

## **The Teacher Educator Technology Competencies and Technology Tools in Action**

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### Abstract

This article connects the Teacher Educator Technology Competencies (TETCs) to specific technology tools, applications and resources that can be employed in PK-12 and higher education classrooms. The author introduces the TETCs and suggests technology tools for active use by teacher educators and teacher candidates. The article presents various pedagogical models, such as project-based learning (PBL), the Flipped Classroom model, and game-based learning (GBL). Also, the author recommends professional development options, which include joining professional development organizations and using digital badging systems. The article offers a blueprint of how to actively begin using the TETCs as well as reasons why these competencies are important.

*Keywords:* competency, education, professional development, teacher educator, teacher candidate, technology

In 2018, a group of instructional technology experts within the Society for Information Technology and Teacher Education developed the Teacher Educator Technology Competencies (TETCs). These competencies describe the current skills, knowledge and attitudes necessary for teacher educators who support teacher candidates (Burrows et al., 2021; Foulger et al., 2016; Foulger et al., 2017; Graziano et al., 2017; Society for Information Technology and Teacher Education, 2018). Teacher educators are individuals who directly provide instruction or support services in PK-12 classrooms or higher education settings; teacher candidates are individuals who are engaged in the preparation process for professional education licensure or certification with an official educator preparation provider (EPP) (Council for the Accreditation of Educator Preparation, 2019). In order to provide a solid foundation, all EPPs must ensure that teacher educators are effectively using updated and current technology while educating teacher

candidates for employment in PK-12 classrooms (Hodges et al., 2022; U.S. Department of Education, Office of Educational Technology, 2017).

The Council for the Accreditation of Educator Preparation (CAEP, 2019) defines technology as the tools and techniques available through computers, the Internet, telecommunications, and multimedia employed by EPPs for instruction. This technology includes the input, storing, processing and analyzing of data in quality assurance systems. CAEP emphasizes that all PK-12 teaching candidates are responsible for using current technology effectively to support student learning. Hence, all teacher educators should be prepared to include technology-based instruction in their college-level teaching.

The TETCs were developed to guide teacher educators in the knowledge, skills and attitudes required to integrate technology throughout teacher preparation programs. Appendix A contains the full list of the current TETCs (Society for Information Technology and Teacher Education, 2018). The main objective of the competencies is their integration throughout teacher education programs. Additionally, it is important to note that teacher educators and candidates who use and apply these technology competencies can play a critical role in promoting inclusive excellence in education by fostering personal reflection, connectivity, and the building of support systems for leaders, educators, students, and families. The TETCs are based on promoting a sense of community and support that can lead to greater understanding, respect, and inclusivity. Foulger et al. (2017) stated,

The end goal of the TETCs is to positively impact teacher candidates graduating from teacher preparation programs and teacher educators who teach within those programs, and to initiate conversations across institutions about larger reform issues surrounding the movement towards technology integration across the curriculum. Collectively, all teacher

educators are responsible for preparing teacher candidates who enter future classrooms with the skills needed to use and integrate technology appropriately for teaching and learning. (p. 436)

### **The TETCs and Technology Tools**

Without question, teacher educators and teacher candidates require certain technological skills necessary to teach in today's technology-literate world (Foulger et al., 2017; Hodges et al., 2022; Sprague et al., 2022; & U.S. Department of Education, Office of Educational Technology, 2017). The TETCs are not a solution-oriented approach to technology integration for teacher preparation; however, teacher educators cannot meet the competencies without exposure to new technology tools and hands-on practice with the applications. Burrows et al. (2021) suggested that there should be a two-way street of knowledge contribution to infuse technology into teacher education programs. Hodges et al. (2022) stressed that teacher preparation programs are now required to "prepare teachers for the reality that they will likely teach in different modalities during their careers" (p. 202). Hence, all teacher educators require an updated toolbox of technology tools and skills.

