, pre-service teachers need to be prepared to consider how technology can play a role in providing ongoing professional learning opportunities, engaging diverse learners, supporting student learning, and closing persistent achievement gaps.

Four Guiding Principles

The four guiding principles developed by the OET are:

- Focus on the **active use** of technology to enable learning and teaching through creation, production, and problem-solving.
- Build **sustainable, program-wide systems of professional learning** for higher education instructors to strengthen and continually refresh their capacity to use technological tools to enable transformative learning and teaching.
- Ensure pre-service teachers' experiences with educational technology are **program-deep and program-wide,** rather than one-off courses separate from their methods courses.
- Align efforts with research-based **standards, frameworks, and credentials** recognized across the field.



Guiding Principle #1:

Focus on the **active use** of technology to enable learning and teaching through creation, production, and problem-solving.

Teachers must be equipped with the skills to integrate technology seamlessly into their instruction in ways that move beyond mere presentation and communication to a place of creation, innovation, and problem-solving. With the increased investment in infrastructure and classroom technology by school districts nationwide, the use of technology in teaching can no longer be an afterthought in lesson and unit planning. Therefore, teacher preparation programs must ensure instruction focuses on the active use of technology.

To meet this aim, coursework should go beyond simply viewing presentations or slides and provide pre-service teachers opportunities to use technology in ways that allow for active engagement. For example, pre-service teachers enrolled in a University of Michigan's School of Education course participated in a simulation activity that allowed them to use virtual tools to review primary sources and explore houses on the grounds of Greenfield Village, an outdoor museum in Dearborn, Michigan, as a way of supporting the learning of history.[12]

Additionally, faculty in teacher preparation programs need their own experiences with the meaningful use of technology to model best practices in their courses. At Vanderbilt University's Center for Teaching, for example, members of the academic community have access to resources such as guides created in-house, in person one-on-one support, and a regular lecture series, *Conversations on Digital Pedagogy,* that allows faculty to develop a plan to successfully integrate technology into their curriculum. The Center also highlights effective use of technology to support student learning in the higher education setting through its Leading Lines podcast.[13]

DEFINING ACTIVE AND PASSIVE USE

Active Use
The active use of technology allows for greater interaction with technology by students and teachers. Examples of active use in the classroom include peer-to-peer collaboration, the production by students of published content (such as blogs and videos), real-time interaction with experts, and connecting with other learners across the globe.

Passive Use
Passive technology use involves activities in which students have very little interaction. Examples of passive use in the classroom include digitized worksheets and activities that only require students to consume content produced by others.

TOWSON UNIVERSITY OFFERS LEARNING EXPERIENCES DESIGNED AROUND ACTIVE USE OF TECHNOLOGY

Towson University is working with local school systems in Baltimore County, Maryland, to provide authentic learning experiences for its pre-service teachers prior to their clinical internships. Faculty work to partner pre-service teachers with an in-service teacher in the local area as part of a course on Universal Design for Learning.[14] Pre-service teachers observe their host class and identify a real learning barrier that may be removed by using technology tools they are learning about in their coursework. Throughout the course, pre-service teachers investigate how different tech tools and pedagogical practices may be integrated to meaningfully address the needs of students and the in-service teacher in their host classroom. Pre-service teachers then present their findings and recommendations to the in-service teacher and faculty.

