

# Transforming Teaching through Technology (TTtT)

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## **Transforming Teaching through Technology (TTtT)**

### **Significance**

In a rapidly evolving technological environment, it is the responsibility of teacher education programs to prepare candidates to employ emerging technologies to enhance the learning of students. However, what is apparent in the literature, is that 1) students have inequitable access and use of technology for learning, 2) educators require ongoing development about the importance and use of instructional technologies, and 3) teacher preparation programs must reform their approaches to prepare teachers who then support the learning of P-12 students as they develop the knowledge and skills that are required in the 21<sup>st</sup> century workplace. The TQP project, Transforming Teaching through Technology, will result in an innovative and replicable model for the integration of technology in the teacher education curriculum, a model that will serve to transform approaches to teacher preparation.

Bagley, Rice and Wilson (2001) note:

Professional organizations in many subject areas have emphasized changing the way subject matter is taught by actively involving students in critical thinking, problem-solving, decision-making, and exploration. One way to accomplish this is with the use of technology and constructivism, although many barriers to technology integration exist.

(p. 211)

Improving student learning requires first that teachers develop the knowledge, skills and dispositions to overcome these barriers. Extensive reform of teacher education and simultaneous delivery of professional development for in-service teachers are required. Oliver, Osa and Walker (2012) write:

[T]he success of a professional education programs unit depends in part on the ability to prepare and produce prospective teachers who can effectively and efficiently teach with new instructional technologies. Therefore, teacher preparation programs need to model the use of multiple technologies as teaching and learning tools in university and encourage pre-service teachers to adopt new instructional technologies to enhance effective teaching and learning for PreK-12 students. (p. 285)

Integration of technology in the curriculum is essential for all learners; however, it is particularly important for students in high need schools who do not have access to and experience with 21<sup>st</sup> century technologies. Wei and Hindman (2011) write that the “digital divide” is no longer only about socioeconomic differences in *access* to technology; today, the divide describes differences in *depth of understanding* about how to use technology. Gorski (2005) notes that this divide is particularly significant in the classroom.

We must broaden the meaning of access beyond that of physical access to or usage rates of computers and the Internet to include access to equitable support and encouragement to pursue and value technology-related fields educationally and professionally...A new approach for understanding the digital divide must critically examine who has access to, or uses, computers and the Internet, as well as how these technologies are being used by various individuals or groups of people or by those teaching. (p. 6)

Transforming Teaching through Technology will institute a model for reform that ensures teachers are prepared to teach *all* students, regardless of individual learning needs and socioeconomic status, to use technology to learn, to problem solve, and to create. By incorporating emerging technologies and strategies such as makerspaces, the project will prepare teacher candidates in all content areas, with emphasis on high need subjects such as science,

technology, math and engineering, as well as literacy instruction and teaching English language learners and students with disabilities. Once in place, the reforms will result in sustainable improvements in teacher quality and student performance.

### **Competitive Preference Priority**

Transforming Teaching through Technology (TTtT) addresses Competitive Preference Priority 1: Promoting STEM Education: 1) By systematically integrating existing and emerging technologies into teacher preparation programs, TTtT will increase opportunities for teachers of all subjects to receive high quality preparation and professional development in technology (see Project Design for full explanation). 2) STEM content faculty in Arts and Sciences will work with SOE faculty to develop and present professional development to assure that both teacher candidates and in-service teachers have strong content knowledge and TPACK skills (see Project Design). Secondary licensure candidates at UNCG complete a major in math or a science discipline (biology, chemistry, integrated science, physics). Thus the criterion for strong content knowledge in the competitive preference priority is assured. In addition, the emphasis on science and engineering practices and crosscutting concepts of the Next Generation Science Standards will fit naturally into the makerspace design of the TTtT program.

Criterion 2 and 3 of the competitive preference priority are addressed through secondary candidates' placements in elementary and middle school classrooms taking on the role of STEM Guide during their science or math methods courses. SG/licensure candidates will acquire pedagogical skills as they co-develop and present science lessons in K-8 classrooms. SGs will spend three hours per week planning lessons with the lead teacher and five hours per week in the classroom, co-teaching with the lead classroom teacher. These activities will be supported by biweekly meetings of all SGs, the science methods faculty, and Arts and Sciences STEM faculty.

Additionally, using the model of Project ExSEL, an NSF-funded grant, TTtT will recruit, prepare and support STEM majors for math or science licensure. Early professional experiences in classrooms, working with math and science professionals in the classroom, and participation as support personnel in the TTtT summer maker camp will encourage students to pursue math and science licensure. Since UNCG has high proportions of women and minority undergraduate students (65% female; 36% African American, Hispanic, and multiracial), the recruitment program will be able to target these under-represented populations.