The TETCs present a holistic view of competencies, which when linked to specific technology tools, can be addressed in higher education programs. Carpenter et al. (2019) asserted that there are two common generalizations about teacher preparation in the literature. First, many pre-service teachers leave their EPPs with insufficient knowledge of how to use technology to facilitate PK-12 student learning. Second, this lack of knowledge on the part of novices is commonly assumed to exist at least in part because many teacher educators lack the technical knowledge and skill necessary to provide instruction. In fact, these teacher educators may not be

aware of the current TETCs. Hence, current teacher educators may not be incorporating the competencies into their work with teacher candidates.

In order to overcome these challenges, Foulger et al. (2018) presented some helpful suggestions on how teacher educators may promote the TETCs in the higher education community. First, the authors suggest using the TETCs to transform teacher educators' course goals and design. They also note that the adoption of the TETCs could guide effective, transformational pedagogical practices. Another option could be using the TETCs to develop self-assessment tools for teacher educators in colleges and schools of education. In terms of yearly performance reviews, the TETCs could be used to incentivize standards of academe and affect current promotion and tenure guidelines. Professional development programs could use the TETCs to focus on one-on-one, reciprocal mentoring as well as group workshops. Finally, teacher educators could use the TETCs to make changes in accreditation by aligning current standards with the TETCs.

This article will address each TETC that was presented by Foulger et al. (2017) along with several concrete tools and applications that can be used at the college level. The full list of TETCs can be found in Appendix A. When the technology resources and applications are used effectively by teacher educators, teacher candidates are given an opportunity to practice implementing the technology. All faculty who train future teachers are responsible for using appropriate and updated technology in the classroom.

### **Content-Specific Technology**

Teacher educators and teacher candidates are responsible for designing instruction that utilizes content-specific technologies to enhance teaching and learning (Foulger et al., 2017). In order to provide appropriate instruction, teacher educators can evaluate content-specific

technology in areas such as reading, mathematics, language arts, science and social studies. Moreover, teacher educators can model approaches for aligning the content being taught with appropriate pedagogy and technology.

There are certain content-specific technology tools that all teacher educators can use when teaching in EPPs. Virtual field trips allow social studies and science educators to take their students to foreign and exotic locations without ever leaving the classroom (Scholastic, n.d.). In fact, more schools are choosing to take students on virtual field trips to save costs and avoid transportation issues. Additionally, in today's world, virtual field trips prove to be safe as well as efficient. The Discovery Education (2020) website offers teachers various virtual field trip options. Teachers can plan virtual excursions to traditional field trip venues, such as museums and zoos, as well as to more distant venues such as foreign countries and historic landmarks.

Another content-specific technology application for science and mathematics educators is the website e-Missions. The website e-Missions (n.d.) offers simulated, problem-based learning adventures delivered in the classroom using online, distance learning technology. Each e-Mission is a student-centered, team-based, interactive educational experience that uses scientifically accurate data to solve problems.

Social studies educators may appreciate using Actionbound and GooseChase, which are technology applications that can be used to design real-world scavenger hunts (Actionbound, n.d.; Goosechase, n.d.). These online scavenger hunts allow students to document their learning using their mobile devices. By using these tools, teacher educators and teacher candidates can leverage gaming elements and tools like GPS locations, directions, maps, compass, pictures, videos, quizzes, missions, tournaments, and QR codes to create educational mobile app-based adventures.

