ABSTRACT OF CAPSTONE

Stacie Barnett-Slusher

The Graduate School

Morehead State University

March 12, 2019

EQUITABLE TECHNOLOGY INTEGRATION: KENTUCKY TECHNOLOGY INTEGRATION CERTIFICATION

Abstract of Capstone

A capstone submitted in partial fulfillment of the
Requirements for the degree of Doctor of Education in the
College of Education
At Morehead State University

By

Stacie Barnett-Slusher

Pineville, Kentucky

Committee Chair: Dr. L. Jeannie Justice, Associate Professor

Morehead, Kentucky

March 12, 2019

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EQUITABLE TECHNOLOGY INTEGRATION: KENTUCKY TECHNOLOGY INTEGRATION CERTIFICATION

Today's students need to be prepared for a rapidly changing world infused with technology. For students to develop 21st century skills, educators must be able to incorporate technology into learning in order to give students the opportunity to practice and develop transferable technology skills. Students' future digital participation is dependent upon equitable technology integration and the reduction of digital divides in classrooms. Educators also experience an inequity in technology training. A qualified, skilled technology integration specialist or technology coach can assist other educators in developing technological pedagogical skills by providing effective professional development. The Commonwealth of Kentucky recognizes the need for technology integration specialist but does not require or recommend specific credentials or certification. This capstone makes a case for the creation of a technology integration specialist and creates a model certification to facilitate systemic, effective, equitable classroom technology integration in the Commonwealth of Kentucky's school districts, individual schools, and individual classrooms. Creating a technology integration specialist certification for the Commonwealth of Kentucky has the potential to afford common understanding and uniform application of the role.

KEYWORDS: technology integration specialist certification, digital divide, digital equity, technology integration, technology professional development

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EQUITABLE TECHNOLOGY INTEGRATION: KENTUCKY TECHNOLOGY INTEGRATION CERTIFICATION

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DEDICATION

This work is dedicated to my family for supporting me through many hours of work and understanding my desire to learn and grow. You can have me back now.

To my children: Watching you grow and learn always makes me smile. I hope that you know how much I value what I have learned from each of you. You are my finest accomplishments.

To my husband: Thank you so much for your hard work, learning with me, and understanding my need to continue learning. Your patience, support, and hours of listening to my ideas are appreciated.

To my parents: Thank you for all the books, encouragement, and pretending not to know how often I stayed up after my bedtime reading under a blanket with a flashlight. A love of books and the knowledge I learned to find therein has been a gift. Thank you for teaching me to find answers and work for what I want. But above all, thanks for making me a fighter!

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I would like to thank my committee members, Dr. Shane Shope and Dr. Daryl Privott. Their time, feedback, and advice have been invaluable. Thanks to each of you for sharing your experiences, wealth of knowledge, and the passion for education. Your desire to keep making a difference is evident in all you do! Please know it is admired and respected. You have gone above and beyond to support me!

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For all the ways that this group of people have helped me grow, assisted me in the face of challenging professional dilemmas, and supported me throughout this endeavor, I truly thank you. I am better because of each of you!

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Executive Summary

What is the core of the capstone?

The core of this capstone is the creation of a technology integration specialist certification. This capstone is intended to make a case for the creation of a technology integration specialist certification (TISC) as one potential solution to the lack of systemic, effective, equitable classroom technology integration in the Commonwealth of Kentucky's school districts, individual schools, and individual classrooms. Examination of the intended purpose of the role of a technology integration specialist (TIS), the necessity to provide clarity in the functions of the role, and the current status of the role in Kentucky is provided to strengthen the case for the creation of a technology integration specialist certification.

Although technology has the potential to be a transformative factor in education (Denton, 2012; Ertmer, 1999; Matzen & Edmunds, 2007), integration in classrooms has not reached anticipated levels even when technology tools are available. Institutions continue to invest in technology tools; however, technology integration by teachers is still lacking (An & Reigeluth, 2011; Ertmer & Ottenbreit-Leftwich, 2013). In addition, computer literacy embedded in teacher education programs is not producing the desired results (Keengwe, Onchwari, & Wachira, 2008).

Although learning can occur without the use of technology tools, it is imperative for student success that learning integrate technology because digital equity and participation are important outcomes for students. "Digital

equity is defined as equal access and opportunity to digital tools, resources, and services to increase digital knowledge, awareness, and skills" (National Digital Inclusion Alliance, 2017, p. 3). Digital participation is considered a means to improve personal and social conditions that is predicated on "people's ability to gain access to digital technology, and understand how to use it creatively" (Myant, 2011, p. 1).

Decreasing the gaps in technology access, usage skills, and capacity, often referred to as digital divides (Rappaport, 2003; Reinhart, Thomas, & Toriskie, 2011; Wei, Teo, Tan, & Chan, 2011), for educators and students is important in insuring students are equipped with technology skills and efficacy. These are important components of 21st century skills which students will need for a lifetime. Educators need to overcome barriers and digital divides to decrease the likelihood and severity of the digital divides for students.

Research over the past 30 years reveals common barriers to effective technology integration in educational practice have existed, and continue to exist worldwide including: leadership, teacher attributes, professional development, and support (Bingimlas, 2009; Ertmer, 1999; Hsu, 2016; Pritchett, Pritchett, & Wohleb, 2013). It has been demonstrated that teacher, support, and leadership barriers may be improved or alleviated with training, professional development, and continued support and that teachers often request this type of assistance (Blanchard, LePrevost, Tolin, & Gutierrez, 2016; Capo, 2013; Darling-Hammond, 2006; Hew & Brush, 2007; Liao, Ottenbreit-Leftwich, Karlin, Glazewski, & Brush, 2017).

Technology integration mentoring and coaching is one solution to overcoming such barriers (Kopcha, 2012; Sugar, 2005). A technology integration specialist is "a school-based position whose primary concern is empowering teachers to harness the power of technology integration for student learning" (Hofer, Chamberlin, & Scot, 2004, p. 34). The need for such roles, referred to synonymously as technology integration specialists, technology resource teachers (TRTs), and technology coaches are reflected in the Kentucky Educational Technology System's (KETS) Master Plan for Education Technology 2018-2024 (Kentucky Office of Education Technology, 2018).

While it is recognized that a technology integration specialist can prove valuable in facilitating technology integration in schools, the position is not mandated and not approached in the same way between districts and schools in Kentucky. Kentucky does not issue any credential or certification for technology integration specialists (TIS) or a technology coach according the Educational Professional Standards Board (EPSB) Webpage ("Kentucky Teaching Certificates," n.d.). See Appendix A for list of Kentucky teaching certifications.

Neither technology integration nor the adoption and equal understanding of technology integration specialists' roles has diffused throughout the state. Currently, the role of a technology integration specialist in Kentucky is unregulated by the state; therefore, qualifications of a TIS vary widely between districts and schools. These conditions make it possible that TIS or technology coach positions may not exist in some schools, filled with unqualified personnel, or performed by people better suited

for technology support service or networking roles. It is reasonable to believe that misconceptions, terminology and role confusion, and misunderstanding of what constitutes technology integration in education all factor into such situations.

In some instances, technology support services personnel train people on the technological tools; however, this does not always connect tools to instructional goals. Review of other studies led Kopcha (2012) to determine that the type and delivery of technology integration training could become a barrier for trainees. Other trainers often used in schools are teachers, technology support personnel, or media specialists who may not be well-versed in technology pedagogy, instructional design theory, technology products, or a combination of these factors.

A technology integration specialist certification can establish competency and leadership in persons occupying the role. While this concept is not new, the rate of adoption and diffusion of this innovation is not reaching the level needed to provide an equitable benefit of technology integration to Kentucky schools, teachers, and students. In fact, the amount of full-time technology integration specialists in Kentucky has shown a decline (Kentucky Department of Education, n.d.).

Creating a technology integration specialist credential, certification endorsement, and certificate requirements for the Commonwealth of Kentucky has the potential to afford a common understanding and uniform application of the role. Districts can be more confident that the person(s) hired are qualified based on technological pedagogical skills and leadership. Rather than continue to hire

unqualified persons, the district or school will derive more intended benefits by aligning qualifications to job duties.

Credentialed TIS hires are more likely to possess the leadership and technological pedagogical skills required to understand what constitutes effective educational technology integration, effective coaching of other educators, and effective leadership skills when the person making a hiring decision is aware of skills needed and are provided with a way to ascertain or verify the desired skills.

This capstone describes a model technology integration specialist certification including a set of requirements to earn a TIS certification through a state-sponsored certification process, a certification description, TIS certification candidate requirements and eligibility, a job description, and certification types and requirements for the TIS position. Mirroring the certification levels of the Kentucky Education Professional Standards Board (EPSB), the TISC design features certification at two levels: temporary provisional and professional. Renewal certification requirements are also included.

There are several legal and ethical considerations considered in this capstone. The considerations include meeting legal requirements, fiscal responsibility, social justice, and equity. Other considerations include opportunity hoarding and issues of social mobility as counter-arguments to the certification proposed in the capstone.

Definition of Terms.

21st century skills – A set of competencies intended to ensure success in a changing world are referred to as 21st century learner skills (Partnership for 21st Century Learning, 2019).

Adoption – Adoption is the "full use of an innovation as the best course of action available" (Rogers, 2003, p. 177).

Certificate or certification program – A certificate program "provides instruction and training to aid participants in acquiring specific knowledge, skills, and/or competencies associated with intended learning outcomes" (Institute for Credentialing Excellence (ICE), 2010, p. 2).

Certification – "Professional or personnel certification is a voluntary process by which individuals are evaluated against predetermined standards for knowledge, skills, or competencies" (Institute for Credentialing Excellence (ICE), 2010, p. 3).

Credential – A credential "is proof of an individual's qualification or competence in a given subject" (Hurley, 2017, para. 1).

Diffusion – Rogers (2003) defines diffusion as "the process in which an innovation is communicated thorough certain channels over time among the members of a social system" (p. 5).

Digital divide – The digital divide is the gap between those with digital access and technology use skills and those without digital access and technology use skills (Gunkel, 2003).

Digital equity – "Digital equity is defined as equal access and opportunity to digital tools, resources, and services to increase digital knowledge, awareness, and skills" (National Digital Inclusion Alliance, 2017, p. 3).

Digital inclusion – The National Digital Inclusion Alliance (NDIA) defines digital inclusion as "the activities necessary to ensure that all individuals and communities, including the most disadvantaged, have access to and use of, information and communication technologies (ICTs)" (Siefer, 2016, para. 9).

Digital participation – Digital participation is considered a means to improve personal and social conditions that is predicated on "people's ability to gain access to digital technology, and understand how to use it creatively" (Myant, 2011, p. 1).

First-level digital divide – The level of the digital divide that refers to the gap between those that have technology tools and access and those that do not have access (Maram & Ruggeri, 2013).

Innovation - "An innovation is an idea, practice, or project that is perceived as new by an individual or other unit of adoption" (Rogers, 2003, p. 12).

Rejection – According to Rogers (2003), rejection is the decision to "not to adopt an innovation" (p. 177).

Second-level digital divide – The gap in technological use skills from person to person is referred to as the second-level digital divide (Reinhart et al., 2011; Wei et al., 2011).

Self-efficacy – Self-efficacy is the perceived belief of ability to determine and complete a course of action (Bandura 1993).

Social justice - Vasquez (2012) defines social justice as "the goal to decrease human suffering and to promote human values of equality and justice" (p. 337).

Technological pedagogical knowledge – Technological pedagogical knowledge is "an understanding of how teaching and learning can change when particular technologies are used in particular way" (Koehler & Mishra, 2009, p. 65).

Technological skills – Technological skills are effective skills learners develop as a result of the use of the computer and technologies (Zhou, 2015).

Technology integration – An & Reigeluth (2011) confirm that technology integration definitions vary and can be vague; however, they state "technology integration is generally viewed as the use of technology for instructional purposes" (p. 55).

Technology integration specialist - Hofer, Chamberlin, & Scot (2004) define a technology integration specialist position as "a school-based position whose primary concern is empowering teachers to harness the power of technology integration for student learning" (p. 34).

Who is the capstone meant to impact?

Ultimately, the capstone is meant to have a systemic impact on schools in Kentucky through Kentucky educators' technology integration and technological pedagogical knowledge. Improvement in students' technological and 21st century skills would also be anticipated. If adopted by the Kentucky State Board of Education, this capstone will impact those that wish to be employed as a technology

integration specialist, technology coach, or technology resource teacher in a Kentucky P-12 school.

Technology integration is a function that impacts schools at the local, state, and national levels. At the local level, technology integration impacts the district, the school, administrators, teachers, students, and, eventually, the community. At the state and local levels, technology integration influence the progress toward goals in the Kentucky Department of Education Technology plan, which is intended to support the goals outlined in the National Technology Plan (U.S. Department of Education: Office of Educational Technology, 2017). Meeting goals in the state plan increases the effectiveness of the National Technology Plan.

If adopted, a possible consequence of this capstone will be to those seeking certification and the Kentucky Education Professional Standards Board (EPSB). Those seeking certification will be affected because they will have to meet the requirements outlined in the capstone if adopted by the state. The EPSB will be impacted due to the additional oversight and applications required to certify candidates. As an unintended consequence, the state could benefit from the generation of additional revenue for a new certification or endorsement.

Most importantly, by requiring specific qualifications to receive credentials as a technology integration specialist, the quality of professional development for administrators and teachers will improve, which, in turn, will impact students' use of technology and development of 21st century skills. Research has established that

effective technology integration correlates to student use of technology and digital literacy (Beglau et al., 2011).

Preparing students with 21st century skills will impact communities by reducing participation divides and social equity divides. Students that possess these skills may experience a lesser impact of social divides. In turn, communities, states, and the nation will have an increase in citizens that are likely better equipped to participate as active members in society (Kentucky Office of Education Technology, 2018; National Digital Inclusion Alliance, 2017; Partnership for 21st Century Learning, 2019).