### **Project Design**

#### **Rationale**

The UNCG Teacher Quality Partnership project, Transforming Teaching through Technology, will address Absolute Priority 1 by developing and implementing a transformational model for teacher preparation in which candidates, alongside university and school-based faculty, integrate existing and emerging technologies into P-12 instruction to ensure that students have the knowledge and skills to become lifelong learners and productive workers in the 21<sup>st</sup> century. The proposed project will apply Puentedura's SAMR model (2014) and the Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006) to reform teacher education in partnership with Guilford County Schools and Winston-Salem/Forsyth County Schools.

Integration of technology in the teacher preparation curriculum implies a commitment to the use of technology in university coursework both for candidate learning and their preparation to integrate technology into their practice in the schools. Technology can improve P-12 students' motivation and engagement in all classrooms; it offers hands-on, problem-based approaches to learning that increase generalizability of knowledge and skills, as well as long-term retention of the information (Foss et al., 2013; O'Dwyer et al., 2005; Safar & AlKhezzi, 2013). Overall,

technology can challenge students to explore, problem solve, innovate and be creative for deeper learning through hands-on, active engagement in the learning process.

The use of technology is not simply a generalized approach to teaching and learning, but can be specific to content areas. For example, digital visualization for inquiry-based learning about climatology (Edelson, Gordin & Pea, 1999), science lab procedures (Chittleborough, 2014), technology-rich resources to support students' construction of historical knowledge (Poitras, LaJoie, & Hong, 2010) and computer games for problem-based literacy instruction (Gee, 2003). In all, these and many other examples demonstrate that domain-specific technologies provide opportunities for rigorous exploration of the content areas.

In the SAMR Model, Puentedura emphasizes the importance of using technology for learning in ways that not only serve to substitute and augment current instructional methodologies, or “below the line” uses of technology, but also to enable students to use technology for new forms of learning, content creation, and sharing, such that technology modifies and redefines learning, or “above the line” uses of technology (Puentedura 2014). Some classroom applications of technology serve to *substitute* for existing tools or *augment* existing materials or processes without a functional change in learning (below the line). In above the line applications, teachers use technology to *modify* and *redefine* tasks in ways that transform learning. In order to better prepare current and future teachers to thoughtfully integrate existing and emerging technology for P-12 student learning, it is critical for us to move beyond enhancement through substitution and augmentation to the transformational use of instructional technology in teaching and learning.

The Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006) has been widely applied in thinking about the specific ways in which knowledge

of technology intersects with pedagogical knowledge and content knowledge in all disciplines to become “technological pedagogical content knowledge.” That is, TPACK demonstrates the complex intersection of content knowledge, such as chemistry or mathematics; pedagogical knowledge about how to teach; and knowledge of technology (particularly “above the line” per SAMR) that teachers must address today (Koehler et al, 2007; Polly et al, 2010).

The TPACK model illustrates the specific technological pedagogical content knowledge that teacher educators must have to strategically, systematically, and deeply develop pre-service and in-service teachers’ decision-making through curriculum content and scaffolded deliberate practice (Ericsson, Krampe, & Tesch-Romer, 1993). In this project, to markedly enhance UNCG’s existing teacher preparation programs, we apply the TPACK framework to teacher education.

Using technology in instruction involves new ways of thinking and doing. Lortie (1975) describes a phenomenon unique to teaching that he calls the “apprenticeship of observation.” Through their own experiences as students in K-12 schools, teacher candidates develop cognitive frameworks about what does and does not happen in schools that can be difficult to modify and replace. We propose that the integration of technology in teacher education programs by UNCG faculty offers teacher educators many ways in which to encourage and support candidates’ adoption of new and more effective approaches. The appropriate application of technological pedagogical content knowledge to the practice of teacher education will further the goal of ensuring that teachers are prepared to make the most effective and efficient educational decisions for student learning across their careers, from pre-service preparation through induction and professional development.

## Transforming Teaching through Technology

### Logic Model

**Purpose:** The UNCG Teacher Quality Partnership project will develop and implement a transformational model for teacher preparation in which candidates, alongside university and school-based faculty, integrate existing and emerging technologies into P-12 instruction to ensure that students have the knowledge and skills to become lifelong learners and productive workers in the 21<sup>st</sup> century.