### **Pedagogical Approaches**

Today, teacher candidates and PK-12 students are connected to digital devices and live in a world of instant interpersonal communication and infinite access to information and educational resources. “Graduates of teacher education programs should be able to command high levels of performance in any teaching context, including complete changes in contexts like what happened at the onset of the pandemic” (Sprague et al., 2022, p. 183). Teaching candidates would benefit from the opportunity to undertake field experiences in online and blended environments (Hodges et al., 2022). Therefore, a re-examination and update of present pedagogy in teacher preparation programs is suggested. As Foulger et al. (2017) envisioned, teacher educators could be incorporating pedagogical approaches that prepare teacher candidates to effectively use technology in many ways and various settings. Christen (2009) asserted,

Sitting quietly and passively while taking lecture notes does not come naturally to a student population accustomed to a virtual world of instant messaging, pervasive Internet access and online social networking. If these connected students are to excel in education, their learning environment should mirror the ways in which they engage the world. (p. 29)

Three effective approaches that implement technology and prepare teacher candidates to use technology today are: 1) project-based learning, 2) the Flipped Classroom and 3) game-based learning.

#### ***Project-Based Learning***

Project-based learning (PBL) is a pedagogical model that organizes learning around hands-on and real-world projects (Thomas, 2000). PBL requires the design and implementation of projects that are complex and involve learners in design, problem-solving, decision making, or

investigative activities. Many PBL tasks require the utilization of real-world technological tools and applications. In addition, PBL allows learners the opportunity to work relatively autonomously over extended periods of time and culminates in realistic products or presentations.

Many technology applications are available to help teacher educators create these PBL assignments (TeachThought, 2020). Glogster can be used to plan and develop digital posters and other multimedia projects. Animoto can be used to present findings of a project using a realistic video platform. VoiceThread allows users to create, share and comment on interactive slideshows combining documents, presentations, images, audio files and video files.

### ***The Flipped Classroom***

The Flipped Classroom is a pedagogical approach that allows the infusion of technology into the higher education classroom. The Flipped Classroom was developed by Bergmann and Sams (2012) to reinvent the ideas of traditional lecture-based education (Hertz, 2012). Using the Flipped Classroom model, learners watch recorded lectures or online videos before attending class. Once in the face-to-face class environment, the learners are prepared to complete their assignments, group work and assessments with one-on-one assistance from the teacher.

In order to use the Flipped Classroom model, teacher educators need to choose appropriate videos. Lindahl (2019) suggested using TED-Ed (n.d.) for finding original animated videos and interactive lessons on a range of topics to support the Flipped Classroom. TED-Ed digital resources are well suited for teacher candidates as well as their PK-12 students. Another useful Flipped Classroom technology tool is Edpuzzle, which is an online application that gives teacher educators and candidates the ability to create lessons and assessments using online modules (Graham, 2016; Petty, 2018).

### ***Game-Based Learning***

Digital game-based learning (DGBL) or game-based learning (GBL) is a third pedagogical approach that teacher educators can employ in the higher education classroom (Farber, 2016; Meredith, 2016). Gee (2013) defined and developed DGBL with Prensky (2005) claiming that today's students are no longer the people our educational system was designed to teach. Therefore, current teachers need to use updated techniques to meet the needs of today's PK-12 and college students. Prensky asserted:

Today's learners have changed in some fundamentally important ways. Growing up with digital technology, of which computer and video games are a major part, has dramatically—and, importantly, discontinuously changed the way people raised in this time think and process information. These changes have been so enormous that today's younger people have, in their intellectual style and preferences, very different minds from their parents and, in fact, all preceding generations. (p. 97)

Furthermore, Prensky coined the term “digital natives” to describe this generation. Digital natives include today's PK-12 students and most teacher candidates who are "native speakers" of the digital language of computers, video games and the internet. Conversely, individuals who were not born into the digital world but have, at some later point in life, adopted certain aspects of the new technology are called “digital immigrants”.

Teacher educators can actively seek ways to meet the needs of digital natives by using various GBL technology tools (Farber, 2016). For example, Minecraft can be used to build structures and teach coding skills (Minecraft, n.d.). McColgan et al. (2018) claimed that Minecraft is a versatile educational tool related to many school subjects and content areas. Future language arts teachers may be interested in playing the Walden Game, based on Henry David

Thoreau's classic (WaldenGame, n.d.). This game is an exploratory narrative and simulation about the life of the American philosopher during his experiment in self-reliant living at Walden Pond. Other gaming sites such as iCivics and Mission US can be used in a social studies classroom to motivate and engage learners (Farber, 2020; iCivics.org., 2020; Mission US, n.d.).