Potential changes in the classroom may be in the form of improved instruction and increased student exposure to meaningful and transferrable technological skills. As a result, the discrepancies in technological skills between students in varying settings may decrease; thereby, providing a more equitable education for students and decreasing the digital divide.

Providing sustained, quality professional development in technology integration at an equitable level across schools and districts will enable teachers to infuse their classrooms with technology that students can directly transfer to 21st century skills for academic and career success. Certification can help assure that districts and schools have technology integration roles populated by those possessing acceptable skill levels and capable of providing the type of technology training needed.

Another possible impact of the Capstone could be to persons in technology integration roles that are not qualified or to those in mistitled positions. Such persons may well resist a TIS certification for obvious reasons such as job preservation. Resistance to instituting a technology integration specialist certification will likely involve a counterargument of opportunity hoarding based on exclusionary policy (the certification). Conversely, a TIS certification requirement will open opportunity for those that have skill and merit to attain positions occupied by those that, in reality, exemplify opportunity hoarding based on the ideas of (Howard & Reeves, 2001).

Districts and schools may experience a change in funding and more effective use of professional development dollars. To this end, the items identified as operational needs in the KETS Master Plan are used to identify priorities and needs in districts' technology plans and are intended to maximize technology investments. Funding for districts is based on items identified in those plans and the progress toward meeting the KETS Master Plan goals (701 KAR 5:110).

Demonstration of the best way to use the funds to leverage resources is appropriate fiscal management as indicated in ISLCC Standard 3 (National Policy Board for Educational Administration, 2008). Identifying roles and professional development plans within a district technology plans impacts funding allocated to districts and schools. The misidentification of needs and roles along with misapplication or ineffectiveness of professional development dollars decreases the effective use of funding. Additionally, the effectiveness of funding and the ability to maximize the investment in technology is decreased.

Another group possibly impacted will be composed of those that are already acting in the role, that claim to be self-taught, or those holding certifications for various competencies or through specific vendors. This capstone does not seek to undermine the value or usefulness of such products. Unfortunately, being certified in one tool or in a vendor-specific technique or product does not necessarily correlate to possession of leadership skills, technological pedagogical knowledge, the ability to design and provide effective professional development, or knowledge of the ISTE Standards for Coaches, ©2011, ISTE® (International Society for Technology in Education), iste.org. All rights reserved. (See Appendix B) Certification will not limit upward mobility.

How was the capstone project implemented?

Solutions to this problem requires change. Only when educators gain skills, are trained correctly, and supported will they gain the confidence and skills to integrate technology appropriately and help their students do the same. Because the suggested use of this role and the purpose is relayed in the state technology documents, why is this change not occurring on a larger scale and the use of a TIS, or innovation, unable to diffuse throughout Kentucky schools?

In order to understand what is hampering diffusion, one must first understand the process by which it occurs. Rogers' Diffusion of Innovations theory, originally published in 1962, is used to explain how the characteristics of an innovation impact adoption decisions. Rogers (2003) describes an innovation as "an idea, practice, or

object that is perceived as new by an individual or other unit of adoption" (p.12).

Diffusion

Rogers (2003) identified five characteristics regarding an innovation that are factors in adoption:

1. Relative advantage is the perceived advantages or disadvantages of an innovation.
2. Compatibility is the degree that an innovation is perceived as compatible with work and values.
3. Complexity refers to the degree to the difficulty involved in understanding or using an innovation.
4. Trialability refers to the ability to experiment with an innovation before committing to using the innovation.
5. Observability refers to the how visible results of the innovation are to users.

The innovation considered in this capstone is classroom technology integration via a coach, TRT, or TIS. Applying the five characteristics to the innovation aids in understanding why the innovation has not been successfully adopted system-wide (statewide).

1. Relative advantage - There is not a system-wide buy-in signaling a relative advantage of utilizing coaches or technology integration specialist positions. All districts, schools, and teachers do not perceive the role as an advantage. Many districts, schools, and teachers consider the position unnecessary and expensive because they believe technology integration is already present,

misunderstand the concept of technological pedagogical knowledge, or do not view it as important in achieving instructional goals. Some districts and schools may see the additional cost and effort as a disadvantage.

Furthermore, there is little incentive for schools to demonstrate effective technology integration or how technology is used in classrooms. Including technology goals in a technology plan suffices.

2. Compatibility - If a district or school places value on effective technology integration and understands the ways in which a technology integration specialist can help achieve the goal, it is compatible. When low value is placed on using instructional technology or a misconception is present, the role is not compatible with the existing beliefs or structures. As demonstrated earlier in the capstone, the TIS role and function is not compatible with all the components in the system. Changing beliefs and behaviors is required. Existing roles and structures reduce the compatibility of technology integration.
3. Complexity – Because of the misconceptions and ambiguity involved in technology, the whole concept is complex. Adding to the complexity, lack of technological pedagogical knowledge increases the likelihood of not applying the components correctly or believing technology integration is something it is not, such as the existence or use of tools equates to instructional use of the technology. Technological pedagogical knowledge is not a simple concept. It involves a large amount of complex knowledge.

4. Trialability – Due to the complexity of the concepts, a large investment of time and motivation are required to overcome barriers. This negatively impacts the way schools, districts, and teachers are willing to experiment with technology.
5. Observability – The results of technology integration are not easily observable to those that may adopt. Many conclusions espoused in this capstone indicate that some adopters or potential adopters are not even sure what it is that they should observe, or they believe they are observing results of one thing when it is another.

An examination of the current status of many technology integration conditions and considerations present in Kentucky indicates the innovation presents a low relative advantage for many stakeholders requiring a large change in existing practices. The complexity involved in providing technological pedagogical knowledge for districts and schools, perceived complexity in technological pedagogical knowledge (TPK), and the complex nature of TPK are negative factors in the adoption process. Trialability and observability are also weak, which is also a negative indicator for adoption. It is easy to see why diffusion rates system-wide are lower than believed or anticipated.

A state issued certification for a technology integration specialist may improve the five characteristics of innovation and positively influence adoption system-wide by increasing technological pedagogical knowledge and bringing a common understanding to the terminology, roles, and functions involved in

technology integration. In addition, a more uniform use of the TIS position would help ensure most were on the same page with the state and the intention to promote *effective* technology integration.

To create a change that has further influence on technology integration throughout the state, strategies to encourage a systemic change must take place. Currently, some teachers, schools, and districts are doing great things in classrooms aiding student development of 21st century skills via technology integration. Based on reports and data in the KETS Master Plan (2018), it can be determined that piecemeal changes are occurring in separate districts, schools, or individual classrooms; however, change and benefits experienced in the use of technology integration is not occurring uniformly all over the state.

The outcome desired by the state and one that is necessary to meet the needs of educators and students indicates the need for a systemic change. Reigeluth & Duffy (2006) maintain that systemic change is an essential to meet educational change needs. They contend "tinkering" with parts of a system leaves the old system's basic structure (p. 209). It appears that this is the way technology integration in Kentucky is currently approached due to the approach of information versus mandate and the application by individual districts and schools.

Systemic change is more effective than piecemeal change as a system is "more than the sum of its parts" (Ellsworth, 2000, p. 198). Piecemeal change does not depend on the interrelationships between components of a system. Because system components (districts, schools, teachers) can function interdependently, part

of the system may encounter barriers. This description mirrors the current status of the technology integration specialist role in Kentucky.

While the state recognizes the need for technology integration via coaches and specialists, districts choose how closely the guidelines are followed, what they interpret the guidelines to mean, or if they want to use them at all. Piecemeal change is disadvantageous when a systemic change is desired because how one part responds – or does not respond - could mean a system will be "unable to function at all" (Ellsworth, 2000, p. 198).

Piecemeal change has the disadvantage of being slowed or stopped more easily by entities. For example, a district is able to employ an unqualified person to make technology and technology integration decisions or provide professional development training, thereby enabling those resistant to change to slow the rate of change and adoption.

In a systemic change, the support of other areas enables change to be more likely to occur successfully because of other systems, employees, or groups moving forward with the change and the increase in available support. For example, if the whole system requires change and redefines processes around the desired change, the area refusing change will have to conform to fit into the whole or be outside the requirements of the system. This means that districts or hiring managers that do not understand the concept of technology integration will be less likely to hire unqualified personnel.

When considering piecemeal individual changes, the reason for an absence of widespread changes becomes clearer. It appears that individual technologies or technology integration itself are not the primary reasons for the slow diffusion of appropriate technology integration in classrooms. It is the continued piecemeal implementation and varied understanding of technological pedagogical knowledge that is problematic. I contend that the innovation will continue to negatively diffuse in the statewide system or within systems of schools and districts due to the misapplication and confusion. Correspondingly, Hall & Hord (2001)set forth that misusing an innovation negatively influences change.

Since technology integration has been adopted by some parts of the system and not by others, leadership is necessary to assist in the change process. Creating a technology integration specialist certification has the potential to provide competent personnel to act in leadership capacities and to prepare other educators to do so. Acting as a leader is competency of the TIS role as reflected in both the ISTE Standards for Coaches © and the ISTE Standards for Administrators.

The goals of the technology integration specialist certification for this capstone are to:

- provide qualified professionals to assist in decreasing the digital divides for students, educators, and schools,
- promote awareness and importance of 21st century skills,
- provide credentialing process leading to certification,

- aid districts and schools in identifying appropriate qualifications for the TIS role,
- provide a focus on instruction first, technology second,
- aid in maximizing technology investment by increasing appropriate technology integration,
- to add value to the human capital side of educational technology in Kentucky,
- increase quality professional development in technology integration,
- ensure that all TIS candidates receive relevant training to prepare them for working practices, and
- ensure appropriate skill levels are acquired for a TIS to effectively perform major job duties.

Table 1 below aligns the objectives to the digital divide level(s) the objectives are intended to address.

Objectives of the Technology Integration Specialist Certification	**Digital Divide Level(s) Addressed**		
	1st Access	**2nd Capability**	**3rd Outcomes**
Provide qualified professionals to assist in decreasing the digital divides for students, educators, and schools.	X	X	X
Promote awareness and importance of 21st Century skills.	X	X	X
Provide credentialing program leading to certification.	X	X	X

Aid districts and schools in identifying appropriate qualifications for the TIS role.	X	X	X
Provide a focus on instruction first, technology second.		X	X
Aid in maximizing technology investment by increasing appropriate technology integration.	X	X	X
To add value to the human capital side of educational technology in Kentucky.	X	X	X
Increase quality professional development in technology integration.		X	X
Ensure that all TIS candidates receive relevant training to prepare them for working practices.		X	X
Ensure appropriate level of skill is reached for a TIS to effectively perform major job duties.		X	X
Ensure appropriate level of skills are acquired for a TIS to effectively perform major job duties.	X	X	X

Table 1: TISC objectives aligned to the digital divides.

The capstone project defines the role of a TIS and outlines a certification process which provides appropriate training emphasizing the need for on-going professional development designed to provide the TISC candidates time to follow an effective model of training themselves. The certification is influenced by several other programs: the West Virginia Department of Education Technology Integration Specialist program, the Educational Technology Endorsement Program (ETEP), sponsored by the University of Utah and the Utah Education Network, and the Texas Computer Education Association (TCEA) Campus Technology Specialist Certification program.

The certification process proposed encompasses levels of certification corresponding to established education certification levels in the state. The levels proposed begin with a temporary provisional certification to indicate a beginning role and acceptance into the certification process. The certification level would progress to a professional certification to designate the completion of a program or possession of skills to fully perform the job duties of a TIS.

The temporary provisional level allows for beginners to establish a base set of competencies and become "enrolled" in the certification process, attend the related training, and engage in continuing education hours. This level is intended to designate a developing technology integration specialist skill set. The temporary provisional certificate would be renewed for a period of three years. The renewal of the provisional certificate would require attendance in the state-sponsored yearly training.

Continuing education hours outside the certification yearly training allow for candidates to pursue activities that are most meaningful to their needs. Those needs may be updating technical skills or addressing self-assessed areas of need. Additionally, those hours demonstrate a commitment to professional skills as The ISTE Standards for Coaches © Standard 6 (See Appendix C).

After attendance in three yearly sessions of the yearly training and completion of the professional development hours, the next level of certification would be a professional level. At this level, the TIS would be recognized as fully prepared in requisite skills and knowledge of the position.

Renewal certifications would be governed by the state of Kentucky's renewal requirement for professional certificates. Currently, certifications are renewed at five-year intervals. Each technology integration specialist renewal would require evidence of employment as a TIS or coach or 40 hours of continuing education. The renewal requirements would help ensure that skills are updated and current.

The length and design for the technology integration specialist certification is recommended to provide immersive, on-going professional development with a hands-on component. This design will allow the formation of a professional learning network and a cohort model to allow participants to engage in and experience collaborative learning networks and professional learning programs (ISTE Standards for Coaches, ©2011, Standards 3 and 4).

The recommended list of yearly training sessions suggestions included in the capstone project is meant to encompass skills guided by the goals of the certification, the objectives of the certification, and the job duties specified therein. It is impossible to determine the entire scope of training needs prior to selection of participants and assessment of individual competencies and needs; therefore, it is recommended that participants use the outside professional development hours required to address knowledge gaps and stay abreast of current trends.

Why were this capstone and related strategies selected?

This capstone addresses the need to provide equity in technology integration to decrease digital divides for schools, teachers, and students through a systemic

change by way of a technology integration specialist certification. This capstone further highlights the need to decrease the impact of factors contributing to digital divides.

The interest in technology in the classroom is sometimes credited to a belief that technology increases learning. Basak & Govender (2015) posit that the success of education is dependent upon the increase in the levels of both teaching and learning. Technology integration is considered by some as one means of moving from teacher-centered learning to student-centered learning and improving student engagement. An & Reigeluth (2011) caution that more research is needed on learner-centered technology integration rather than general technology integration issues but emphasize the value of technology to increase student engagement (p 54).