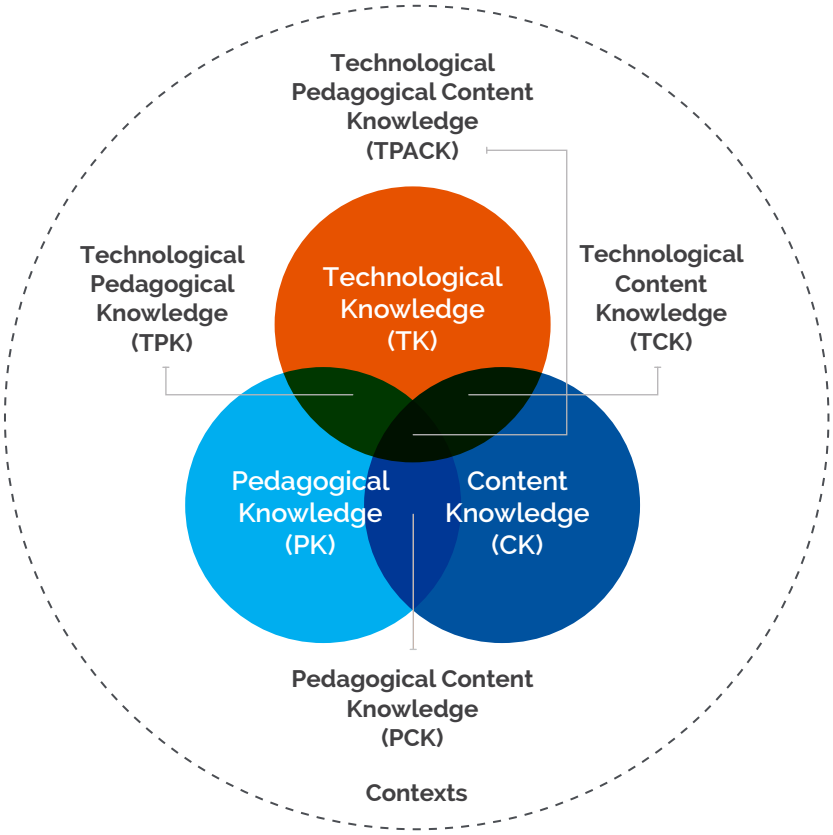
This project highlights Towson's efforts to model the active use of technology in the classroom to address real-world challenges.[15] Recognizing the importance of modeling effective technology use for K-12 students, faculty at Towson are modeling how pre-service teachers can use problem-based learning to nurture technology as a tool for creating solutions that can have a real impact on their communities.

Guiding Principle #2

Build **sustainable, program-wide systems of professional learning** for higher education instructors to strengthen and continually refresh their capacity to use technological tools to enable transformative learning and teaching.

Schools of education that intend to bridge the gap between what teachers need to know about technology in modern classrooms and what they are learning in pre-service teacher programs must have a process for supporting instructors' professional development around technology and pedagogical integration. Because technology develops and evolves at a rapid pace, faculty and instructors of teacher preparation programs also should be provided with ongoing, job-embedded opportunities designed to maintain and grow their ability to use technology to transform the learning of pre-service educators.

To create expert teachers, preparation programs may find it helpful to incorporate a combination of skills and knowledge often referred to as TPACK: Technological Pedagogical Content Knowledge. Graduates should be able to incorporate a solid knowledge of content matter, a deep understanding of how students learn, and a practical facility with technology.



DEFINING TPACK

TPACK is a framework consisting of Technological, Pedagogical, and Content Knowledge that provides educators with a model to determine how their knowledge, based in the three areas, intersects to effectively use technology to support student learning.[16,17]

Content Knowledge (CK): This component of the framework focuses on educator knowledge about the subject matter, including the "deeper knowledge fundamentals of the disciplines" an educator teaches.

Pedagogical Knowledge (PK): This component of the framework focuses on the practice of teaching, specifically the knowledge of learning theories, teaching methods, strategies for student assessment, and applications to the learning environment.

Pedagogical Content Knowledge (PCK): This component, which merges the elements of pedagogical knowledge and content knowledge, focuses on an educator's ability to represent the subject matter in a way that considers student learning preferences as well as prior knowledge related to the content with the ultimate goal of increasing student understanding.

Technological Knowledge (TK): This component of the framework highlights educator knowledge of available technological tools and their ability to achieve selected tasks.

Technological Content Knowledge (TCK): This component of the framework highlights educator ability to understand how specific technologies can be used to effectively support student learning within the content area.

Technological Pedagogical Knowledge (TPK): This component of the framework highlights the relationship between teaching, learning, and technology use. In other words, TPK is an understanding of how the use of technology can transform how educators teach the content, and how students interact with and learn the subject matter.

At the core of the these components is TPACK, which is an understanding of how the use of technological tools and resources enhances teaching, and provides students with deeper learning experiences that lead to greater understanding and mastery of the content.