### **Attitudes of Teacher Educators**

There are issues in today's higher education that can affect teacher educators' attitudes; these issues include the digital divide, digital equity, and the lack of effective technology integration (Foulger et al., 2017; Gorski, 2009; Stanford, n.d.; Tyger, 2011). In 2017, Rowsell et al. presented two forms of digital divides: one of access to technology and the Internet, and another of implementation. Fingal (2018) explained that current issues of digital equity can be linked to a cycle called the "participation gap. . . It's more than just access to the tool, you need the participation and the learning experience" (Fingal, para. 6-7). Gorski (2009) described digital inequity as a broader, social issue, which includes a "vast, complex web of inequities, sociopolitical in nature, unsolvable merely by adding more or faster computers and Internet access to homes and schools" (p. 353).

Digital inequities and participation gaps are evident in many current teaching preparation programs. Some teacher educators and teacher candidates are skilled with using technology, but many are not comfortable with completing a technology task that is more advanced than typing a paper and emailing it. Fingal (2018) explained:

I know that's digital literacy but it's still a part of digital equity in my mind because if we're not exposing students to these different tools and allowing them to become comfortable using them, then how do they learn it? How do they explore it? When do they have an opportunity to create if we don't bring it in? (para. 9)

In fact, this sentiment rings true in many teacher preparation programs where it takes a depth of understanding to effectively implement the use of technology in the classroom.

Without strong instruction that supports technology, teacher candidates who are not prepared for today's technologies may not be able to optimally perform in the classroom. Fingal (2018) discussed the importance of acknowledging that some teacher candidates may not be ready to use certain forms of technology. However, in today's world, there is an immediate need for all teacher educators to use and model current technology in both face-to-face and remote classrooms (Hodges et al., 2022). During the current COVID-19 pandemic and its response, many digital inequities have come to light. Teacher preparation programs can address these digital inequities and societal contexts, which will persist as critical topics for teacher development even after COVID-19 passes. "The pandemic affords unprecedented connections to the digital divide for PSTs, and teacher educators should seek to incorporate current equity issues even as students return to K-12 classrooms" (Hall et. al., 2020, p. 439).

In order to address these digital equity issues, teacher educators can encourage teacher candidates to join and support digital advocacy programs and organizations. For example, the National Digital Inclusion Alliance (NDIA) is a non-profit organization that advocates for national broadband access (NDIA, 2020). Another organization that promotes digital equity is PowerUp, which stands for "Providing Opportunities Where Everyone Rises Up". PowerUp was formed in 2010 as a response to the increasing demand for the infusion of technology in all classrooms. Recruiting highly trained teachers and providing necessary technology equipment to education institutions are additional goals of PowerUp (PowerUp, 2020).

**Online Tools**

In today's ever-changing technological world, there are many online tools that a teacher educator can use when instructing teacher candidates (Foulger et al., 2017). It is impossible for a teacher educator to use or model all of these tools, but there are some that stand out. Google Classroom is an online application that can help teacher educators with designing instruction, creating assignments, boosting collaboration, and promoting communication (Google, 2020). Google Classroom integrates seamlessly with the other Google applications. Teacher educators can use Google Classroom to create classes, distribute assignments, and send feedback. Since some PK-12 schools and higher education institutions are operating remotely, video conferencing is a key tool that teacher educators and candidates should be prepared to use. Video reflection, along with peer feedback, can be a critical technique that can affect preservice teachers' instructional techniques (Burrows et al., 2021). Some of these video conferencing tools include Skype, Zoom and Google Meet. In addition to being used for class lectures and meetings, these technological tools can be used for virtual field trips, guest speakers, and classroom collaborations (Hertz, 2013; Scholastic, n.d.). Moreover, Padlet is an interactive Web 2.0 application that provides a virtual wall or bulletin board that allows participants to simultaneously view, add, and rearrange content (Fisher, 2017; Padlet, n.d.).