On the other hand, there are those that do not agree that technology integration matters or increases student learning. Groff & Mouza (2008) state that "While most researchers agree that technology can change the teaching process, making it more flexible, engaging, and challenging for students, little evidence exists to support these claims" (p. 25). Tamim, Bernard, Borokhovski, Abrami, & Schmid (2011) support Richard Clark's "No Significant Difference" theory which sets forth that technology is only a vehicle for learning and does not, in itself, increase learning. Simply put, some people realize that learning can occur without technology. While this is true, technology integration involves more than the function of learning specific content in the classroom. Beliefs similar to this theory may be central to why some educators place little emphasis on technology integration.

According to Cuban (as cited in (Hofer, Chamberlin, & Scot, 2004), "Two decades after the introduction of personal computers in the nation, with more and more schools being wired and billions of dollars being spent, less than two of every 10 teachers are serious users of computers in their classrooms" (p.34). The lack of technology integration in classrooms can contribute to the digital divides; whereas, the ability to embed technology into instruction decreases the usage divide.

In American schools, some barriers to technology integration have become less common or have shown improvement over time, while others have remained. Early on, one of the most obvious and common barriers was due to access to technology. Lack of access was coined the "digital divide" (Gunkel, 2003; Rapaport, 2009, pt. 5). The digital divide was defined to explain the difference between the access to technology from one entity or group of people to another based on lack of resources, gender, age, geographic location, or infrastructure issues.

An inequality of access to technology was determined to be an earlier barrier to technology integration in schools. For classroom instructional technology integration purposes, the digital divide is a school- or system-level barrier. The term encompasses several meanings as technology and the association with the "have not" portion of the terms has evolved (Gunkel, 2003; van Dijk, 2012).

In response to the digital divide reported in the NTIA publication and elsewhere, the government took steps to ensure that students, as well as others, had access to technology in public schools. In recognition of the digital divide, The Telecommunications Act of 1996 went beyond concerns of phone service to include

digital media and provisions to access in response to the digital divide (Hammond, 1997).

The Office of Educational Technology continued to publish additional reports that resulted in increased funding and policies with the intent to decrease the digital divide in schools. Closing the digital divide continues to be important, especially in a societal context; however, this capstone is focused on the digital divide in Kentucky school systems. Technology access barriers are no longer as widespread in schools. Public schools now have funding for some technology. The discrepancy lies in the amount of funding and how a school devises a technology plan (Fisher, 2014; U.S. Department of Education, 2017).

As increased access to computers and related technologies began lessening the "original" or first-level digital divide, recognition of other "divides" appear in the literature (Davison & Cotten, 2003; Hargittai, 2002; Maram & Ruggeri, 2013; Wei et al., 2011). Literature in the early 2000's through the present reflects the Second-Level Digital Divide, "the difference, or 'divide' in how technology is used" (Reinhart et al., 2011, p. 181).

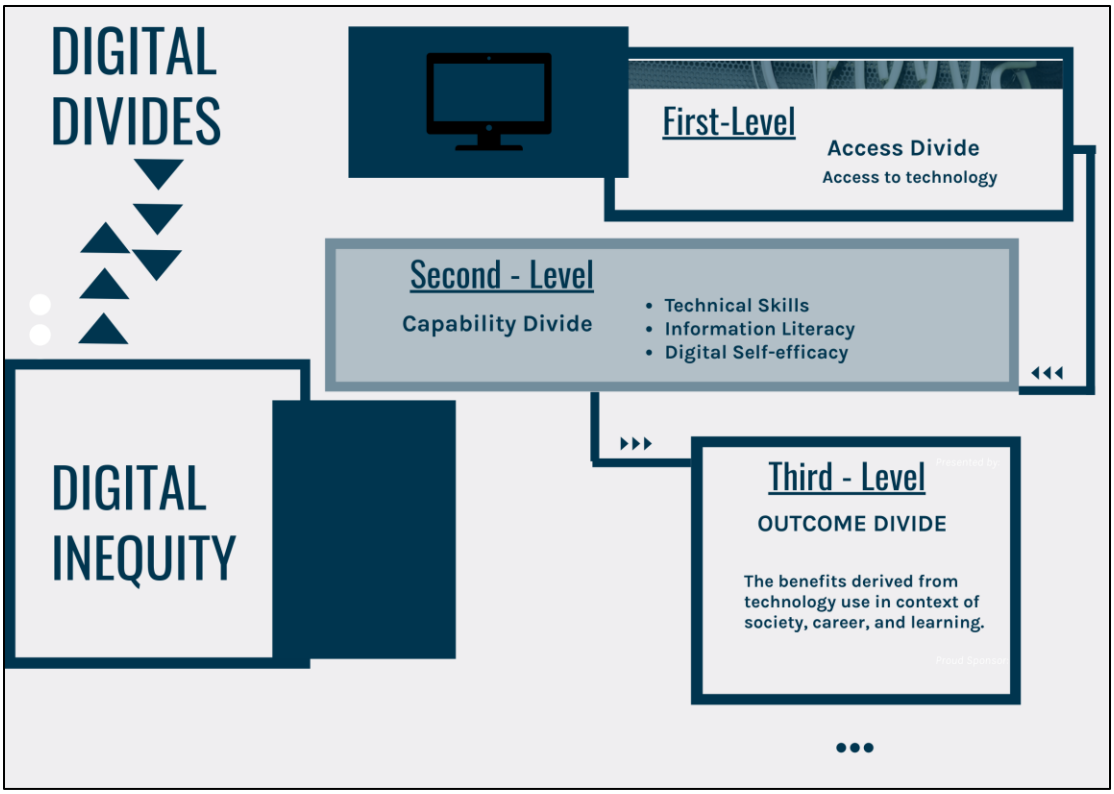

Figure 1. The relationship between the digital divides and digital inequity

According to Tierney (2016), "The first level has to do with physical access to technology. The second level has to do with differences in how people use technology." Wei et al., (2011) refer to the Second-Level Digital Divide as "capability" divide that can lead to a third-level divide involving "outcomes" (p. 171). See Figure 1.

While Wei et al. (2011) consider the third level of outcomes to include issues of digital participation rather than just capacity, the lens used in this capstone will consider digital participation as a condition that occurs when, and is contingent upon, successfully navigating the three levels of the digital divide as shown in Figure 2. To further simplify this premise, it could be considered that each level impacts the next

level to arrive at digital participation. It could also be said that full participation depends on knowing how to transfer the skill to use technologies tools to varying contexts and conditions.

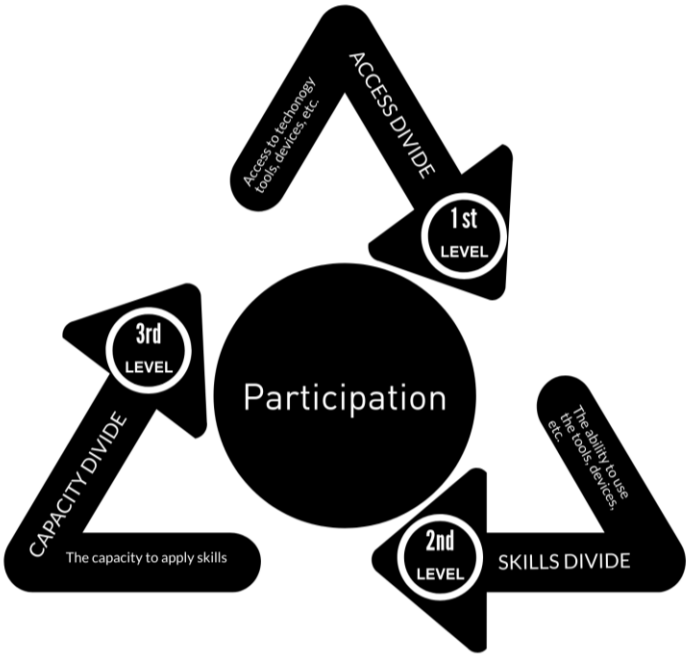

Figure 2: The relationship of the digital divides and participation.

To further clarify, the National Digital Inclusion Alliance (NDIA) definition of digital equity is "equal access and opportunity to digital tools, resources, and services to support an increase in digital knowledge, awareness, and skills" (T. Davis, Fuller, Jackson, Pittman, & Sweet, 2007, p. 1). Tierney's statement combined with the NDIA definition connects the first-level, or access, divide to the second-level, or usage divide. This capability and capacity to use technology is the determinant of the condition of digital equity (National Digital Inclusion Alliance, 2017). The third-

level of the digital divide aligns to the capacity necessary to achieve digital participation.

Access, capability, and capacity outcomes for students drive the need to close the digital divides in education settings to increase future digital participation. Cakir (2012) states that "schools have a great responsibility to educate individuals who are capable of effectively using technology" (p. 273). These outcomes determine whether students can fully participate digitally.

Digital participation can be considered the entire process of having, using, and applying technology in appropriate and new contexts and purposes (Myant, 2011). Therefore, it seems necessary to navigate all three levels of the digital divide to fully participate digitally. The NDIA (2017) considers digital participation to be necessary to participate in "society, democracy, and economy" to gain "civic and cultural participation, employment, lifelong learning, and access to essential services." Digital inequity and lack of digital participation creates opportunity gaps.

In addition to the pressure for teachers to improve instructional methods due to accountability measures, teachers are expected to include 21st century learner skills into instruction. The Framework for 21st Century Learning is a set of standards meant to prepare students "to thrive in today's digitally and globally interconnected world" (Partnership for 21st Century Learning, 2019, p. 1). These standards are intended to prepare students to respond to and be adaptable to rapidly changing technologies and can be considered to be connected to the outcomes referenced in the third-level digital divide.

The framework revolves around three themes: learning and innovation skills; media and ICT (information, communications and technology) literacy skills; and life and career skills. The themes are interdependent. They depend on each other to achieve the higher order instruction that students need to be successful, both in today's world and in the future.

Incorporating digital literacy and using technologies to complement other skills and competencies requires technology integration by both teachers and students in the classroom. It is essential for teachers to integrate technology into instruction to prepare 21st century learners (Fazilat, Scherer, & Tondeur, 2016; Saavedra & Opfer, 2012). If teachers, and ultimately, students experience digital divides, students will not have adequate technology skills to demonstrate 21st century skills.

Furthermore, because today's students will use technology in their everyday lives, inadequately preparing students for the technology they need to use contributes to an opportunity gap both academically and socially, creating an educational and social equity issue. In effect, they will experience a participation and opportunity gap.

Because students need technology skills to navigate today's world, the outcomes are connected to social justice and equity for students. The Interstate School Leaders Licensure Consortium (ISLCC) Standards reflect a connection between skills and social equity (National Policy Board for Educational Administration, 2008). Promoting the success (Standard 1) of students by

recognizing the skills student needed for social mobility (Standard 6) affirms the importance of outcomes for students.

The literature indicates that closing the first-level digital divide in schools and partially overcoming the lack of access has been mostly accomplished. Redmann & Kotrlik (2008) concluded that barriers related to access were considerably lower when comparing study results from 2002 to 2007. Similarly, Stevenson (2009) recognized that access to hardware and software was no longer the deciding factor on what constituted a divide, but that application of the technology constitutes another form of divide that fits in several broad categories of barriers related to technology integration (system-level, school-level, and teacher-level).

The ability to use and apply technology, as referenced above leads to the next level of the digital divide. Teachers' and administrators' inability to practice or recognize technology integration is a form of the use divide included in the second-level digital divide. When the digital divides are present in classrooms or for educators, the same digital divides for students are not lessened. Furthermore, as technology advances, the continued neglect of technology integration in instruction further increases the second- and third-level digital divides for teachers and, by default, for many students. See Figure 3. Eventually, the third-level digital divide occurs in classrooms and for students because students do not develop skills and have opportunities to apply those skills.

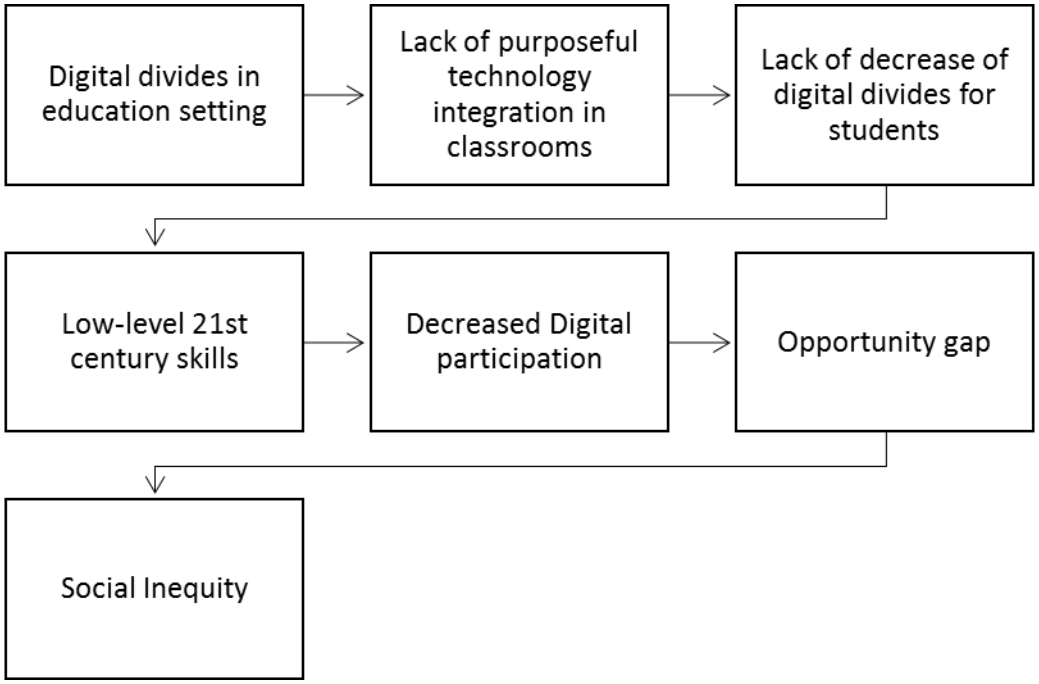

Figure 3: Effects of digital divides in the education setting on students.