Initial Situation and Need	Project Goals	Project Objectives	Outcomes of Objectives	Expected Impacts
<p>Technology is increasingly central to the learning environment and it is rapidly changing and expanding. Practicing teachers, teacher candidates and P-12 students must develop skills to adapt and integrate emerging technology in their learning and professional practice.</p> <p><b>UNCG needs:</b> The faculty recognizes that reform of the teacher education curricula requires integration of awareness and skill to evaluate, select, and effectively use appropriate instructional technology. The skills and dispositions to explore the utility of technologies for learning and performing are also important.</p> <p><b>Guilford County Schools needs:</b> GCS has determined that development of capacity for providing personalized learning and a focus on</p>	<p>Goal 1: Reform UNCG teacher education curricula for 300 candidates per year in all 23 initial teacher licensure areas.</p>	<p>1.1 Revise curriculum based on review of program data and study of existing and emerging technologies</p> <p>1.2 Utilize and expand a university-based makerspace</p> <p>1.3 Provide faculty development related to the integration and use of instructional technology</p> <p>1.4 Implement and evaluate revised teacher education curricula</p>	<p>1.1 All curricula will incorporate appropriate technology strategies using the SAMR model and TPACK framework.</p> <p>1.2 A makerspace community of practice will be developed.</p> <p>1.3 75 faculty members will participate in PD.</p> <p>1.4 Self-study process will be initiated in Year 1 and carried throughout the project.</p>	<p>1. UNCG teacher candidates complete their programs able to demonstrate high levels of knowledge skills and dispositions as measured by UNCG assessments.</p> <p>2. Partner schools implement appropriate technology-related strategies to improve teaching and learning and increase teacher retention.</p> <p>3. Capacity to use “above the line” SAMR strategies is increased in practicing teachers and teacher candidates as measured by an annual inventory of strategies in use and classroom observations.</p> <p>4. Improvement in</p>
	<p>Goal 2: Provide clinical experiences that are consistent with the revised teacher education curriculum, state and national standards, and the needs of partner schools.</p>	<p>2.1 Establish partner schools in GCS and WSFCS</p> <p>2.2 Provide professional development for P-12 teachers and UNCG teacher candidates</p> <p>2.3 Provide coaching for in-service teachers</p> <p>2.4 Implement and evaluate revised clinical experiences</p>	<p>2.1 Partnerships with 4 GCS and 3 WS/FCS high need schools will be formed.</p> <p>2.2 PD for teacher candidates and cooperating teachers implemented.</p> <p>2.3 Support provided to partner schools by 4 UNCG coaches.</p> <p>2.4 Evaluation-supported continuous improvement</p>	<p>4. Improvement in</p>

## Transforming Teaching through Technology

Initial Situation and Need	Project Goals	Project Objectives	Outcomes of Objectives	Expected Impacts
<p>educator and organizational excellence are high priority strategic goals. They recognize that increasing the capacity of their teaching force and educational leaders to implement technology related to teaching and learning is integral to these strategic priorities.</p> <p><b>Winston-Salem/Forsyth County Schools needs:</b> This district is striving to have its teachers, principals and school leaders prepared to lead change by implementing district-wide magnet school and STEM-focused programs. The District recognizes the need for support in implementing these strategies, as well as in retaining high quality teachers, especially in high-needs schools.</p> <p>The continued partnership with UNCG will help the District support the preparation of teachers who will provide quality instruction to high needs schools and stay to ensure stability for the students.</p>			<p>of clinical experiences, PD and coaching will be implemented.</p>	<p>teacher candidate performance, persistence, and graduation rates as specified in the evaluation plan.</p>
	<p>Goal 3: Recruit and retain high quality, diverse teachers to work in high need schools in the partner school districts</p>	<p>3.1 Develop and implement an annual summer maker camp for P-12 students.</p> <p>3.2 Develop and implement technology-focused induction support for beginning teachers in high needs schools in the partner districts, in collaboration with existing induction support programs.</p> <p>3.3 Develop and implement technology-focused PD for P-12 teachers in high needs schools in the partner districts.</p> <p>3.4 Evaluate effectiveness of recruitment and retention activities</p>	<p>3.1 Each year, maker camp engages 45 students from high-need partner schools and 30 teacher candidates.</p> <p>3.2 New teachers receive coordinated, high quality PD workshops and coaching to support implementation of classroom technology-related skills and strategies.</p> <p>3.3 Teachers receive high quality PD workshops and coaching to support implementation of classroom technology-related skills and strategies.</p> <p>3.4 Increasingly diverse and representative groups of teacher candidates and new teachers. Improved 1 and 3-year new teacher retention rates.</p>	<p>5. Improvement in the retention of program completing new teachers as specified in the evaluation plan.</p> <p>6. Improvement in the performance of new teachers' students as specified in the evaluation plan.</p>

## Needs assessment

North Carolina is deeply committed to preparing students to be education and career-ready in the context of a quickly changing, digital 21<sup>st</sup> century environment. In 2006, the State Board of Education developed goals that include:

NC public schools will produce globally competitive students.

- Every student excels in rigorous and relevant core curriculum that reflects what students need to know and demonstrate in a global 21st Century environment, including a mastery of languages, an appreciation of the arts, and competencies in the use of technology.
- Every student uses technology to access and demonstrate new knowledge and skills that will be needed as a life-long learner to be competitive in a constantly changing international environment.

NC public schools will be led by 21st Century professionals.

- Every teacher will have the skills to deliver 21st Century content in a 21st Century context with 21st Century tools and technology that guarantees student learning.

NC public schools will be governed and supported by 21st Century systems.