The dotted line around the framework represents the various contexts that include student background, subject matter, and available resources that can influence how TPACK is applied in a practical sense.[18]

THE UNIVERSITY OF SOUTHERN CALIFORNIA EXPANDS ONBOARDING AND CONTINUED PROFESSIONAL DEVELOPMENT MODEL FOR FACULTY AROUND TECHNOLOGY

To improve their own online instruction, full-time and adjunct faculty at the University of Southern California (USC) collaborated on a data-informed process of course redesign to better meet the needs of their students. USC realized that student feedback via surveys and exit interviews were paramount in enhancing the program with the latest technology and pedagogy. Using student responses, faculty members continue to develop an internal community of practice to give each other feedback on how to improve virtual classroom practices and learn about new techniques and technological tools. For example, faculty members developed a video-based onboarding process where new faculty can engage with multimedia, resources, and lesson plans. Looking ahead, faculty are working toward creating an inventive video-based professional development model for flipped learning[19] as part of a new version of the Master of Arts in Teaching (MAT) program.

Prior to these changes, online course deliverables consisted of five papers and asynchronous discussion boards. Today, students are working collaboratively on online-based documents, recording sample video lessons for constructive peer critique, providing and receiving virtual feedback from colleagues and professors, building dynamic concept maps via web presentation platforms, and learning through flipped instruction models. As more K-12 schools shift to variants of flipped instruction, USC faculty models this work for pre-service teachers and colleagues who increasingly recognize how these pre-recorded videos and prompts can maximize in-class instructional time at the K-12 level and in higher education.

SAINT LEO UNIVERSITY BUILDS SUSTAINABLE LEARNING THROUGH INVESTMENT IN COMMUNITY

In 2014, Saint Leo University developed a technology summer institute for in-service teachers in the Pasco County School District to build their capacity in the use of technology in the classroom.[20] The institute modeled a "community of learners" approach, where college faculty and in-service teachers were co-learners in developing a better understanding of how to use technology more effectively in teaching and learning. Since its inception, the institute has offered intensive professional development to sixty in-service teachers who agree to provide support and mentorship to Saint Leo's pre-service teachers.

As part of the institute, in-service teachers receive intensive summer development, year-long mentorship, and their choice of a tablet device or a class set of virtual reality devices. In turn, in-service teachers must complete a year-long action research project taking a concerted look at how their selected tool can transform student learning.

In 2016, Saint Leo developed an advanced Teacher Technology Leader Institute to train institute alumni on how to develop sustainable professional learning opportunities within their schools and serve as mentors for in-service teachers working on action research projects. Mentors meet once a month with in-service teachers for project updates to address challenges, and to develop concrete next steps for implementation. In-service teachers meet as a group twice a year to receive feedback and to present their findings to institute colleagues, mentors, and faculty.

Guiding Principle #3

Ensure pre-service teachers' experiences with educational technology are **program-deep and program-wide** rather than one-off courses separate from their methods courses.

Research has shown that providing pre-service educators with a single educational technology course does not sufficiently prepare them for the current technology-rich classrooms becoming more common throughout our nation.[21] One instructional technology course does not lead to sustained effective integration of technology into pedagogical practice. However, research has shown that continuous exposure can improve teachers' attitudes and beliefs toward technology use in the classroom.[22]

To better prepare our pre-service teachers to use technology effectively to support student learning, we must move toward a model in which the use of educational technology is embedded throughout preparation programs. For example, pre-service teachers in science education courses can gain experience creating science investigation learning experiences that allow students to use digital scientific probes or sensors to collect real-time data. Pre-service history teachers enrolled in methods coursework can gain experience in creating learning experiences that use primary sources from digital collections available from various libraries and museums worldwide. Pre-service teachers of all potential grades could build websites as an assignment to increase communication with families.

UNIVERSITY OF MICHIGAN INTEGRATES TECHNOLOGY THROUGHOUT TEACHER PREPARATION

Rather than offering a single-semester course in technology use, Michigan faculty began integrating a technology course that would stretch across the entire pre-service education program in all four semesters of the 2-year program. Thus, a pre-service teacher would begin the program with an introduction to a philosophical framework around teaching with technology and end their teaching program "doing" technology integration in their student teaching placement. This program-deep and program-wide approach allows pre-service teachers time to get comfortable with pedagogical approaches with technology integration, discuss theory and practice with experts, and collaborate on and execute standards-based projects with all methods instructors. Pre-service teachers further gain exposure to the International Society for Technology in Education (ISTE) Standards for Teachers[23] and the Framework for 21st Century Learning[24] and have opportunities for clinical experiences prior to student teaching where they can integrate technology considerations into lessons.