A reasonable way to approach this is to investigate what factors contribute to the second- and third-level digital divide in the education. As early as the 1990's and continuing through this decade, the literature indicates through numerous studies that computer technology integration was, and continues to be, hampered by a host of barriers (Bingimlas, 2009; Ertmer, 1999; Hadley & Sheingold, 1993; Hsu, 2016; Keengwe et al., 2008; Laferrière, Hamel, & Searson, 2013; Pritchett et al., 2013).

Researchers have examined and identified barriers to computer technology integration throughout the last three decades with mostly similar conclusions reflecting that technology integration in education is still lacking (An & Reigeluth, 2011; Ertmer & Ottenbreit-Leftwich, 2013). Buabeng-Andoh (2012) categorized

these barriers as either teacher-level (i.e., personal characteristics, computer competence, computer self-efficacy, gender, and teaching experience) or school- and system-level issues (i.e., teacher workload, institutional characteristics, professional development, accessibility, technical support, leadership support, and technological characteristics).

Teacher-level barriers are attributed to factors such as attitude and beliefs, pedagogical practices, level of technological skill, teacher education preparation, professional development, and leadership (Basak & Govender, 2015; Buabeng-Andoh, 2012; Clark & Zagarell, 2012; Cox, 2013; Hadley & Sheingold, 1993; Harris, Mishra, & Koehler, 2009; Reinhart et al., 2011). It is established that education, professional development, and leadership are recommended approaches to decrease or remove the barriers (Bingimlas, 2009; Buabeng-Andoh, 2012; Clark & Zagarell, 2012; Ertmer, 1999, 2005; Groff & Mouza, 2008; Twining, Raffaghelli, Albion, & Knezek, 2013).

Because the topic of barriers is in-depth and well-established, addressing all barriers is beyond the scope of this capstone. Instead, it is more appropriate to view these barriers as interrelated. The idea that barriers can influence other types and categories of barriers, as suggested by Buabeng-Andoh (2012), establishes the relationship and influence of one type of barrier on another. As the digital divide is a barrier, it stands to reason that other barriers also influence the digital divides.

The connectivity between levels of the digital divides is similar to the interrelationship and interdependence of these barriers. Following this line of

thought, if the first-level digital divide is not really an explanation for the lack of technology integration, then the skills and application of technology are most at issue. Within these barriers, the problems most responsible within a classroom, school, and district for how and to what extent technology is used by educators and students are identified.

These digital divides illuminate a large part of why, even after decades of investment, technology integration is low. The presence of tools or access to technology does not mean use or skill develops for teachers or students. Keengwe et al. (2008) noted that tools without curriculum integration will not increase student learning.

It has long been established that the tools and resources available must be used in a meaningful way. Ertmer (1999) promoted the importance of teachers gaining technical skills along with pedagogical applications and skills to enhance instructional methods. In a report detailing the effects of coaching on student learning, "the powerful use of technology" is described as occurring when teachers create learning opportunities which support and/or lead to student technology use that enables students to select appropriate tools; develop collaboration, communication, creativity and innovation, and critical thinking skills; and take responsibility for learning (Bakhshaei, Hardy, Francisco, Noakes, & Fusco, 2018, p. 9).

Laferrière, Hamel, & Searson (2013) found that agents can oppose tensions using a systemic approach to successfully navigate some barriers. Their study concluded that technology integration relies upon leadership, shared vision, and an

ongoing approach to professional development. Exactly who occupies roles as leaders and change agents varies from organization to organization.

Kentucky indicates the need for change agents to facilitate classroom technology integration within several Kentucky Department of Education technology-related documents. For example, the second area of emphasis identified by the Kentucky Education Technology Systems (KETS) in the KETS Master Plan (2018) for the future is to:

> address the importance of having adequate numbers of education technology roles/positions in all districts to ensure that existing and new education technology is (a) extremely reliable and available in the classroom, (b) maximized, (c) secure and safe, and (d) provides data of the highest quality. (p. 5)

Kentucky aims to align the state technology plan with recommendations from the National Technology Plan (U.S. Department of Education: Office of Educational Technology, 2017) regarding technology in learning, assessment, teaching, infrastructure, and leadership (Kentucky Office of Education Technology, 2018, p. 16). The five recommendations listed are:

1. Learning – Engaging and Empowering Learning through Technology - All learners will have engaging and empowering learning experiences in both formal and informal settings that prepare them to be active, creative, knowledgeable and ethical participants in our globally networked society.

2. Assessment – Measuring for Learning – Our education system at all levels will leverage the power of technology to measure what matters and use assessment data to improve learning.

3. Teaching – Teaching with Technology – Educators will be supported by technology that connects them to people, data, content, resources, expertise, and learning experiences that can empower and inspire them to provide more effective teaching for all learners.

4. Infrastructure – Enabling Access and Effective Use - All students and educators will have access to a robust and comprehensive infrastructure when and where they need it for learning.

5. Leadership – Creating Cultures and Conditions for Innovation and Change – Embed an understanding of technology-enabled education within the roles and responsibilities of education leaders at all levels and set state, regional, and local visions for technology in learning. (p. 16)

Of the five recommendations, those of learning, assessment, and leadership are most directly related to the roles of a technology integration specialist. The role of a technology integration specialist should provide leadership and vision to enable teachers to provide teaching that infuses technology to facilitate learning experiences for all learners reflective of 21st century skills.

Kentucky indicates a desire to increase technology integration by recognizing and sharing a vision that the TIS role can provide leadership to change teacher perceptions and abilities regarding technology, model technology use, and

connect technology and pedagogical practice - all through effective professional development (Kentucky Office of Education Technology, 2018). While the Kentucky Department of Education and its Office of Education Technology share the vision and makes suggestions to districts, all that is required of districts is the production and submission of a technology plan.

The KETS Master Plan (2018) is careful to emphasize that it is unable to "define a step-by-step process" or "advocate one solution over another" in the technology process (p. 15). It leaves room for flexibility and local control. Unfortunately, it does not effectively communicate the means to assure qualified personnel will connect technological pedagogical knowledge to educators' pedagogical content or other personnel's technical knowledge through effective professional development.

According to the KY TELL (Teaching Empowering Leading and Learning) Report ("State summary results: TELL KY 2017," 2017), 81.8% of teachers indicated that training met their needs to effectively integrate technology (p. 8). The data indicates a moderate need for technology integration training; however, the data may be misleading. When reviewing the data collected in the KETS Master Plan, only 35% of districts have a position specifically for full-time technology integration. More alarmingly, the data shows a decrease in such positions over the last several years. At first glance, this could indicate that overall need is low; however, the data also shows that only 36% of teachers indicate they receive support in technology integration planning.

Why the conflicting data? Simply put, people do not always know what they do not know. One glaring problem with this data is that, as demonstrated by H. A. Davis, Hartshorne, & Ring (2010), there is a large variation in what teachers, ranging from preservice to experienced and reflecting up to doctoral level coursework, consider instructional technology and its effective use for learning.

While the KETS Master Plan (2018) recognizes and affirms the need for educational technology specialists as part of the "Human Capital" element of success for technology implementation (p. 33), there is a missing puzzle piece to implement the roles effectively. This missing puzzle piece may exist because Kentucky does not formally recognize *who* has the leadership and technological pedagogical skills needed to act in technology integration roles; however, these skills are mentioned and referenced in the state technology plan. While the need for a technology integration specialist is recognized, guidelines to encourage that technology roles are occupied by competent persons are not available.

Chapter 16 of the Kentucky Administrative Regulations KAR 4:010(15) (Kentucky Legislative Research Commission, n.d.) sets forth the requirements that an instructional technology director, a position closely related to that of a TIS, need only hold a valid teaching certificate; thereby, only ensuring that the person has teaching experience. There are no requirements specified for any type of technological pedagogical knowledge.

Although the Kentucky Department of Education articulates a vision and the needs to accomplish the vision, these acts alone do not provide enough guidance for

establishing the TIS role nor does it serve to assure the implementation of the duties implied therein. More pointedly, describing the need for a TIS role in the state technology plan and sharing the vision does not assure that the purpose of a TIS to facilitate technology integration will trickle down beyond district technology coordinators or other leaders.

The National Technology Plan warns against such assumptions. The updated plan specifically counsels: "Leaders who believe they can delegate the articulation of a vision for how technology can support their learning goals to a chief information officer or chief technology officer fundamentally misunderstand how technology can impact learning" (U.S. Department of Education: Office of Educational Technology, 2017, p. 42).

As it stands, districts are not required to employee anyone in a technology integration capacity at all. In addition, a district can employ a person to occupy the role of a technology integration specialist, technology coach, etc. based on whatever criteria the district decides to use. Very often, the person in charge of making a hiring decision to fill a TIS position is not well-versed in the difference in technology roles and technological pedagogical skills. When a poorly qualified candidate is hired, the intended benefits of utilizing a TIS to decrease the digital divides for teachers and students can be negated. The employing district or school then operates on the assumption that they are reducing the digital divide for students.

Many districts employ a form of a technology integration specialists, technology resource teachers, technology coaches, or rely on other personnel to

provide some type of technology integration training. These varying titles can be found occupied by persons with different levels and types of preparation and skill. The employment capacity may entail a range of full-time TIS responsibilities to part-time or occasional responsibilities. Some schools rely on full-time classroom teachers or administrators with varying levels of skill and preparation. Still others rely on the network administrators or other technical staff that may have little or no pedagogical experience. With such variation, how can it be assured that the aims of the state technology plan regarding technology integration are fulfilled?

Fulfilling these roles requires a good grasp on what technology integration means, why it is important, and how to best help educators do it. "Integration requires that teachers readily and flexibly incorporate technologies into their everyday teaching practice in relation to the subject matter they teach" (Hadley & Sheingold, 1993, p. 265).

Teachers commonly use computers to perform a variety of administrative and clerical functions such as taking attendance, email communication, and lesson planning, but not for higher-level tasks, instructional purposes, or student-centered learning (An & Reigeluth, 2011; Ertmer, 1999, 2005; Keengwe, Schnellert, & Agamba, 2012). Groff & Mouza (2008) recognized that teachers and administrators use technology or computers for their own purposes but neglect to investigate technology as "instructional tools" (p. 22). Unfortunately, that trend is often true for students. Data collected from a random survey sample of students tested in April 2017 in a report published by ACT® tells another alarming story. Moore & Vitale,

(2018) share data that shows 32% of the students surveyed indicated they did not use technology daily for any activity related to school at school or home (p. 5).

Unfortunately, teachers lacking the skills or desire to use instructional technology are sometimes never recognized as lacking such skills due to deficiencies in an administrator's knowledge related to technology integration; likewise, an administrator may praise or promote subpar technology integration skills. In essence, educators who think a PowerPoint loaded with text, then projected onto an interactive whiteboard for students to dutifully copy meets a technology integration component of an evaluation have a fundamental misunderstanding of what constitutes technology integration to increase student outcomes. Using a PowerPoint in the manner described above with the idea that such activities are strong indicators of technology integration to meet student needs exemplifies either deficiencies in technological pedagogical skills or knowledge of technology integration models.

One model, SAMR (Substitution-Augmentation-Modification-Redefinition) is a model introduced by Dr. Ruben Puentedura to explain "technological levels of use" (Puentedura, 2006, p. 3). The PowerPoint example above is demonstrative of the level of substitution in the SAMR model. Substitution is the act of replacing one tool with a technology tool that does not change the function of the original tool. In the example above, a chalkboard and chalk will accomplish the same purpose for students to copy notes. The model, as shown in Figure 4, is commonly used to help educators choose tools and evaluate use or purpose. The model can also be used to

understand the levels of the digital divides addressed by corresponding SAMR uses as shown in Figure 5.

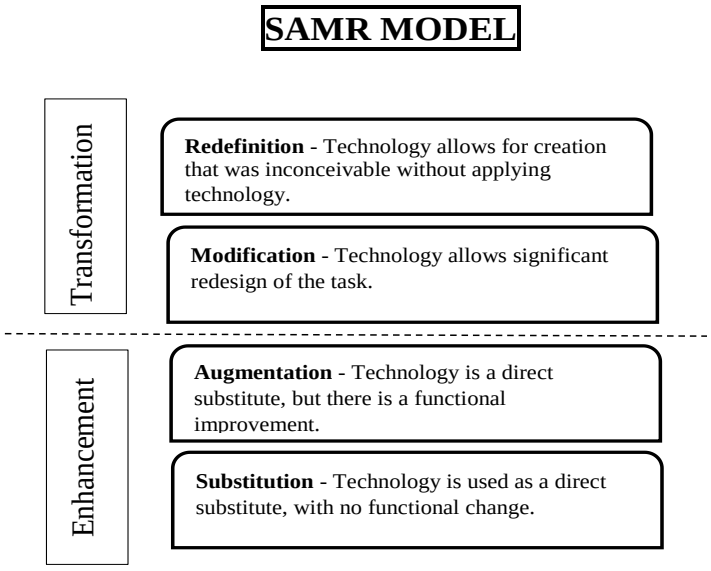

Figure 4: SAMR model (Puentedura, 2006).