**Instruction & Diverse Learning Needs**

Teacher educators should be prepared to design instruction using technology to meet the needs of diverse learners and individuals with disabilities (Foulger et al., 2017). They should also be able to prepare their teacher candidates with assistive technology tools that have been designed to help diverse learners participate fully and naturally in inclusive learning environments. Sullivan (2019) defines assistive technology (AT) as:

Any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities. AT includes a wide variety of no-tech, low-tech, and high-tech tools. Some assistive technology tools cost nothing, and others can be fairly inexpensive. Many teachers are using some tools that function as AT—even if they don't think of them that way. (para. 2)

Sullivan (2019) provided several useful ideas to infuse AT into the classroom. First, teacher educators can use YouTube videos that contain a closed captioning option to assist students in making connections between text and audio representations of language. Mind mapping is an AT technique that can be used to organize various forms of data for diverse learners. Technology tools such as StoryboardThat, Mindmeister and Mindomo allow teacher educators to create mind maps and differentiate instruction for all learners (Kapuler, 2020, Mindmeister, n.d., Mindomo, n.d., StoryboardThat, n.d.). Another useful AT device is an online timer, such as Online Stopwatch. This technology tool can be projected onto the class interactive whiteboard during timed class activities, such as collaborative group work, projects or tests (Online Stopwatch, n.d.).

Another useful assistive technology is speech-to-text, which “is a form of assistive technology that allows students—and teachers—to dictate into their computer and watch their words appear as text on the computer screen, without typing” (Sullivan, 2019, para. 13). Martin (n.d.) suggested the following speech-to-text or dictation software options: Dragon Dictation, Co:Writer Universal, and WordQ.

### **Assessment Tools**

Teacher educators should be prepared to use technology to assess teacher candidates' competence and knowledge as well as show them ways to use assessment tools in the PK-12 classroom (Foulger et al., 2017). For example, Goobric is a rubric-based assessment tool that works with the Doctopus Add-on for Google Sheets (Crawford, 2016). Crawford explained that a teacher could use Goobric in conjunction with Google Classroom and Doctopus to import and organize student writing. Goobric will insert a rubric for each student's submission. Another useful assessment tool that can be used in the higher education classroom is Formative. Formative can be used to assess students as well as differentiate learning and meet the needs of the diverse learner (Kolb, 2016). Finally, a popular formative assessment tool being used by many PK-12 and college educators is Kahoot, which is an online gaming application that allows teachers to create learning activities for their students (Kahoot, 2020; Lenz, 2019). Kahoot allows a teacher to create quizzes and polls which focus questions and answers according to a certain topic (Martínez-Molina et al., 2019).

### **Online & Hybrid Teaching Strategies**

Foulger et al. (2017) suggested that teacher educators should model online and blended learning methods and strategies as well as provide opportunities for teacher candidates to practice teaching online and in blended or hybrid learning environments. Today's teacher educator programs can be modified to include field experiences in online and blended learning. Teacher educator programs "have a long history and established practices of partnering with schools and districts to provide opportunities for their students to undertake field experiences in the brick-and-mortar or face-to-face environment" (Hodges et al., 2022, p. 209). Now, these programs need to expand these opportunities to include online and blended environments, and

partner with providers that offer online and blended clinical experiences. In order to prepare teacher candidates for these opportunities, there are some technology resources and tools offered by nationally recognized distance learning associations that can assist teacher educators as they model online and blended learning methods.