- Twenty-first century technology and learning tools are available and are supported by school facilities that have the capacity for 21st Century learning.

Subsequently, North Carolina Professional Teaching Standards were developed that explicitly reference the importance of technology for 21<sup>st</sup> century learners:

*Teachers integrate and utilize technology in their instruction:* Teachers know when and how to use technology to maximize student learning. Teachers help students use

technology to learn content, think critically, solve problems, discern reliability, use information, communicate, innovate, and collaborate. (North Carolina State Board of Education, 2007)

In response, North Carolina student learning goals were revised, all teacher education programs were revised to align with the new standards, and evaluations of teachers, administrators and university teacher education programs were developed. These new evaluations were designed to ensure that P-12 students become creative, innovative, flexible lifelong learners and productive citizens who have appropriate content knowledge that they can operationalize in the context of a widely digital society. As the Partnership for 21<sup>st</sup> Century Skills explains:

People in the 21st century live in a technology and media-suffused environment, marked by various characteristics, including: 1) access to an abundance of information, 2) rapid changes in technology tools, and 3) the ability to collaborate and make individual contributions on an unprecedented scale. To be effective in the 21st century, citizens and workers must be able to exhibit a range of functional and critical thinking skills related to information, media and technology. (Partnership for 21<sup>st</sup> Century Skills, 2007)

**UNCG's Needs.** At UNCG, all teacher education programs were revised with clear attention to performance-based assessments leading to licensure, preparation of culturally competent teachers who are skilled in working with diverse students (including students with disabilities and English language learners); emphases on content literacy, differentiation, and technology; the use of formative assessments to ensure that all P-12 students make positive gains; the use of technology for instruction and data management; and a new focus on teacher leadership, collaboration and professional development. All elements of the programs' curricula

and their assessments were aligned with the State Board of Education Goals and North Carolina Professional Teaching Standards.

In 2010, UNCG was awarded a TQP grant, Project ENRICH, the goals of which included the implementation and evaluation of these new programs. Over the course of the next five years, a structured, unit-wide assessment system for teacher education was developed and implemented. Data were collected from candidate performances, including capstone projects, field experiences and standardized assessments; surveys of seniors/program completers, alumni, cooperating teachers and employers; and value-added measures. Faculty have used these data semi-annually to study their programs and make improvements.

As a result of the program self-study and review of 21<sup>st</sup> century requirements, the faculty understands that, while technology is embedded in the current curriculum, it now requires deeper and more pervasive attention. They understand that technology is becoming increasingly central to the learning environment and that it is rapidly changing and expanding. Both awareness of and the skills to use technology must be elements integral to teacher preparation programs. The ability to evaluate and select appropriate instructional technology is essential. The skills and disposition to explore the utility of technologies for learning and performing are also important. In short, teacher candidates and P-12 students must develop skills to adapt and integrate emerging technology in their learning and professional practice.

The transition to a digital-age education system that fully harnesses the power of modern technologies will impact all aspects of education, including the content students learn, the methods teachers use, where and when learning takes place, what resources are required, and how success is defined and measured. (Friday Institute for Educational Innovation, 2014, p.1)

Faculty have begun the process of making technology a more central focus of curricula. Some faculty have engaged in university and School of Education professional development, participated in learning communities focused on technology, and provided leadership through an SOE technology committee. Additionally, Project ENRICH has established a makerspace within the School of Education that is designed to embed technology, creativity, entrepreneurial learning and innovation in the teacher education curriculum. The space was constructed and five initial projects were undertaken. In order for “digital-age education” to become systemic in UNCG teacher preparation programs, additional faculty development, curriculum design and physical resources will be required.

**Guilford County Schools’ Needs.** UNCG is located in Guilford County, North Carolina, a county that spans 658 square miles. Guilford County Schools (GCS) is the third-largest district in North Carolina, serving more than 72,300 students across 126 schools in urban, suburban and rural areas. The system has 68 elementary schools, 23 middle schools, and 28 high schools and 10 non-traditional schools. District-wide, 37 percent of students in 2013-14 are white; 41 percent are African-American; 12 percent are Hispanic; 6 percent are Asian; and 4 percent identify as multi-racial. Less than 1 percent are American Indian or Pacific Islander. GCS students speak 117 languages or dialects and represent 95 countries. Sixty percent of GCS students receive free or reduced price meals.

GCS offers 47 magnet and choice schools with 54 programs, from Science, Technology, Engineering and Math (STEM) to performing or visual arts, advanced academics, Spanish immersion, Montessori, health sciences and aviation. The magnet/choice schools program is an important component of GCS’ Strategic Plan 2016: Achieving Educational Excellence: Personalizing Learning. The Strategic Plan focuses on reaching each student at his or her

academic or interest level, then providing the tools to move them ahead. The proposed TQP project, Transforming Teaching through Technology (TTtT), is designed to align specifically with the following Strategic Plan goals:

**Area I: Personalized Learning**

I.2 Personalize learning to improve student outcomes. Allow middle school students to actively participate in the design of their learning and build a network of peers, experts and teachers to guide and support their learning. Use technology as a tool to provide access to resources and support students working at individual paces. Expand initiative to other grade levels as funding is secured.