This new approach has allowed technology course instructors to collaborate with methods instructors and K-12 partnership schools to develop project-based learning activities such as the English Language Arts Digital Citizenship Project, in which pre-service teachers have the opportunity to design and lead lessons on digital citizenship topics prior to student teaching.[25] These clinical teaching projects help pre-service teachers see the complexities of teaching with support from their instructors and teachers in the field. This program-long approach reflects Michigan faculty members' beliefs that learning is a process. Pre-service teachers should be able to process ideas and experiment in ways that bridge their learning between their educational technology and methods courses.

Guiding Principle #4

Align efforts with research-based **standards, frameworks, and credentials** recognized across the field.

While teachers may work in a wide range of settings and cultural contexts with different types of access to resources, every student in the country deserves a teacher who can use available technological tools to better meet student needs. To ensure rigor, quality, and preparedness of teachers, we need a common language to articulate expectations around effective use of technology by students, teachers, school and district systems, and at the university level. This can be done by creating field-wide sets of competencies, frameworks, and credentials for the following four groups: teacher preparation programs; teacher preparation faculty; pre-service educators; and in-service educators. By uniting around a common set of expectations and language, pre-service educators can be assured that those tasked with preparing them to use digital tools to support student learning have the skills necessary to do so no matter which institution they choose. It also ensures that teachers can continue to build their skills as they move into an in-service role.

A number of educational technology leaders and leading educational organizations have made strides toward refining educational technology preparation for pre-service educators. For example, CAEP, whose goal is to "advance excellent educator preparation through evidence-based accreditation" (Council for the Accreditation of Educator Preparation, 2015), worked closely with ISTE to create joint ISTE-CAEP standards for technology facilitators, technology leaders,

and secondary computer science educators. In addition, the development of CAEP's Content and Pedagogical Knowledge standard was influenced in part by ISTE's 2008 teacher standards, highlighting the long-standing collaborative relationship between the two organizations.[26,27]

At the Educational Technology in Teacher Preparation Innovation Summit members of the teacher preparation community shared various initiatives geared toward refining how pre-service teachers are prepared to use technology. One group of higher education professors joined forces to create a uniform set of competencies for teaching with and about technology. Another group of higher education faculty shared their progress in creating a set of micro credentials that will allow pre-service educators and higher education personnel to demonstrate what they know, what they can do, and what they can teach others about the use of educational technology. These efforts are supported by others in the field. For example, led by Randy Hansen of the University of Maryland University College and Arlene Borthwick of National Louis University, editors from a wide variety of peer-reviewed journals are on track to release an editorial supporting this work in mid-December 2016.

DEVELOPING STANDARD COMPETENCIES FOR TEACHING WITH AND ABOUT TECHNOLOGY IN TEACHER PREPARATION

Teresa Foulger, an associate professor at the Mary Lou Fulton Teachers College at Arizona State University, is leading a working group of educational technology faculty-researchers to develop a set of competencies for use by teacher educators in teacher preparation. The goal of the Teacher Education Technology Competencies (TETC) project is to define the knowledge, skills, and behaviors of higher education faculty who support pre-service teachers in learning to teach with technology. The competencies are being created using crowdsourced scholarly literature as a base, then a collaborative Delphi methodology where input is attained from an international base of teacher educators and content experts. The research team plans to release the competencies in Spring 2017.

BADGING CONSORTIUM PREPARES TO RELEASE MICRO-CREDENTIALS

Led by Rick West, an associate professor of education at Brigham Young University's David O. McKay School of Education, and Kyle Peck, professor of education at Penn State University's College of Education, a coalition of educational technology leaders has committed to creating a set of micro-credentials, or badges, as a way for pre-service educators and faculty to demonstrate what they know, can do, and can teach others. The team plans to create a set of micro-credentials based on the ISTE Standards for Teachers and hopes to release them in 2017.