Quality Matters (QM) is a nationally recognized organization that focuses on the development of distance learning courses (Quality Matters, 2020a). QM offers various professional development options for higher education faculty (Quality Matters, 2020b). These options, which include workshops and certification programs, aim to train and empower faculty, provide guidance for improving the quality of courses, and certify the quality of online and blended courses. Similarly, the Online Learning Consortium (OLC) provides useful resources to promote online teaching and learning (Online Learning Consortium, 2020a). The OLC website contains links to best-practice publications, forms of online instruction, technology-focused conferences, practitioner-based research and empirical research. For example, the OLC's Institute for Professional Development offers online learning opportunities for individuals at all levels.

### **Connecting Globally**

During teacher preparation, instructors can address the issue of global connectivity in various ways by using certain technology tools (Foulger et al., 2017). Teacher educators can model global engagement using technologies to connect teacher candidates with other cultures and locations. They can also introduce discussions and address strategies needed for cultures and regions with different levels of technological connectivity. Since learning and teaching are both socially constructed (Kolb, 2016), it is important for teacher educators and candidates to use technology tools that allow them to engage with others.

Moreover, the TETCs can play a significant role in connecting educators and teacher candidates to social justice pedagogy by providing them with tools and resources that can facilitate access to information, create platforms for ongoing dialogue, and enable advocacy for equity and fairness topics (Foulger et al., 2017). By using the TETCs as a framework, teacher educators can help their students gain access to information on diverse perspectives and experiences, and to gain a deeper understanding of the social and political issues that affect education in global settings. Also, the TETCs can guide students and educators how to use social media, online forums, and video conferencing to engage in meaningful conversations on issues of social justice. This use of technology can empower individuals to become agents of change and to work towards creating a more just and equitable society.

Kolb (2016) suggested using a technology application called Collabrify to design instruction in which teacher candidates use technology to collaborate with learners from a variety of backgrounds and cultures. Collabrify promotes synchronous collaboration on mindmaps, documents and other files for data collection and analysis. Another possible technology tool teacher educators can use for global collaboration is the social bookmarking tool called Diigo (Crawford, 2016). Diigo permits teacher educators to highlight, annotate and tag content found online. By recording and analyzing thoughts, learners become active researchers while they create tags and organize their notes in outline format.

### **Legal, Ethical, and Socially Responsible Use of Technology**

Teacher educators can guide their teacher candidates' use of technology in legal, ethical, and socially responsible ways as well as provide opportunities for teacher candidates to design curriculum following legal, ethical, and socially responsible uses of technology (Foulger et al., 2017). By supporting associations such as The National Association of Media Literacy

Education (NAMLE), teacher educators illustrate the importance of media literacy as a highly valued and widely practiced essential life skill (NAMLE, n.d.). By using NAMLE resources, teacher educators can provide opportunities for teacher candidates to design curriculum following legal, ethical, and socially responsible uses of technology. Additionally, Code.org is an association that advocates for the socially responsible use of technology in education. This non-profit association is dedicated to expanding access to computer science in PK-12 schools and increasing participation by women and underrepresented minorities (Code.org, 2020). Teacher candidates can use this website to guide their use of technology in legal, ethical, and socially responsible ways. Another possible way for teacher educators to raise awareness is by promoting crowdsourcing sites such as Donors Choose (Cullen, 2018).

### **Professional Development & Networking Options**

Teacher educators and candidates need various professional development options to be successful in today's digital teaching and learning environment (Borthwick & Hansen, 2017; Dengerink et al., 2015; Foulger et al., 2017; Van der Klink et al., 2017). Additionally, clinical supervisors and cooperating teachers will need professional development to address their technology-related responsibilities (Sprague et al., 2022). By exploring various options, individuals can define goals for personal growth in using technology. Additionally, they can engage in appropriate professional development and networking activities promoting technology knowledge and skills while they support ongoing participation in these activities to increase their knowledge of technology.

The International Society for Technology in Education (ISTE) (2020b) offers various technology-driven professional development options for teacher educators and candidates. Digital Learning Pathways is a new set of online professional development resources that

provide a way for educators at any level of technology readiness to infuse technology into the classroom. The Digital Learning Pathways professional development resources include lesson plans, learning scenarios, and collaboration guides that allow teacher educators and candidates to create authentic, digital-age learning products.