I.3 Differentiate instruction and learning for each student. Students will lead many learning and classroom activities, and will design and execute rich service-learning and project-based learning opportunities. Require students to apply their knowledge to demonstrate mastery. Explore supplemental strategies to increase the frequency of writing assignments and feedback at all levels, and in various curricular areas.

I.4 Realign and reinvigorate professional development to better support and transform teaching and learning initiatives, and build the organization's capacity to operate at high levels and manage change well. Create alternative delivery models including, but not limited to a web-based professional learning community where teachers access just-in-time professional development clips, share lesson plans and resources, and engage in model lessons. Build capacity and expand professional development opportunities for all GCS employees, including administrators and classified employees.

I.15 Educate K-12 students and families about Science, Technology, Engineering and Mathematics (STEM) and other technical education and career opportunities. Work with

the community and local industry to identify workforce needs and then seek opportunities for career exploration, internships and certification programs that align with community economic needs.

**Area IV: Educator and Organizational Excellence**

IV.B Increase employee satisfaction levels with GCS as an employer; improve employee morale.

IV.C Reduce the annual teacher turnover rate as measured/reported by the North Carolina Department of Public Instruction (NCDPI). (2012 baseline: 11.66 percent.) 2016 measure: 9 percent.

**Winston-Salem/Forsyth County Schools' Needs.** For many years, UNCG has placed student teachers Winston-Salem/Forsyth County Schools (WS/FCS). The WS/FCS have been involved in school improvement efforts from the system's inception in 1963 with the merger of the city and county school systems. The district now serves approximately 54,900 students within 81 schools and is the 5th largest school system in the state and the 83rd largest school system in the nation. The system has 43 elementary schools, 13 middle schools, and 14 high schools and 11 non-traditional schools in the 446 square-mile county. District-wide, 42 percent of students in 2013-2014 are white; 29 percent are African-American; 22 percent are Hispanic; 2 percent are Asian; and 4 percent identify as multi-racial. Less than 1 percent are American Indian or Native Hawaiian/Pacific Islander. Winston-Salem experienced a significant increase in the number of Hispanic families moving into the area over the last ten years (from 11% in 2003-04 to 22% in 2013-2014).

The Winston-Salem/Forsyth County School System is striving to have its teachers, principals and school leaders prepared to lead change in their schools by implementing a district-

wide magnet school program, WS/FCS schools are working to attract socio-economic diversity as well as racial diversity in all their schools and, thereby, to provide students real world experiences and exposure to diverse people. WS/FCS also has a network of Science, Technology, Engineering and Mathematics (STEM) education from kindergarten through 12th grade, with three magnet schools and plans additional STEM schools. In WS/FCS, STEM education is about nurturing students' inquisitive minds and providing an innovative learning environment that is based on standards and relevant for all students. The district's STEM strategic plan includes the following strategies: 1) Implement problem/project based learning. 2) Increase the number of experiential learning experiences. 3) Create connections with post-secondary universities. 4) Create partnerships with business/community partners. 5) Create communication plan to increase awareness in the community. 6) Expand extracurricular STEM programming (to include after-school clubs, summer programs, and an increase in student involvement numbers). Transforming Teaching through Technology directly aligns with these strategies.

The Winston-Salem/Forsyth County School district recognizes the need for additional support in implementing these strategies, as well as retaining high quality teachers. At this time, retention is a substantial problem, with the turnover rate for 1st year teachers at 10%, 2nd year teachers at 20% and 3rd year teachers at 16%. Exit interviews indicate that teachers are dissatisfied due to lack of support. Strengthened mentoring and professional development would help alleviate their reasons for leaving.

Schools with high rates of poverty often have high teacher turnover. For example, Carver High School with 86% of its students eligible for free and reduced meal has a teacher turnover rate of 31%. The State average for high school turnover is 16%. Philo Middle School

has a teacher turnover rate of 31% and their free and reduced meal percentage is 98%. The state turnover rate for middle school is 6%. The continued partnership with UNCG will help Winston-Salem/Forsyth County Schools support the preparation of teachers who will provide quality instruction to high needs schools and stay to ensure stability for the students.