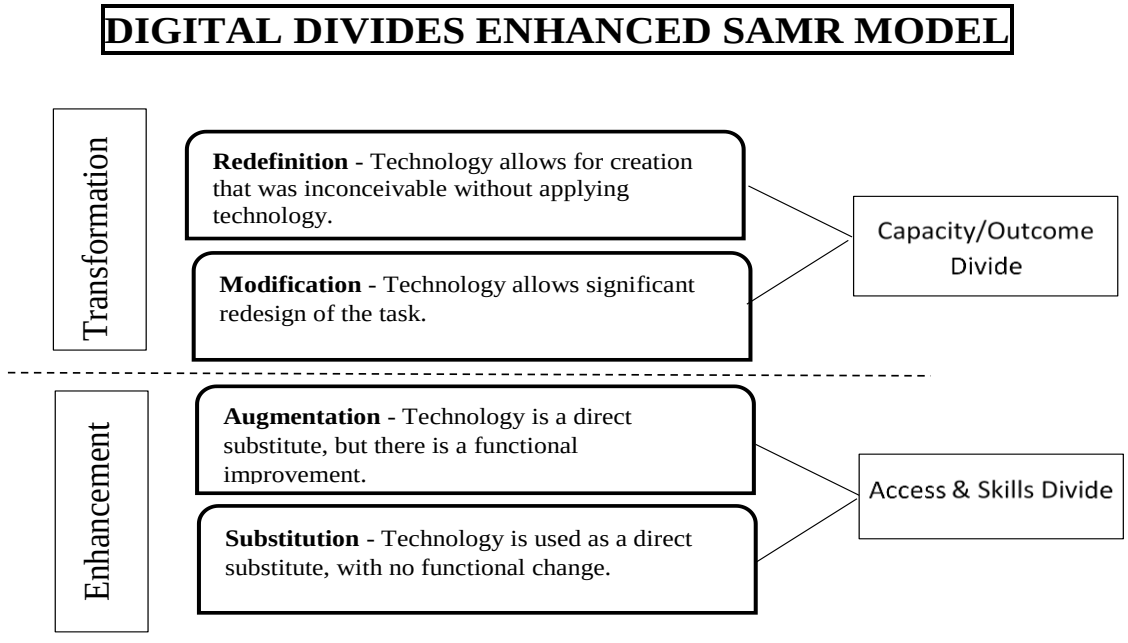

Figure 5: Digital divides enhanced SAMR model. Adapted from Puentedura (2006).

For technology integration to be present in classrooms and pedagogical practice two things are instrumental beyond access: (1) technical ability, which addresses the second-level digital divide, and (2) an understanding of pedagogical practice that truly integrates technology by matching the best tool for an instructional purpose or outcome, or technological pedagogical skills, which addresses the third-level digital divide. Teachers that cannot apply skills or knowledge of tools to the context of instruction experience a capability divide that is often passed on to students.

Koehler & Mishra (2009) describe technological pedagogical knowledge, or TPK, as "three core components: content, pedagogy, and technology, plus the relationships among and between them" (p. 62). Koehler & Mishra (2009) enjoin the three components to describe a framework, TPACK, which describes knowledge required for effectively integrating technology with pedagogical skills and content knowledge (See Figure 6).

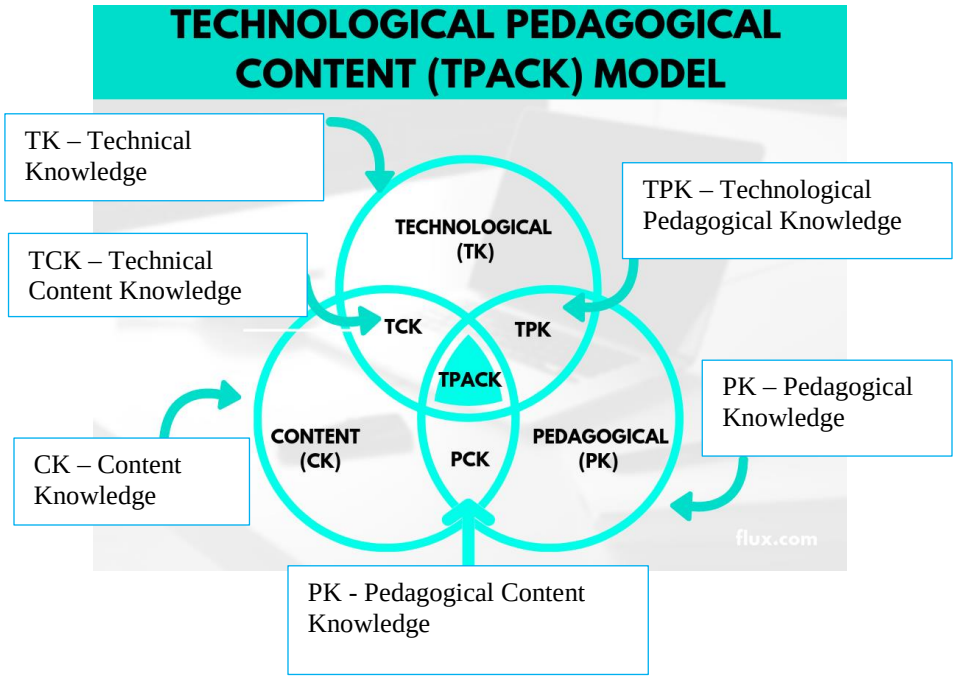

Figure 6: The TPACK model. Reproduced with permission of the publisher, ©2012 by tpack.org.

According to Koehler & Mishra (2009), TPACK is a foundation for integrating technology into teaching. It is based on all the types of knowledge necessary for effective pedagogy and technology integration of content.

This capstone refers to technological pedagogical skills in relation to the knowledge a TIS should possess. The entire TPACK framework should be familiar; but, a TIS cannot realistically be expected to know all content areas. This is why a TIS works *with* educators rather than telling them what and how to teach. The TIS and educator collaborate to bring both parties expertise together to effectively integrate content into an educator's classroom.

Although educators may have all the skills or only technology use skills and pedagogical skills, many have difficulty transferring those skills to design instruction and integrating the appropriate technology through design intended to maximize outcomes for students. Educators' technological skills, competence, and ability to apply technology to instructional practice directly translates to whether students benefit from technology integration.

Another way that the equity in technology integration is not made available in classrooms is when educators characterize technology as unimportant. If educators believe that technology is not useful for instruction, only useful for low-level tasks, or will not change teaching practices, then technology integration is present less often than in the classrooms of teachers that believe the opposite or are open to other practices (Chen, 2008; Hsu, 2016). These educator characteristics impact both the frequency and quality of students' experiences with technology and the ability to practice 21st century skills.

That teachers have some technology skills is assumed today but, it depends on the individual characteristics of the teacher. Although younger teachers are oftentimes assumed to be digital natives, there is a still is a gap between the ability to use technology and to incorporate technology into instruction. Clark & Zagarell (2012) observed "many of these digital natives have only superficial experiences with technology" (p. 137). This line of reasoning parallels the assumptions of students' experiences and technology use.

If there is a gap in technological pedagogical skills for education professionals, a logical place to provide technological competence and integration modeling is through professional development. The KETS Master Plan (2018) and documents contained within discuss the importance of professional development in reaching the goals and vision outlined by the Kentucky Department of Education.

Professional development can give teachers and administrators the skills they need to integrate technology (Blanchard et al., 2016; Capo, 2013; Ertmer, 1999, 2005; Matzen & Edmunds, 2007; Twining et al., 2013). However, professional development that teaches a skill without demonstrating how to use it in a particular classroom is not usually effective, nor does it ensure pedagogical changes (Harris et al., 2009; Koehler & Mishra, 2009).

Not only is there a need for professional development to teach skills and methods of technology integration, there is a lack of quality professional development because many times professional development is only for a single session and does not follow-up or continue building skills. For technology integration professional development to be successful, it must provide more than a single session. Professional development should be scaffolded, monitored, and on-going (Blanchard et al., 2016, 2016; Ertmer, 2005). According to Sugar, van Tryon, & Slagter (2014), on-going professional development is effective in assisting teachers to implement technology.

Professional development is often delivered in the form of workshops or conferences. V. Davis (2009) refers to these quick events or overload of information

as a “binge” professional development. A chunk of information is presented, or a new tool may be demonstrated and that is the end of the session. Often teachers are unable to transfer the information or tool to their own classrooms because the learning is not ongoing or scaffolded and elements of practice and feedback are missing.

While these types of training have value, they are more of an informational or introductory training than instructional training. Foltos (2014) refers to the difference in training purpose or outcome as “just in case” and “just in time” (para. 4). The problem arises when trainers assume that an information training automatically is translated to classroom use.

For an instructional training purpose in professional development, the art of using instructional design for adult learners is often missing. Most educators are trained in learning theory and teaching methodology for school-age children and young adults, not adult learning theories, or andragogy. The role of the teacher is different when working with most adult learners (Kapur, 2015, p. 52).

While Kentucky requires evidence of knowledge of student learning theories via the Praxis® Principles of Learning and Teaching (PLT) exam, there is nothing similar to demonstrate competency to train or teach other adult educators (“Praxis: Kentucky: Test Requirements,” n.d.).

Another component of providing instructional professional development is through instructional design models, as reflected in The ISTE Standards for Coaches, ©2011, Standard 2f (See Appendix C.) When teaching adults, instructional design

considerations requires the instruction to be planned in a way that acknowledges adult learning theories. Most pointedly, adult learners do not accept the information at face value but will assign significance to the information and evaluate its usefulness.

Central to the success of professional development, along with the way it is provided to education professionals, is who provides the training. Those who do not understand pedagogy, only technical skills, are unable to provide effective guidance on how to incorporate the technology into teaching practices. "Technical skills are mandatory for integrating technology, but learning to effectively integrate that skill into the learning environment is equally as important" (Pritchett et al., 2013, p. 30).

In addition to the absence of specificity of skills and role restrictions via Kentucky state agencies detailing requirements to perform the role of a technology integration specialist or coach, the roles associated with overseeing professional development are similarly lacking requirements. The qualifications for providing professional development to other school professionals are decided on within schools and districts by an assortment of criteria, such as volunteering to lead a session, or selection by an equally wide assortment of people within a school community.

Interestingly, a professional development coordinator position requires certification as a principal or supervisor of instruction (Kentucky Legislative Research Commission, n.d.). It appears that to oversee professional development, one should possess experience and leadership skills with the assumption of instructional expertise.

Confusion around technical skills and qualifications versus technological pedagogical skills and technology integration compounded by confusion regarding what each type of skill encompasses is problematic. For example, the technology department and LMS roles are often intertwined and confused (Johnston, 2015).

In many Kentucky schools, the job of technology training often defaults to library media specialists (LMS) or other employees with a technology title. This leads to another set of concerns. As the role of the LMS in schools has evolved, there is a wide variation of skills (Johnston, 2012, 2013, 2015; Koehler & Mishra, 2009; Wine, 2016). The role of some library media specialists has transitioned from providing technical assistance for media (television, cables, etc.) to that of a hardware, software, and technology integration specialists (Johnston, 2013; Wine, 2016). Library media specialists may or may not have the technological pedagogical knowledge nor time to spare from library duties to fulfill the functions of a technology integration specialist.

It is difficult to assess whether a person acting as a TIS or professional development provider possesses appropriate qualifications based on their title, preparation, or years of experience. In order to decide who has the proper qualifications and ability to train other teachers, the traditional way to make a decision has revolved around such factors; however, they are not reliable in this case (Pritchett et al., 2013).

Based on all the aforementioned, it begins to become clearer why there are digital divides and how the barriers contribute to them. It is apparent that Kentucky

recognizes a TIS as a position to facilitate equitable and effective technology integration. It is evident that much confusion around terminology (e.g., technology integration and technical support and competencies in each area).

It is painfully clear that in the absence of defined technology integration roles filled by qualified people, technology related roles have become blurred and mislabeled, underperformed, and inconsistent across the state, districts, and schools. Technology integration goals will continue to be effective in only parts of the system and the digital divides will not decrease as hoped.

What does seem clear is a way to address some of the issues without the Kentucky Department of Education removing district control as referenced earlier. One way to assure skills is through certification. Wierschem, Zhang, & Johnston (2010) describe the value that is placed on professional certifications in other fields and establish the appropriateness for technology professionals' certifications. Certification will define the role and duties of a technology integration specialist and provide additional resources for district reference. Certification may boost the adoption and diffusion of the TIS role.

This dilemma is not specific to Kentucky. It is recognized that, although some states require a certification, the certification may not be specific to the roles of a technology coach; for example, New York and Illinois require technical skills as part of the certification.

When was the capstone implemented?

Research for the capstone project began in 2017. Upon approval of the capstone project proposal in 2018, further research and investigation of other certifications were investigated and completed in November. The design of the capstone project was completed on January 4, 2019.

Implementation of the certification proposed in the capstone will require adoption by the Kentucky Board of Education via recommendation of the Educational Professional Standards Board (EPSB). The EPSB has the authority under Kentucky Revised Statute (KRS) 161.030 to establish criteria for certification in Kentucky (Kentucky Legislature, n.d.). This authority includes the ability to establish levels of certifications, requirements, and assessments required to issue varying levels of certification (i.e. emergency, temporary, or professional certificates or endorsements to existing certificates).

Following final approval of the committee chair and committee, it is my intention to present the capstone to the Department of Education for consideration. Next steps will be contingent upon interest from the Kentucky Department of Education.

Impact of the capstone

The capstone has not been implemented at the date of completion. It is anticipated that implementation of the capstone by the Kentucky Department of

Education will impact the adoption and diffusion of the technology integration specialist role statewide and in individual schools or districts.

While the state currently gives the appearance of adopting the technology integration specialist role, it has not been well-adopted by districts and individual schools nor has the position diffused well according to the data shared in "The People Side of K-12 Tech: A Human Capital Call to Action, a report included in the KETS Master Plan (Kentucky Department of Education, n.d.). Diffusion is the way innovations are adopted by members in a system (Rogers, 2003). In fact, the data referenced previously shows a decline in the number of full-time technology integration specialists, indicating discontinuance by some districts or schools. Rogers believes that discontinuance is an indicator for knowledge issues or misapplication of the innovation (Rogers, 2003). The TIS certification has the potential characteristics to diffuse relative advantage, compatibility, and complexity.