As teacher educators are looking for ways to promote 21st century professional development in their courses, they can consider infusing digital badges into their teaching and assessment practices (Braxton et al., 2019). Digital badges are indicators of accomplishment, skill, quality, or interest that can be earned in various learning environments (HASTAC, n.d.). Badges can provide evidence of learning that is not available in traditional formats. For example, digital badges can report and record learning that takes place outside of traditional schools or classrooms. Some specific digital badging examples for educators can be used in the higher education classroom (Grant, 2014). For example, Carnegie Mellon University's CS2N is an online learning environment where individuals can earn badges and certifications as they explore computer science and STEM-related topics (CS-STEM). Who Built America? Badges for History Education is an online professional development learning community where teachers can practice and master the skills of effective history teaching. The aforementioned OLC Institute for Professional Development provides many professional development options. Teacher educators can explore various forms of professional development, with the opportunity to earn digital badges for completing specific technology-based workshops (Online Learning Consortium, 2020b).

### **Leadership & Advocacy**

By sharing a vision for leadership and advocacy with technology, teacher educators can motivate their teaching candidates to do the same (Foulger et al., 2017). Teacher educators can

engage with certain local, state, and national professional organizations that advocate technology use in education as they seek to influence the opinions and decisions of others regarding technology integration. Furthermore, teacher educators can aim to support their teacher candidates in understanding local, state, and national technology policies in education. Another idea is that teacher educators can use these competencies to advocate for educational practices that promote social equity and anti-racist pedagogy. For example, they can use technological tools and social media applications to create learning opportunities that are culturally responsive and inclusive. These leadership and advocacy discussions can be ongoing in class as well as in the teacher candidates' clinical experiences, such as student teaching.

ISTE is one of the leading providers that offers various leadership and advocacy options for teacher educators and teacher candidates (The International Society for Technology in Education, 2020a). ISTE offers membership to various professional learning networks, such as: (1) Arts and Technology Network, (2) Computer Science Network, (3) Digital Citizenship Network, (4) Digital Equity Network, (5) Education Leaders Network, (6) Global Collaboration Network, (7) Interactive Videoconferencing Network, (8) Mobile Learning Network, (9) Online and Blended Learning Network, and (10) STEM Network (The International Society for Technology in Education, 2020c). Additionally, the Association for the Advancement of Computing in Education and the Society for Information Technology and Teacher Education are recognized academic associations that offer technology tools and resources to teacher educators (AACE, 2020; SITE, 2020).

### **Where to Begin: A Blueprint**

Teacher educators and teacher candidates benefit from focusing on the TETCs, but where do they begin? The plethora of technology competencies and tools can be overwhelming. If

teacher educators are to meet the competencies set by the TETCs and the standards set by various educational accreditation groups, they must have practical, hands-on experience with technology in their teacher training (Burrows et al., 2021). This blueprint guides educators in using the TETCs and technology tools:

1. Acknowledge the need for change. The first step in using the TETCs and successfully integrating technology into instruction is recognizing the need for change. This change may need to happen inside of an individual, which can affect his or her approach to teaching (Edutopia, 2007). This gap in opportunity is evident in many current educational programs. These competencies are often overlooked. The adoption of the TETCs have the capacity to guide effective, transformational pedagogical practices (Foulger et al., 2017). By accepting the need for change, teacher educators can start focusing on the TETCs and teaching in today's technological world. When any teacher candidate or teacher educator starts using technology in the classroom, he or she will no longer be the center of attention and roles will change. This pedagogical switch can be a challenging one for many teacher educators who are used to learning and teaching the way they were taught. It is crucial to be aware that the level of refocused attention will, of course, depend on the amount and the type of technology being used in the face-to-face or remote classroom. However, this pedagogical switch does not mean that the teacher is no longer essential to the learning process. These discussions in the pre-service classroom can guide the change and help the teacher candidates accept and use the TETCs.
2. Start small. The TETCs are meant to guide teacher educators, but the amount of information can be overwhelming. So, start small by using one piece of technology or one tool. A teacher educator may want to start by holding office hours using Google Meet

or Zoom. Or, use a TED-Ed lecture in place of a traditional, face-to-face class lesson.