### **Preparation for Strong Teaching Skills**

In order to ensure that UNCG teacher candidates are prepared to be highly qualified teachers with strong teaching skills and deep content knowledge who are responsive to the expectations of the 21<sup>st</sup> century learner, including their need to be capable and thoughtful users of existing and emerging technologies, Transforming Teaching through Technology (TTtT) will develop and implement a transformational model for teacher preparation. It is no longer sufficient for teacher education to prepare candidates to use technology as isolated tools that are “below the line” (see SAMR model above); rather, technology must be integral to instruction and assessment for students at all levels and in all content areas using “above the line” applications. Teacher education must model, scaffold and coordinate the use of technologies through the curriculum and in practice. TTtT will provide the resources and structures necessary to reform the teacher education curriculum to ensure that innovative use of emerging technologies is integrated throughout programs; courses and field experiences (theory and practice) are seamlessly connected; candidates have extensive and meaningful practice through internships and student teaching in high need schools with strong professional models; professional programs are the collaborative efforts of education faculty, Arts and Sciences faculty, and school partners; and candidate outcomes and program effectiveness are continually evaluated using multiple valid and reliable measures in alignment with NCATE recommendations (NCATE,

2010). To ensure these outcomes, the project has three goals: 1) Curriculum Reform, 2) Strengthen Clinical Experiences, and 3) Recruitment, Retention and Diversity.

**Goal 1- Curriculum Reform:** Transforming Teaching through Technology will reform UNCG teacher education curricula for 300 candidates per year in all 23 initial teacher licensure areas, which include American Sign Language; Art; Birth-Kindergarten; Comprehensive Science; Comprehensive Social Studies; Dance; Education of The Deaf and Hard Of Hearing; Elementary Education; Elementary/Special Education Dual Major; English; English as a Second Language, Health/Physical Education; Mathematics; Middle Grades Education in Language Arts, Mathematics, Science and Social Studies; Music; second language studies in French, Latin and Spanish; Special Education: General Curriculum; and Theatre Arts. These teacher education programs are housed in the Schools of Education; Health & Human Sciences; Music, Theatre & Dance; and the College of Arts & Sciences. The Teachers Academy, funded by the School of Education, serves as the governance structure for teacher education at UNCG, facilitating collaboration, communication, policy, and program review across all programs and units. The Council of Program Coordinators (representatives of all programs), Steering Committee (leaders of each school/college), and Advisory Committee (representatives of UNCG and public schools) ensure continual collaboration.

**Goal 1, Activity 1:** TTtT will support the revision of the teacher education curriculum to include 1) the integration of up-to-date technologies that provide pre-service teachers with opportunities for deliberate practice within the TPACK framework, and 2) course content to help candidates understand empirically based practice and scientifically valid research, particularly as related to the selection and innovative use of technology.

The project will integrate the following technologies for deliberate practice:

***Mixed Reality Simulations (e.g., TEACH LivE).*** Dieker et al. (2014) and Dieker et al. (2008) point out that simulated training in a mixed reality classroom (i.e., TEACH LivE) offers pre- and in-service teachers varied and unique benefits. Simulated training offers targeted opportunities for practicing effective teaching behaviors that impact student achievement, such as praise, wait time, guided practice, and higher order questioning, in a safe, controlled learning environment; opportunities for repeated practice of effective teaching skills in high stakes situations; interaction with diverse student avatars; personalized training geared to pre- or in-service teachers' needs and goals; critical reflection on action through debriefing after each session; opportunities to increase the lesson complexity and the problem behavior exhibited by the avatars over time; and opportunities to demonstrate improved pedagogical, technological, and content knowledge. At UNCG, TEACH LivE will be used to support the acquisition of specific knowledge and skills, for example, positive behavioral intervention and support.

***Gaming & Virtual Worlds (e.g., Second Life, SimSchool).*** Gaming and fully immersive virtual simulation technologies allow teacher educators to engage pre- and in-service teachers in collaborative problem-based learning that enables them to build mental models that support principles of effective teaching (Mahon et al. 2010). Unlike TEACH LivE, which is a mixed reality simulation, fully immersive virtual simulations, such as Second Life and SimSchool (Gibson, 2007), have also been proven valuable by educational researchers. For example, Aldosemani & Shepherd (2014) concluded that Second Life offered a rich virtual environment to build multicultural knowledge in pre- and in-service teachers. Cheong (2010) confirmed that collaborative practice teaching in Second Life was more effective than individual practice teaching and that the sessions influenced changes in participants' personal teaching efficacy. Mahon et al. (2010) used Second Life to provide pre service teachers with more opportunities to

practice classroom and behavior management techniques. Wang and Burton (2013)

recommended wide spread adoption of Second Life by teacher educators as an instructional tool to develop pre- and in-service teachers' content, pedagogical, and technological knowledge.

In addition to fully immersed simulation, several teacher education researchers have used computer/video games and other digital media to promote development of pre-and in-service teachers higher order thinking and content learning. For example, Anderson and Barnett (2011) used video game technology (i.e., *Supercharged!*) to support pre-service teachers acquisition of content knowledge in physics. Annetta et al. (2012) explored how designing and developing video games for standards-based secondary science curriculum impacted in-service teachers' attitudes and efficacy. Hsu and Wang (2010) posit that developing gaming literacy in pre- and in-service teachers is important, from the "play" (i.e., reading and comprehending) and "design" (i.e., comprehending to writing) perspectives, both of which yield positive effects on learning. Moreover, they maintain that game debriefing, through oral discussion or written reflection, can help scaffold new pedagogical, content, and technological learning and assist pre- and in-service teachers in making connections between game-playing experiences and real world situations.