The following relative advantages are present when considering the advantages and benefits of a technology integration certification over the present practice of allowing districts and schools to define the role and choose personnel based on seemingly random reasons that are inconsistent throughout the state:

- clarifies job duties
- provides clarity on qualifications required
- provides a way to determine credentials
- ensures skills match duties

- uniformity in the application of the role across the state
- may increase diffusion of the TIS roles by schools and districts for prestige reasons
- may be viewed as school quality indicator
- increases the likelihood of effective technology professional development
- likelihood of better coaching for teachers
- likelihood of more awareness for administrators outside technology departments
- likelihood of more instructional technology use
- increased technological pedagogical knowledge for educators
- is not just a vendor-specific certification
- more focused on teaching than just technology tools
- can be used in a full-time or part-time capacity
- more alignment with the goals and areas of improvement in the state technology plan
- signals the importance of proper technology integration to districts, schools, and educators
- increased awareness of true technology integration
- can reduce digital divides for educators and students
- increases equity for students

- increases 21st century skills use in the classroom
- potential revenue gain from additional certifications

The technology integration certification is compatible with existing values of the Kentucky Department of Education. KDE expresses a need for roles that foster technology integration and wants to maximize benefits of the technology investments. Certification does not contradict KDE's role as one of guidance; however, it strengthens KDE's commitment to the goals outlined in the KETS Master Plan.

Continuing Rogers' characteristics of diffusion, the adoption of the certification has some complexity. The adoption would require formalization of the statute through the Kentucky Board of Education. It would also require an update to the Educational Professional Standards Board. These processes are already established and should not require a huge amount of complexity to complete.

Complexity may be a consideration for the actual oversight and management of the certification process. Documentation and finalization of training would require additional work. Establishing personnel to perform training and verify participant hours would be required. The current status requires no oversight by the Department of Education for certification; however, there is some oversight for technology plans.

Observation and trialability are low, which is not most conducive to diffusion; however, these characteristics have been found to be less influential than the others. Observation may be possible by comparing results or position effectiveness in states

requiring certification or other credentials. Trialability is not possible unless the state elects to run a pilot of the certification.

Of the innovation characteristics discussed above, the relative advantage of a technology certification is high due to the amount of perceived advantages (see list above), suggesting the innovation is likely to diffuse. Relative advantage is sometimes the most influential characteristic effecting adoption (Rogers, 2003). Compatibility with the needs and beliefs is also high, which indicates a more likely diffusion.

Considering that KDE wishes to foster technology integration, the relative advantage, compatibility, and low complexity should increase the likelihood of diffusion and should outweigh the low trialability and observation if the certification is adopted by the state. The increased characteristics of a technology integration certification will be higher than the previous attempt to diffuse the role.

Some other factors and advantages are worth additional consideration or further explanation. Within the individual organizations of the state schools, individual districts and schools were able to implement or not, which impacted the diffusion rate of the previous model of TIS roles. Further implementation was also left up to decision makers (district or school), which was different than the adopter (Kentucky Department of Education). Decision makers at the school and district level may not have shared the same view of the characteristics of the innovation in the adoption process. The certification allows more awareness of the vision of KDE.

While a certification will not mandate that a school or district use a technology integration specialist, a certification will impact qualification of those occupying a role. Therefore, if a school or district wishes to report a TIS, it will be likely to be occupied by a credentialed employee.

Because the state designates technology integration as an area for improvement, the state may see a larger number of technology integration specialists employed in response to a formal certification. Certification may be considered indicative of the level importance with which KDE views technology integration. Schools and districts are responsive to certifications and may be more likely hire qualified candidates once awareness increases.

Additionally, those that are interested in technology integration are likely to pursue certification for personal or status reasons. Likewise, schools and districts that want to be perceived as innovative or aligned to state goals are likely to desire the credentialed TIS. Either scenario can further increase awareness and influence the diffusion rate.

Limitations of the study

Limitations to the capstone are present. One limitation is generalization as the capstone is intended for use in Kentucky even though other states have similar issues. The capstone project is further limited due to implementation constraints.

Due to the ever-changing nature of technology in combination with potential unknown responses and impacts, such as university response to provide the

certification components through program offerings, both the TIS certification and certification process would need revisions to be responsive to changing conditions.

Reflections

Beginning this capstone was a result of my strong commitment to providing students with sound instruction and preparing them for the world that awaits them beyond a school building. As a career and technical education, I believe the idea of "readiness" means preparing students for the world outside the school walls.

Technology integration is not something that is only a concern for schools. The world is infused with technology. The ability to use technology and develop 21st century skills determines how a person can access an interact with an array of activities, such as finding and applying for employment, participating in a virtual interview, or accessing and receiving healthcare services. Recognizing the value and of these life skills created my interest in further improving outcomes for students.

As a veteran teacher, I have long witnessed the wide variation in skills and levels of previous exposure to technology obvious in students entering my classroom. When students have entered my classroom with minimal technology skills and experience with technology, I wondered how it was possible that a student attended schools possessing a plethora of technology equipment and tools and yet had almost no experience with technology tools. How could this be?

It was apparent that how and what they were taught, as well as the amount of exposure to technology in previous classrooms, factored heavily into how well

students navigated and approached technology use for educational purposes. Likewise, it was apparent that there must be quite a few classrooms that did not integrate technology on a regular basis.

When observing classroom teachers and completing evaluations, I often noted the lack of technology integration or the use of technology tools for low-level skills. Additionally, I have observed many teachers use a technology tool just to satisfy a check box on an evaluation instrument without thoughtful use or an intentional purpose to support instruction. Rappaport (2003) opined that many classrooms display the use of technology but in a way that is still "fundamentally conventional" and reinforces traditional practice.

The above realizations led me to question the reasons why more teachers were not using technology to provide student-centered instruction and meaningful activities. Noticing empty computer labs or observing teachers only use technology as a novelty, for skill-and-drill activities, or for low-level activities made me question why some teachers do not make use of the tools at their disposal in a fashion that truly integrates technology into instruction to promote learning.

Observing teachers proudly hailing students typing a paper using word processing software as the technology integration in a lesson brought me to the realization that some teachers focused on just *using* a technology tool or adding some technology just to have technology, not on how the technology was used or for student outcomes. As I reviewed principal observations, I noticed that teachers were

not the only ones that appeared to exhibit confusion regarding instructional technology integration.

Throughout my career, I have observed the confusion around technology competencies and roles. There is a huge disparity between what people perceive a specific competency should look like or the basic skills necessary to meet the objective, as reflected in the process of integrating technology in education.

I realize that some people simply do not understand the difference between many computer-related functions; for example, the difference between computer programming and the use of productivity applications. Still others do not realize that technology integration goes beyond the existence of a technology tool in a classroom. The absence of technological pedagogical content knowledge leads to confusion about what it is, what it looks like in practice, and who can apply it.

When considering the amount of confusion, I relate it to any other tool or process. Imagine if toolmakers could not decide what a standard measurement is for a tool size or what specifics make a wrench. What would happen if every company that makes wrenches had a different idea of how a wrench works or what a half-inch really is? It would be difficult for anyone to know if a wrench was going to be the correct size or if it would even be the best tool for the job.

Although there are technology standards available through institutions such as The International Society for Technology in Education (ISTE), “equal” understanding of technology integration may exist in standards but are not always known or recognized. Even worse, those responsible for quality assurance (e.g., principals and

administrators) do not agree on a performance standard because they lack a common understanding or knowledge of standards for technology integration.

To complicate the issue further, the technology tools available are different in educational settings; however, true understanding of technology integration moves beyond the specific tool to the focus on how a tool aids in the learning process and learning outcomes. For instance, Ranasinghe & Leisher (2009) stressed the significance of choosing technology tools to complement lessons in "meaningful and relevant ways, using technology to support the curriculum rather than dominate it" (p. 1958).

As an educator, I have always regarded technology as a tool to help my students learn and demonstrate learning. For example, during the latter part of this capstone, I participated in a training cohort to prepare for the new ISTE Certification for Educators©. This certification is available to demonstrate technology integration competency for teachers (See Appendix D). These standards are different than the ISTE Standards for Coaches© that reflect standards for those coaching other educators.

This capstone process has made me more aware of equity for students and how much more valuable technology skills really are, especially to already disadvantaged students. It is my hope that the work within these pages can make a difference for teachers and students.

Capstone Project

KENTUCKY TECHNOLOGY INTEGRATION SPECIALIST CERTIFICATION

CERTIFICATION GUIDE

Kentucky Technology Integration Specialist Certification

February 17, 2019 – Version 1.0

Table of Contents

1. Overview

1.1 Purpose

The purpose of the Kentucky Technology Integration Specialist (TIS) Certification is to prepare selected applicant to perform the role of a technology integration specialist, technology coach, or technology resource teacher.

A TIS is a curriculum coach with technological pedagogical knowledge and a professional development provider skilled in providing professional learning for adults with the goal of enhancing 21st century skills for students.

1.2 Audience

Kentucky Educators

1.3 Overall Goal

The overarching goal of Kentucky Technology Integration Certification program is to provide educators with the leadership, instructional design, and technological pedagogical skills necessary to occupy the role of a Technology Integration Specialist (TIS) to maximize student outcomes and technology related investments.

1.4 Program Objectives

The objectives for the TIS Program are to:

- provide qualified professionals to assist in decreasing the digital divides for students, educators, and schools.

- promote awareness and importance of 21st Century skills.
- provide credentialing program leading to certification.
- aid districts and schools in identifying appropriate qualifications for the TIS role.
- provide a focus on instruction first, technology second.
- aid in maximizing technology investment by increasing appropriate technology integration.
- to add value to the human capital side of educational technology in Kentucky.
- increase quality professional development in technology integration.
- ensure that all TIS candidates receive relevant training to prepare them for working practices.
- ensure appropriate level of skill is reached for a TIS to effectively perform major job duties.

Objectives of the Technology Integration Specialist Certification	**Digital Divide Level(s) Addressed**		
	1st Access	**2nd Capability**	**3rd Outcomes**

Provide qualified professionals to assist in decreasing the digital divides for students, educators, and schools.	X	X	X
Promote awareness and importance of 21st Century skills.	X	X	X
Provide credentialing program leading to certification.	X	X	X
Aid districts and schools in identifying appropriate qualifications for the TIS role.	X	X	X
Provide a focus on instruction first, technology second.		X	X
Aid in maximizing technology investment by increasing appropriate technology integration.	X	X	X
To add value to the human capital side of educational technology in Kentucky.	X	X	X
Increase quality professional development in technology integration.		X	X
Ensure that all TIS candidates receive relevant training to prepare them for working practices.		X	X
Ensure appropriate level of skill is reached for a TIS to effectively perform major job duties.		X	X

Ensure appropriate level of skills are acquired for a TIS to effectively perform major job duties.	X	X	X

Table 2: TIS objectives aligned to the digital divides.

2. Technology Integration Specialist Role

2.1 Job Description

A Technology Integration Specialist (TIS) is a curriculum coach with technological pedagogical knowledge and a professional development provider skilled in providing professional learning for adults with the goal of enhancing 21st century skills for students. A TIS connects classrooms with appropriate technology tools appropriate for learning activities for students. A TIS provides professional development sessions and individual coaching using appropriate methodology and sound instructional design principles for adult learners. Additionally, a TIS makes recommendations for technology tools.

2.2 Qualifications

Qualifications:

1. holds a valid teaching certificate and a Kentucky Technology Integration Specialist certification.
2. has at least three years of full-time teaching experience.

2.3 Major Duties

1. Advocates for digital equity.
2. Advances and shares knowledge of the national, state, and district technology plans.
3. Models the integration of technology in all curriculum content areas.
4. Assesses learning and technology needs of students and other educators.

5. Collaborates with the school community to integrate technology.
6. Selects appropriate digital tools and assists others in selecting and using tools.
7. Collaborates with teachers in group and one-on-one settings to design technology-enhanced instruction and incorporate 21st century skills into content
8. Collaborate with teachers to promote digital citizenship.
9. Provides professional development in technology integration and related topics designed for adult learners.
10. Instructs students and staff in effective technological pedagogical knowledge.
11. Advances professional knowledge and skills by through personal professional development.
12. Uses appropriate instructional design concepts to plan, implement, and evaluate professional development and instructional practices.
13. Demonstrates and provides education on the use of TPACK, SAMR, and other technology frameworks.
14. Promotes technology standards including ISTE Standards, state technology standards, and district standards.
15. Assists with creating and revising school or district technology plans.
16. Performs needs assessments and evaluations.
17. Updates skills regularly through relevant professional learning.

Major Duties of the Technology Integration Specialist Certification	Digital Divide Level(s) Addressed		
	1st	**2nd**	**3rd**
	Access	**Capability**	**Capacity**
Advocates for digital equity.	X	X	X
Advances and shares knowledge of the national, state, and district technology plans.	X	X	X
Models the integration of technology in all curriculum content areas.		X	X
Assesses learning and technology needs of students and other educators.	X	X	X
Collaborates with the school community to integrate technology.	X	X	X
Selects appropriate digital tools and assists others in selecting and using tools.	X	X	X
Collaborates with teachers in group and one-on-one settings to design technology-enhanced instruction and incorporate 21st century skills into content		X	X
Collaborate with teachers to promote digital citizenship.		X	X
Provides professional development in technology integration and related topics designed for adult learners.		X	X
Instructs students and staff in effective technological pedagogical knowledge.		X	X
Advances professional knowledge and skills by through personal professional development.	X	X	X
Uses appropriate instructional design concepts to plan, implement, and evaluate professional development and instructional practices.		X	X
Demonstrates and provides education on the use of TPACK, SAMR, and other technology frameworks.		X	X

Promotes technology standards including ISTE Standards, state technology standards, and district standards.	X	X	X
Assists with creating and revising school or district technology plans.	X	X	X
Performs needs assessments and evaluations.	X	X	X
Updates skills regularly through relevant professional learning.		X	X

Table 3: TIS Major Duties aligned with digital divides.