NORTH CAROLINA DIGITAL LEARNING COMPETENCIES FOR IN-SERVICE EDUCATORS

In 2013, the North Carolina House Bill 23 tasked the State Board of Education with developing digital teaching and learning competencies that demonstrate skills needed by educators to create digital learning environments. On their behalf, the Friday Institute for Educational Innovation at North Carolina State University collaborated with a wide variety of state stakeholders, including deans of education, local school districts, and legislators, to develop the North Carolina Digital Learning Plan. Released in September 2015, one recommendation in the plan tasked stakeholders to "develop and implement digital competencies for teachers and administrators as required by SL 2013-11." (North Carolina Digital Learning Plan, 2015).[28]

The North Carolina Learning Competencies for Classroom Teachers, inspired by International Association for K-12 Online Learning (iNACOL), International Society for Technology in Education (ISTE), and the North Carolina Professional Teaching Standards, was released in June 2016 and provides in-service educators with a standardized framework to strengthen their practice and use technology effectively to support student learning in their respective learning environments. An additional set of competencies was released for school administrators that provides a roadmap to improve practice, build capacity, and support the effective use of technology to support student learning in schools. North Carolina plans to implement these standards in July 2017.[29]

It should be noted that as teacher preparation programs move toward implementing these four principles, care must be taken to ensure that pre-service teachers' experience with educational technology and planning learning experiences for students complies with standard security and privacy standards. These include the Family Educational Rights and Privacy Act (FERPA),[30] the Children's Online Privacy Protection Act (COPPA)[31] and the Children's Internet Protection Act (CIPA).[32]

CALL TO ACTION

This brief provides guiding principles and compelling examples of preparing pre-service teachers to effectively use technology to transform student learning. It is our intent that teacher preparation programs embrace these principles and build upon the work of innovators highlighted in this document and others similarly engaged. The Department encourages all teacher preparation programs to commit to the four principles of educational technology in teacher preparation, strengthen their partnerships with P-12 districts to better understand the skill set that teacher graduates need to effectively use technology to support student learning, and take immediate action to begin implementing the principles laid out above. The Department also encourages simultaneous research that identifies the most effective practices in preparing teachers in teacher preparation programs to identify and implement educational technology meaningfully in their future classrooms.

EDUCATIONAL TECHNOLOGY IN TEACHER PREPARATION CHALLENGE

Schools of education across the country have committed to acting on the Four Guiding Principles by accepting OET's Educational Technology in Teacher Preparation Challenge. The most up to date list of programs that have accepted this challenge can be found at http://tech.ed.gov/edtechtprep/.

Our recommendations to achieve this goal are as follows:

Field at Large

- Intentional, programmatic, system-wide discussion and planning for use of educational technologies by all pre-service teachers.[33]

Higher Education Instructors/Administrators of Teacher Preparation Programs

- Job-embedded professional development for all teacher preparation faculty focused on the use of current educational technologies to support pre-service teacher learning in the same ways pre-service teachers will be expected to support their students' learning.
- Provision of both faculty and pre-service teachers with regular exposure to and experience with teaching and learning technologies and strategies relevant to online, blended and face-to-face environments and their affordances and constraints.

Standards/Accreditors

- Timeline of skills and standards for educational technology use by pre-service teachers throughout their preparation programs.
- Plans for ongoing professional development for teacher preparation faculty and pre-/in-service teachers to maintain competencies in educational technology as the field advances, including micro-credentialing

Teachers

- Seek ways to partner with schools of education to create more sustainable professional co-learning opportunities with teacher preparation instructors and pre-service teachers.
- Stay up to date on current educational technology solutions and strategies in order to be in a position to mentor pre-service teachers in their use in their classrooms.

States and School Districts

- Work with local universities to build sustained opportunities for pre-service teachers to engage with high-quality teachers demonstrating effective use of technology to support student learning

CONCLUSION

Every graduate of a teacher preparation program should possess a set of skills regarding educational technology that reflects modern teaching and learning environments.[34] An entire ecosystem of educational technology tools has emerged over the last five years that can help build a more nimble, informed, and continuously improving teaching force in America. Now is the time to connect pre-service teachers with these tools.

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