### ***Technology Enabled Observation, Supervision, & Coaching (i.e., eCoaching).***

Technology enabled observation, supervision, and coaching allows pre- and in-service teachers opportunities to unobtrusively observe, interact, practice, and apply newly acquired teaching and learning knowledge, skills, and dispositions in clinical settings, from early field experience through student teaching, and provide models, support, guidance, and companionship as pre- and in-service teachers endeavor to apply what they have learned through university coursework or professional development to real world classrooms.

Technology-enabled observation provides pre- and in-service teachers or groups of teachers opportunities to “see” what real world models of best practice (see Hendry & Oliver, 2012) look like through electronic visits, carried out via web based videoconferencing (e.g., Skype, Adobe Connect, Google Hangout). Technology-enabled peer observation of best practice removes limits of time and distance and allows pre- and in-service teachers to capture observations electronically to view later, which provides opportunities for reflection on action and reduces or eliminates interruptions to classroom instruction.

Like traditional, face-to-face supervision, technology-enabled options extend the benefits of observation by providing opportunities for interaction and intentional dialogue that are also aimed at bolstering pre- and in-service teachers’ knowledge or skill development. Technology-enabled supervision affords pre- and in-service teachers and supervisors flexibility (e.g., online or blended options afford greater convenience when interacting) and access to supervisory supports/resources (e.g., eBooks, online modules, video libraries).

As is the case with traditional elbow or side-by-side coaching, the technology-enabled variation allows a coach to provide immediate, discreet feedback to a pre or in service teacher during classroom instruction (Rock et al., 2009; Rock et al., 2012; Rock et al., 2014). The difference, however, is that the coach’s feedback is delivered electronically to the pre- or in-service teacher through onsite or online bug in ear technology (i.e., a Bluetooth earpiece + web based videoconferencing). In both, the purpose remains the same: The coach provides a pre- or in-service teacher with individualized support, helps a pre or in-service teacher gain better understanding of how classroom teaching impacts student performance, increases awareness of classroom practices, and enhances comprehension of how classroom practices influence the school environment (Dunn, 2009; Rock, Gregg, Gable, & Zigmond, 2009; Ostrowski, 2012).

Benefits include enhanced reflection *in* and *on* action, improvements in teachers' use of evidence based practices (i.e., instructional and behavioral), and increases in P-12 students' engagement (see Rock et al., 2009; Rock et al., 2012; Rock et al., 2014). eCoaching can also be carried out with pre- or in-service teachers in simulated training environments, such as TEACH Live (see Elford et al.). Likewise, technology can be used for group coaching to bring pre- and in-service teachers together in blended or online environments to identify problems of professional practice and solve them in ways that make teaching and learning more effective (<http://www.ccl.org/leadership/coaching/group.aspx>). In online PLCs (Blitz, 2013), teachers and coaches work together electronically to find, share, and develop practices that enhance their effectiveness and benefit student learning (Hord, 1997). Unlike face-to-face group coaching, the technology-enabled option allows members to be located across the hall, district, state, country, or globe. Because video clips illustrating problems of practice can be archived electronically, scheduling conflicts may also be reduced. Moreover, electronic connections offer pre and inservice teachers increased levels of support and decreased feelings of frustration and isolation (Curry, 2008, p. 769). Perhaps, most importantly, Blitz (2013) posits that teacher self-reflection of teaching and learning in online professional learning community trumps that which occurs in traditional face-to-face interactions.

***Video Models, Video Annotations, & Digital Exhibitions.*** Hatch et al. (2009) proffered that digital exhibitions, comprised of multimedia records of practice, also provide pre- and in-service teachers with unique opportunities to learn about effective teaching. Digital galleries resemble art exhibitions; however, instead of paintings or sculptures the elements that are displayed online provide models of best educational practice. Online archives and repositories allow pre- and in-service teachers to “see” what educational best practices look like from a

variety of perspectives (i.e., early, midcareer, and veteran) and to compare understanding by examining similarities and differences between expert and novice archives. Moreover, posting digital exhibitions as web based representations of practice allows teacher educators to engage pre- and in-service teachers in collaborative and critical examinations of ideas and practices that are central to effective teaching and learning and to learn not only from one's own practice but also the practice of others over time (Hatch & Grossman, 2009).