3. Certification

The certification design is modeled after other programs: the West Virginia Department of Education Technology Integration Specialist program, the Educational Technology Endorsement Program (ETEP), sponsored by the University of Utah and the Utah Education Network, and the Texas Computer Education Association (TCEA) Campus Technology Specialist Certification program.

3.1 Participation Eligibility

Selected participants must have three years of full-time classroom teaching experience and hold a valid Kentucky teaching certificate.

3.2 Length of Program

The program lasts through three summer sessions (40 hours per summer) and completion of additional professional development activities.

Rationale: This recommended process and program length provides appropriate training which emphasizes on-going, sustained professional development,

providing the TIS candidates time to follow an appropriate model of training themselves.

3.3 Certification Types and Process

Temporary Provisional

Participants are eligible to apply for a temporary provisional TIS certification upon acceptance in the program. The temporary provisional certificate will be renewable throughout the program duration contingent upon meeting the professional development hours specified (40 hours per year).

Professional

Upon completion of the program, participants are eligible to apply for a professional TIS certification

Renewal

The renewal period for a professional TIS certification in every 5 years. Renewal would require either evidence of employment as a TIS or technology coach or 40 hours of continuing education/professional development.

Rationale: The certification process proposed contains level of certifications ranging from a temporary provisional, which would indicate a beginning role and acceptance into the certification process, to a professional certification, which would indicate the completion of a program or possession of skills to fully perform the job duties of a TIS.

The temporary provisional level allows for beginners to establish a base set of competencies and become "enrolled" in the certification process, attend the related training, and engage in continuing education hours. This level would be demonstrative of a developing technology integration specialist skill.

The temporary provisional certificate would be renewed for a period of three years. The renewal of the provisional certificate would require attendance in the state-sponsored summer program.

Continuing education hours outside the certification program allow for candidates to pursue activities that are most meaningful to their needs. Those needs may be updating technical skills or addressing self-assessed areas of need. Additionally, those hours demonstrate a commitment to professional skills as The ISTE Standards for Coaches © Standard 6. (See Appendix B.)

After three sessions of enrollment in the program and completion of the professional development hours, the next level of certification will be a professional level. At this level, the TIS would be recognized as fully prepared in requisite skills and knowledge of the position.

Renewal certifications would be governed by the state of Kentucky's renewal requirement for professional certificates, which is currently every five years.

Each technology integration specialist renewal would require evidence of employment as a TIS or coach or 40 hours of continuing education. The renewal requirements would help ensure that skills are current.

Program length and design for the technology integration program is recommended to provide immersive, on-going professional development with a hands-on component. This design will allow the formation of a professional learning network and cohort model to allow participants to engage in and experience collaborative learning networks and professional learning programs (ISTE Standards for Coaches, ©2011, Standards 3 and 4).

3.4 Recommended Sessions

Rationale: The recommended list of summer program training sessions suggestions is meant to encompass skills guided by the goals of the certification, the objectives of the certification, and the job duties specified herein. It is impossible to determine the entire scope of training needs prior to selection and assessment of individual participants. It is recommended that participants use the outside professional development hours required to address knowledge gaps and stay abreast of current trends.

Summer Session Training Topics

Training Topic **Face-to-Face (40 hours)**	Guiding ISTE® Standard (ISTE Standards for Coaches, ©2011, ISTE® unless designated)	Digital Divide Level(s)
State, District, and School Technology Plans	Standard 1 - Visionary Leadership Technology coaches inspire and participate in the development and implementation of a shared vision for the comprehensive integration of technology to promote excellence and support transformational change throughout the instructional environment. ISTE Standards for Administrators, ©2011, ISTE®	All
Technology Integration Coaching	ISTE Standards for Coaches, ©2011, ISTE®	All
Needs Assessment and Program Evaluation	Standard 1 - Visionary Leadership Technology coaches inspire and participate in the development and implementation of a shared vision for the comprehensive integration of technology to promote excellence and support transformational change throughout the instructional environment. Standard 4 - Professional Development and Program Evaluation Technology coaches conduct needs assessments, develop technology-related professional learning programs, and evaluate the impact on instructional practice and student learning.	All

TPACK, SAMR, and Other Models **TPACK, SAMR, and Other Models (cont.)**	Standard 2 - Teaching, Learning and Assessments Technology coaches assist teachers in using technology effectively for assessing student learning, differentiating instruction, and providing rigorous, relevant and engaging learning experiences for all students. Standard 4 - Professional Development and Program Evaluation Technology coaches conduct needs assessments, develop technology-related professional learning programs, and evaluate the impact on instructional practice and student learning. Standard 6 - Content Knowledge and Professional Growth Technology coaches demonstrate professional knowledge, skills and dispositions in content, pedagogical and technological areas as well as adult learning and leadership and are continuously deepening their knowledge and expertise.	2,3
What is Technology Integration?	ISTE Standards for Coaches, ©2011, ISTE® ISTE Standards for Educators, ©2011, ISTE® ISTE Standards for Students, ©2011, ISTE®	All

Dynamics of Change	ISTE Standards for Administrators, ©2011, ISTE® Standard 1 - Visionary Leadership Technology coaches inspire and participate in the development and implementation of a shared vision for the comprehensive integration of technology to promote excellence and support transformational change throughout the instructional environment. Standard 6 - Content Knowledge and Professional Growth Technology coaches demonstrate professional knowledge, skills and dispositions in content, pedagogical and technological areas as well as adult learning and leadership and are continuously deepening their knowledge and expertise.	All
Instructional Design	Standard 2 - Teaching, Learning and Assessments Technology coaches assist teachers in using technology effectively for assessing student learning, differentiating instruction, and providing rigorous, relevant and engaging learning experiences for all students. Standard 4 - Professional Development and Program Evaluation Technology coaches conduct needs assessments, develop technology-related professional learning programs, and evaluate the impact on instructional practice and student learning.	2, 3
UDL and Personalized Learning	Standard 2 - Teaching, Learning and Assessments Technology coaches assist teachers in using technology effectively for assessing student learning, differentiating instruction, and providing rigorous, relevant and engaging learning experiences for all students.	2,3

	Standard 3 - Digital Age Learning Environments Technology coaches create and support effective digital age learning environments to maximize the learning of all students.	
Outside Professional Development (40 hours per year)		
♦ **Conferences** ♦ **Certifications** ♦ **Workshops** ♦ **Other Professional Development** ♦ **College Courses**	♦ Participants may choose relevant outside activities to meet the 40 hours of outside training requirement. ♦ Any additional hours accumulated will not be credited to the following year. ♦ College course hours and extended professional development hours will be awarded hours on a case by case basis. ♦ Technical certifications will be evaluated individually but will consider vendor recommendations.	All

4. Participant Information Sheets

4.1 Participant Overview Sheet

Technology Integration Specialist Certification
Program Participant Overview

A TIS is a curriculum coach with technological pedagogical knowledge and professional development provider skilled in providing professional learning for adults with the goal of enhancing 21st century skills for students.

The overarching goal of Kentucky Technology Integration Certification program is to provide educators with the leadership, instructional design, and technological pedagogical skills necessary to occupy the role of a Technology Integration Specialist (TIS) to maximize student outcomes and technology related investments.

The objectives for the TISC Program are to:

- provide qualified professionals to assist in decreasing the digital divides for students, educators, and schools.
- promote awareness and importance of 21st Century skills.
- provide credentialing program leading to certification.
- aid districts and schools in identifying appropriate qualifications for the TIS role.
- provide a focus on instruction first, technology second.
- aid in maximizing technology investment by increasing appropriate technology integration.

- aid in maximizing technology investment by increasing appropriate technology integration.
- to add value to the human capital side of educational technology in Kentucky.
- increase quality professional development in technology integration.
- ensure that all TIS candidates receive relevant training to prepare them for working practices.
- ensure appropriate level of skill is reached for a TIS to effectively perform major job duties.

Participants in the program will receive hands-on, on-going professional development through three yearly program sessions (40 hours yearly) and participate in additional activities (40 hours yearly) designed to meet the program goals.

Participants will qualify for a temporary provisional TIS certificate at the commencement of the first summer session or upon acceptance into the program. Upon completion, participants will be eligible for a professional TIS certificate.

4.2 Participant Job Description Sheet

Technology Integration Specialist

Job Description

Position Summary: A Technology Integration Specialist (TIS) is a curriculum coach with technological pedagogical knowledge and professional development provider skilled in providing professional learning for adults with the goal of enhancing 21st century skills for students. A TIS connects classrooms with appropriate technology tools appropriate for learning activities for students. A TIS provides professional development sessions and individual coaching using appropriate methodology and sound instructional design principles for adult learners. Additionally, a TIS makes recommendations for technology tools.

Qualifications:

1. holds a valid teaching certificate and a Kentucky Technology Integration Specialist certification.
2. has At least three years of full-time teaching experience.

Major Duties:

1. Advocates for digital equity.
2. Advances and shares knowledge of the national, state, and district technology plans.
3. Models the integration of technology in all curriculum content areas.
4. Assesses learning and technology needs of students and other educators.
5. Collaborates with the school community to integrate technology.

6. Selects appropriate digital tools and assists others in selecting and using tools.
7. Collaborates with teachers in group and one-on-one settings to design technology-enhanced instruction and incorporate 21st century skills into content
8. Collaborate with teachers to promote digital citizenship.
9. Provides professional development in technology integration and related topics designed for adult learners.
10. Instructs students and staff in effective technological pedagogical knowledge.
11. Advances professional knowledge and skills by through personal professional development.
12. Uses appropriate instructional design concepts to plan, implement, and evaluate professional development and instructional practices.
13. Demonstrates and provides education on the use of TPACK, SAMR, and other technology frameworks.
14. Promotes technology standards including ISTE Standards, state technology standards, and district standards.
15. Assists with creating and revising school or district technology plans.
16. Performs needs assessments and evaluations.
17. Updates skills regularly through relevant professional learning.

4.3 Participant Program Structure and Certification Information Sheet

Technology Integration Certification Specialist

Program Structure and Certification Information

Participants

Selected participants must have three years of full-time classroom teaching experience and hold a valid Kentucky teaching certificate.

Length of Program: The program lasts through three yearly sessions (40 hours per year) and completion of an additional professional development requirement yearly.

Types of Certification

Temporary Provisional

Participants are eligible to apply for a temporary provisional TIS certification upon acceptance in the program. The temporary provisional certificate will be renewable throughout the program duration contingent upon meeting the professional development hours specified (40 hours per year).

Professional

Upon completion of the program, participants are eligible to apply for a professional TIS certification

Renewal

The renewal period for a professional TIS certification in every 5 years. Renewal would require either evidence of employment as a TIS or technology coach or 40 hours of continuing education/professional development.

4.4 Participants Anticipated Sessions Handout

Summer Session Training Topics

Training Topic **Face-to-Face (40 hours)**	Guiding ISTE® Standard (ISTE Standards for Coaches, ©2011, ISTE® unless designated)	Digital Divide Level(s)
State, District, and School Technology Plans	Standard 1 - Visionary Leadership Technology coaches inspire and participate in the development and implementation of a shared vision for the comprehensive integration of technology to promote excellence and support transformational change throughout the instructional environment. ISTE Standards for Administrators, ©2011, ISTE®	All
Technology Integration Coaching	ISTE Standards for Coaches, ©2011, ISTE®	All
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What is Technology Integration?	ISTE Standards for Coaches, ©2011, ISTE® ISTE Standards for Educators, ©2011, ISTE® ISTE Standards for Students, ©2011, ISTE®	All

Dynamics of Change	ISTE Standards for Administrators, ©2011, ISTE® Standard 1 - Visionary Leadership Technology coaches inspire and participate in the development and implementation of a shared vision for the comprehensive integration of technology to promote excellence and support transformational change throughout the instructional environment. Standard 6 - Content Knowledge and Professional Growth Technology coaches demonstrate professional knowledge, skills and dispositions in content, pedagogical and technological areas as well as adult learning and leadership and are continuously deepening their knowledge and expertise.	All
Instructional Design	Standard 2 - Teaching, Learning and Assessments Technology coaches assist teachers in using technology effectively for assessing student learning, differentiating instruction, and providing rigorous, relevant and engaging learning experiences for all students. Standard 4 - Professional Development and Program Evaluation Technology coaches conduct needs assessments, develop technology-related professional learning programs, and evaluate the impact on instructional practice and student learning.	2, 3
UDL and Personalized Learning	Standard 2 - Teaching, Learning and Assessments Technology coaches assist teachers in using technology effectively for assessing student learning, differentiating instruction, and providing rigorous, relevant and engaging learning experiences for all students.	2,3

	Standard 3 - Digital Age Learning Environments Technology coaches create and support effective digital age learning environments to maximize the learning of all students.	
Outside Professional Development (40 hours per year)		
♦ **Conferences** ♦ **Certifications** ♦ **Workshops** ♦ **Other Professional Development** ♦ **College Courses**	♦ Participants may choose relevant outside activities to meet the 40 hours of outside training requirement. ♦ Any additional hours accumulated will not be credited to the following year. ♦ College course hours and extended professional development hours will be awarded hours on a case by case basis. ♦ Technical certifications will be evaluated individually but will consider vendor recommendations.	All

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Appendices

Appendix A: Kentucky Teaching Certificates

Kentucky Teaching Certificates

Base Teaching Certificates

- Interdisciplinary Early Childhood Education (Birth to Primary)
- Elementary School (Primary through Grade 5)
- Middle School (Grades 5 through 9
- Secondary School (Grades 8 through 12
- Middle/Secondary School (Grades 5 through 12)
- Elementary/Middle/Secondary School (Primary through Grade 12) -
- Exceptional Children (Primary through Grade 12 and for collaborating with teachers to design and deliver programs)

Restricted Base Certificates

- Psychology (Grades 8 through 12)
- Sociology (Grades 8 through 12)
- Journalism (Grades 8 through 12)
- Speech/Media Communication (Grades 8 through 12)
- Theatre (Primary through Grade 12)
- Dance (Primary through Grade 12)
- Computer Information Systems (Primary through Grade 12)
- English as a Second Language (Primary through Grade 12)

Endorsements to Certificates

- Computer Science (Grades 8 through 12)
- English as a Second Language (Primary through Grade 12)
- Gifted Education (Primary through Grade 12)
- Driver Education (Grades 8 through Grade 12)
- Literacy Specialist/Reading (Primary through Grade 12)
- Instructional Computer Technology (Primary through Grades 12)

Other Instructional Services

- Consultant
- Endorsement for Environmental Education (Primary through Grade 12)
- Endorsement for School Safety (Primary through Grade 12)
- Endorsement for Mathematics Specialist (Primary through Grade 5)
- Learning and Behavior Disorders (Grades 8-12)
- School Guidance Counselor

- School Nurse
- School Psychologist
- School Social Worker
- Junior Reserve Officer Training Corps
- Principal (Primary through Grade 12)
- Supervisor of Instruction (Primary through Grade 12)
- Director of Pupil Personnel
- Director of Special Education
- Superintendent

*modified from the EPSB Website (“Kentucky Teaching Certificates,” n.d.)