Then, as the comfort level rises, add in new technologies that meet the needs of the teacher candidates.

3. Focus on student learning outcomes. With the end goal of positively impacting teacher candidates (Foulger et al., 2017), teacher educators can use the TETCs to frame learning outcomes in the classroom. Teacher educators can develop concrete learning outcomes that explain what they want their PK-12 teacher candidates to be able to do when they leave the pre-service education classroom. If they want them to be able to present a remote lesson using Google Classroom, set this outcome early and focus on it throughout the course.
4. Create a community of technological learners in your classroom and in the overall higher education community. By discussing the importance of the TETCs, teacher educators can start the conversation about using technology in the classroom and with administration. This conversation can create an atmosphere of technology acceptance and appreciation. In fact, Foulger et al. (2017) claimed that “the TETCs would inspire conversations among their administrators in their university surrounding new aspirations” (p. 434).
5. Keep updated with new technologies and innovations. In today’s world, it is more important than ever that teacher educators are open to trying new ways of preparing teacher candidates. Since it is a challenge for teacher educators to find opportunities for preservice teachers to acquire the necessary experience in using technology and software prevalent in K–12 schools (Burrows et al., 2021), professional development is a critical factor. By participating in remote and face-to-face professional development opportunities that correlate with the TETCs, having discussions with colleagues about the

TETCs, and learning new ways to use various technology tools, teacher educators can keep abreast of new technologies. As Foulger et al. (2017) explained, “Collectively, all teacher educators are responsible for preparing teacher candidates who enter future classrooms with the skills needed to use and integrate technology appropriately for teaching and learning” (p. 437).

### **Conclusion**

In conclusion, it is evident that teacher educators are key players in preparing teacher candidates as they ready themselves to teach in the PK-12 environment. Also, teacher educators have a unique responsibility in promoting inclusive excellence in education by nurturing personal reflection, developing community and promoting connectivity in teacher candidates. The TETCs are a set of competencies that can ensure that all teacher educators are prepared to effectively use technology in pre-service teacher preparation programs. Indeed, the TETCs give teacher educators a starting point to focus on when integrating technology into their teacher plans. Now, it is time for these professionals to explore and use the tools to assist their teacher candidates in preparing to use technology competently and confidently in the PK-12 classroom. Hopefully, by using these technology tools, teacher educators can move towards meeting the TETCs as well as all national standards for preparing teacher candidates.

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## Appendix A

### List of the Teacher Education Technology Competencies (TETCs)

1. Teacher educators will design instruction that utilizes content-specific technologies to enhance teaching and learning.
2. Teacher educators will incorporate pedagogical approaches that prepare teacher candidates to effectively use technology.
3. Teacher educators will support the development of the knowledge, skills, and attitudes of teacher candidates as related to teaching with technology in their content area.
4. Teacher educators will use online tools to enhance teaching and learning.
5. Teacher educators will use technology to differentiate instruction to meet diverse learning needs.
6. Teacher educators will use appropriate technology tools for assessment.
7. Teacher educators will use effective strategies for teaching online and/or blended/hybrid learning environments.
8. Teacher educators will use technology to connect globally with a variety of regions and cultures.
9. Teacher educators will address the legal, ethical, and socially-responsible use of technology in education.
10. Teacher educators will engage in ongoing professional development and networking activities to improve the integration of technology in teaching.
11. Teacher educators will engage in leadership and advocacy for using technology.
12. Teacher educators will apply basic troubleshooting skills to resolve technology issues.