Appendix B: ISTE Standards for Coaches

ISTE STANDARDS
FOR COACHES

1. Visionary Leadership

Technology coaches inspire and participate in the development and implementation of a shared vision for the comprehensive integration of technology to promote excellence and support transformational change throughout the instructional environment.

a. Contribute to the development, communication and implementation of a shared vision for the comprehensive use of technology to support a digital age education for all students.
b. Contribute to the planning, development, communication, implementation and evaluation of technology-infused strategic plans at the district and school levels.
c. Advocate for policies, procedures, programs and funding strategies to support implementation of the shared vision represented in the school and district technology plans and guidelines.
d. Implement strategies for initiating and sustaining technology innovations and manage the change process in schools and classrooms.

2. Teaching, Learning and Assessments

Technology coaches assist teachers in using technology effectively for assessing student learning, differentiating instruction, and providing rigorous, relevant and engaging learning experiences for all students.

a. Coach teachers in and model design and implementation of technology-enhanced learning experiences addressing content standards and student technology standards.
b. Coach teachers in and model design and implementation of technology-enhanced learning experiences using a variety of research-based, learner-centered instructional strategies and assessment tools to address the diverse needs and interests of all students.
c. Coach teachers in and model engagement of students in local and global interdisciplinary units in which technology helps students assume professional roles, research real-world problems, collaborate with others, and produce products that are meaningful and useful to a wide audience.
d. Coach teachers in and model design and implementation of technology-enhanced learning experiences emphasizing creativity, higher-order thinking skills and processes, and mental habits of mind (such as critical thinking, metacognition and self-regulation).
e. Coach teachers in and model design and implementation of technology-enhanced learning experiences using differentiation, including adjusting content, process, product and learning environment based on student readiness levels, learning styles, interests and personal goals.
f. Coach teachers in and model incorporation of research-based best practices in instructional design when planning technology-enhanced learning experiences.
g. Coach teachers in and model effective use of technology tools and resources to continuously assess student learning and technology literacy by applying a rich variety of formative and summative assessments aligned with content and student technology standards.

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h. Coach teachers in and model effective use of technology tools and resources to systematically collect and analyze student achievement data, interpret results, and communicate findings to improve instructional practice and maximize student learning.

3. Digital Age Learning Environments

Technology coaches create and support effective digital age learning environments to maximize the learning of all students.

a. Model effective classroom management and collaborative learning strategies to maximize teacher and student use of digital tools and resources and access to technology-rich learning environments.
b. Maintain and manage a variety of digital tools and resources for teacher and student use in technology-rich learning environments.
c. Coach teachers in and model use of online and blended learning, digital content, and collaborative learning networks to support and extend student learning as well as expand opportunities and choices for online professional development for teachers and administrators.
d. Select, evaluate and facilitate the use of adaptive and assistive technologies to support student learning.
e. Troubleshoot basic software, hardware and connectivity problems common in digital learning environments.
f. Collaborate with teachers and administrators to select and evaluate digital tools and resources that enhance teaching and learning and are compatible with the school technology infrastructure.
g. Use digital communication and collaboration tools to communicate locally and globally with students, parents, peers and the larger community.

4. Professional Development and Program Evaluation

Technology coaches conduct needs assessments, develop technology-related professional learning programs, and evaluate the impact on instructional practice and student learning.

a. Conduct needs assessments to inform the content and delivery of technology-related professional learning programs that result in a positive impact on student learning.
b. Design, develop and implement technology-rich professional learning programs that model principles of adult learning and promote digital age best practices in teaching, learning and assessment.
c. Evaluate results of professional learning programs to determine the effectiveness on deepening teacher content knowledge, improving teacher pedagogical skills and/or increasing student learning.

5. Digital Citizenship

Technology coaches model and promote digital citizenship.

a. Model and promote strategies for achieving equitable access to digital tools and resources and technology-related best practices for all students and teachers.
b. Model and facilitate safe, healthy, legal and ethical uses of digital information and technologies.
c. Model and promote diversity, cultural understanding and global awareness by using digital age communication and collaboration tools to interact locally and globally with students, peers, parents and the larger community.

6. Content Knowledge and Professional Growth

Technology coaches demonstrate professional knowledge, skills and dispositions in content, pedagogical and technological areas as well as adult learning and leadership and are continuously deepening their knowledge and expertise.

a. Engage in continual learning to deepen content and pedagogical knowledge in technology integration and current and emerging technologies necessary to effectively implement the ISTE Standards·S and ISTE Standards·T.
b. Engage in continuous learning to deepen professional knowledge, skills, and dispositions in organizational change and leadership, project management and adult learning to improve professional practice.
c. Regularly evaluate and reflect on their professional practice and dispositions to improve and strengthen their ability to effectively model and facilitate technology-enhanced learning experiences.

Appendix C: ISTE Standards for Administrators

ISTE STANDARDS
FOR ADMINISTRATORS

1. Visionary Leadership

Administrators inspire and lead development and implementation of a shared vision for comprehensive integration of technology to promote excellence and support transformation throughout the organization.

a. Inspire and facilitate among all stakeholders a shared vision of purposeful change that maximizes use of digital age resources to meet and exceed learning goals, support effective instructional practice, and maximize performance of district and school leaders.
b. Engage in an ongoing process to develop, implement and communicate technology-infused strategic plans aligned with a shared vision.
c. Advocate on local, state and national levels for policies, programs and funding to support implementation of a technology-infused vision and strategic plan.

2. Digital Age Learning Culture

Administrators create, promote and sustain a dynamic, digital age learning culture that provides a rigorous, relevant and engaging education for all students.

a. Ensure instructional innovation focused on continuous improvement of digital age learning.
b. Model and promote the frequent and effective use of technology for learning.
c. Provide learner-centered environments equipped with technology and learning resources to meet the individual, diverse needs of all learners.
d. Ensure effective practice in the study of technology and its infusion across the curriculum.
e. Promote and participate in local, national and global learning communities that stimulate innovation, creativity and digital age collaboration.

3. Excellence in Professional Practice

Administrators promote an environment of professional learning and innovation that empowers educators to enhance student learning through the infusion of contemporary technologies and digital resources.:

a. Allocate time, resources and access to ensure ongoing professional growth in technology fluency and integration.
b. Facilitate and participate in learning communities that stimulate, nurture and support administrators, faculty and staff in the study and use of technology.
c. Promote and model effective communication and collaboration among stakeholders using digital age tools.
d. Stay abreast of educational research and emerging trends regarding effective use of technology and encourage evaluation of new technologies for their potential to improve student learning.

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4. Systemic Improvement

Administrators provide digital age leadership and management to continuously improve the organization through the effective use of information and technology resources.

a. Lead purposeful change to maximize the achievement of learning goals through the appropriate use of technology and media-rich resources.
b. Collaborate to establish metrics, collect and analyze data, interpret results and share findings to improve staff performance and student learning.
c. Recruit and retain highly competent personnel who use technology creatively and proficiently to advance academic and operational goals.
d. Establish and leverage strategic partnerships to support systemic improvement.
e. Establish and maintain a robust infrastructure for technology including integrated, interoperable technology systems to support management, operations, teaching and learning.

5. Digital Citizenship

Administrators model and facilitate understanding of social, ethical and legal issues and responsibilities related to an evolving digital culture.

a. Ensure equitable access to appropriate digital tools and resources to meet the needs of all learners.
b. Promote, model and establish policies for safe, legal and ethical use of digital information and technology.
c. Promote and model responsible social interactions related to the use of technology and information.
d. Model and facilitate the development of a shared cultural understanding and involvement in global issues through the use of contemporary communication and collaboration tools.

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Appendix D: ISTE Standards for Educators

ISTE STANDARDS
FOR EDUCATORS

Empowered Professional

1. Learner

Educators continually improve their practice by learning from and with others and exploring proven and promising practices that leverage technology to improve student learning. Educators:

a. Set professional learning goals to explore and apply pedagogical approaches made possible by technology and reflect on their effectiveness.
b. Pursue professional interests by creating and actively participating in local and global learning networks.
c. Stay current with research that supports improved student learning outcomes, including findings from the learning sciences.

2. Leader

Educators seek out opportunities for leadership to support student empowerment and success and to improve teaching and learning. Educators:

a. Shape, advance and accelerate a shared vision for empowered learning with technology by engaging with education stakeholders.
b. Advocate for equitable access to educational technology, digital content and learning opportunities to meet the diverse needs of all students.
c. Model for colleagues the identification, exploration, evaluation, curation and adoption of new digital resources and tools for learning.

3. Citizen

Educators inspire students to positively contribute to and responsibly participate in the digital world. Educators:

a. Create experiences for learners to make positive, socially responsible contributions and exhibit empathetic behavior online that build relationships and community.
b. Establish a learning culture that promotes curiosity and critical examination of online resources and fosters digital literacy and media fluency.
c. Mentor students in the safe, legal and ethical practices with digital tools and the protection of intellectual rights and property.
d. Model and promote management of personal data and digital identity and protect student data privacy.

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Learning Catalyst

4. Collaborator

Educators dedicate time to collaborate with both colleagues and students to improve practice, discover and share resources and ideas, and solve problems. Educators:

a. Dedicate planning time to collaborate with colleagues to create authentic learning experiences that leverage technology.
b. Collaborate and co-learn with students to discover and use new digital resources and diagnose and troubleshoot technology issues.
c. Use collaborative tools to expand students' authentic, real-world learning experiences by engaging virtually with experts, teams and students, locally and globally.
d. Demonstrate cultural competency when communicating with students, parents and colleagues and interact with them as co-collaborators in student learning.

5. Designer

Educators design authentic, learner-driven activities and environments that recognize and accommodate learner variability. Educators:

a. Use technology to create, adapt and personalize learning experiences that foster independent learning and accommodate learner differences and needs.
b. Design authentic learning activities that align with content area standards and use digital tools and resources to maximize active, deep learning.
c. Explore and apply instructional design principles to create innovative digital learning environments that engage and support learning.

6. Facilitator

Educators facilitate learning with technology to support student achievement of the 2016 ISTE Standards for Students. Educators:

a. Foster a culture where students take ownership of their learning goals and outcomes in both independent and group settings.
b. Manage the use of technology and student learning strategies in digital platforms, virtual environments, hands-on makerspaces or in the field.
c. Create learning opportunities that challenge students to use a design process and computational thinking to innovate and solve problems.
d. Model and nurture creativity and creative expression to communicate ideas, knowledge or connections.

7. Analyst

Educators understand and use data to drive their instruction and support students in achieving their learning goals. Educators:

a. Provide alternative ways for students to demonstrate competency and reflect on their learning using technology.
b. Use technology to design and implement a variety of formative and summative assessments that accommodate learner needs, provide timely feedback to students and inform instruction.
c. Use assessment data to guide progress and communicate with students, parents and education stakeholders to build student self-direction.

ISTE

iste.org/standards

VITA

Stacie Barnett-Slusher

EDUCATION

May, 2003	Bachelor of Science Union College Barbourville, Kentucky
December, 2004	Master of Business Administration Morehead State University Morehead, Kentucky
Pending	Doctor of Education Morehead State University Morehead, Kentucky

PROFESSIONAL EXPERIENCES

2008 - Present	Secondary Business Education Teacher Laurel County Board of Education London, Kentucky
2013 -2014	External Evaluator, External University Coordinator University of the Cumberlands Education Department Williamsburg, Kentucky
2007 - 2008	Secondary Science Teacher Claiborne County Board of Education New Tazewell, Tennessee
2006 - 2007	Middle Grades Science Teacher Middlesboro Independent School District Middlesboro, Kentucky
2005 – 2006	Kentucky Textbook Commissioner Kentucky Textbook Commission Frankfort, Kentucky

2004 - 2006	Business Education Teacher Harlan Independent School District Harlan, Kentucky

HONORS

2018	Smaldino & Herring Leadership Award Association for Education Communications & Technology, Teacher Education Division Kansas City, Missouri
2018	Outstanding Doctoral Student – Educational Technology Morehead State University, College of Education Morehead, Kentucky

PUBLICATIONS

Stacie Barnett-Slusher. (2017). Changing with the times: How do we lead technology integration, including mobile devices, in schools? In M. Simonson & D. Seepersaud (Eds.), *Annual Proceedings of Selected Papers on the Practice of Educational Communications and Technology Presented at the Annual Convention of the Association for Educational Communications and Technology* (Vol. 2, p. 73). Jacksonville, Florida: Association for Educational Communications and Technology.