Like athletes, pre- and in-service teachers can improve their teaching practices through use of video and video annotation tools (see Cross, 2012). However, rather than coaches using video to improve players' skills and win the game, teacher educators capture video aimed at developing pre- and in-service teachers' educational practices that increase student achievement. Cross recommended that pre- and in-service teachers create video timelines of their progress showcasing how their use of effective teaching practices has improved and positively impacted student learning. Tripp and Rich (2012) used video analysis to promote teacher reflection and change through a four step process that included recognizing the need to change practices, brainstorming ideas for change, implementing ideas, and evaluating effectiveness. McFadden et al. (2014) used web based video annotation tools effectively to develop reflective practices in beginning secondary science teachers. Rich and Hannafin (2009) conclude: "video annotation tools offer teachers the ability to see, as well as to analyze and refine, practice prior to, during, and following formative field experiences." (p. 65).

***Educational Makerspace Environments.*** Kurti, Kurti, and Fleming (2014) posit that educational makerspaces have the potential to revolutionize teaching and learning. Based on tenants of constructivism, the makerspace movement requires learners, rather than teachers to initiate the learning process. The teacher acts primarily as a guide of hands-on inquiry, actively

engaging the learner(s) and the teacher in collaborative efforts designed to meet the learning challenge. In this project, we will use the UNCG, SOE and school educational makerspaces to engage pre- and in-service teachers in deeper content, pedagogical, and technological learning through deeper questioning and hands on exploration. Although the maker movement is in its infancy, there are studies underway exploring how tinkering supports engagement, intentionality, solidarity, and understanding (<http://makerspace.com/repost/research-roundup-some-studies-on-making-and-learning>).

The availability of technology platforms at UNCG is important, but the ways in which they, and other technology programs and tools, are integrated into the curriculum are equally important. In TTtT, faculty will utilize the teacher education assessment system to review their individual programs and related data, will add assessments that focus on technology skills and use, and will study emerging technologies that are a particularly good fit for their curricula, incorporating them into additional, advanced revision of their programs. While currently, technology is primarily used as a tool, or as Puentadura's SAMR model describes, for "substitution" and "augmentation," the overarching goal for curriculum reform will to "modify" and "redefine." That is, candidates' will be prepared to use technology to fundamentally change the ways that P-12 students approach learning tasks. TTtT will ensure that teacher education and content faculty work together to revise the curriculum so that candidates develop the knowledge and skills for identification, evaluation and use of technologies in classroom in all content areas. Candidates will learn to use technology to differentiate instruction, using the principles of universal design, to meet the needs of all students, including students with disabilities, English learners, gifted students, and students in AP/IB programs. For example:

**Literacy Instruction:** At UNCG preparation for literacy instruction involves the integration of reading, writing, speaking and listening, and language, as defined in the English Language Arts Common Core State Standards. Reading includes instruction in phonemic awareness, phonics, fluency, vocabulary and comprehension. All initial licensure programs include a focus on preparation for strong literacy instruction, as verified by regular program reviews. In Elementary Education, candidates take a minimum of four courses (TED 320: Language Arts Education, TED 420: Reading Education in Elementary School, TED 428: Advanced Methods (diagnostic, formative and summative assessment techniques), including a new course that focuses on foundational skills and linguistics (TED 335). As part of SES 469: Reading Instruction for Learners with Disabilities, Special Education candidates tutor students with disabilities. Elementary and special education candidates will be prepared to pass the Pearson Foundations of Reading exam.

Through TTtT, candidates will integrate technology in a variety of ways. For example, they will conduct inquiry or service projects that develop their capacity/dispositions to use emerging technologies. Candidates will also learn to use digital literacies, such as wikis and websites development, to help students improve their writing skills. They will use technology to collect formative data for instructional decisions. For example, elementary candidates will use Reading 3D, an observational reading assessment software program that has been adopted by the North Carolina Department of Public Instruction's Read to Achieve initiative to assess the essential components of early reading development, including phonemic awareness, phonics, fluency, vocabulary and comprehension.

**Students with Disabilities:** Candidates will learn to select and integrate assistive technologies in the support of students with disabilities both for individual classroom use and in

the collaborative development of Individualized Education Plans (IEPs). There are already many technologies available, including devices such as audio books for students with dyslexia, alternative keyboards for students with learning or physical disabilities related to writing, and free-form database software to help students with memory and organizational difficulties. Candidates will learn about existing technologies as well as develop skills in evaluation of new hardware and software.

**Limited English Proficient Learners:** Based on their meta-analysis of 52 studies, Felix (2005) reported positive impact of Computer Assisted Language Learning (CALL) on English learners' vocabulary development, reading, and writing. Similarly, Healey, et al. (2011) summarized the important benefits of the use of technology in language learning and teaching, but they also pointed out that currently technology in language learning is not being used to its full potential primarily due to the lack of teacher training. With TTtT, more explicit instruction regarding CALL and its related web-based resources will be included in the ESOL curriculum. Teachers will also benefit from learning more about meaningful integration of technology tools in pedagogical design, especially in terms of teacher record-keeping, feedback, and formative assessments.

Additionally, teacher education programs at UNCG prepare both pre-service and in-service teachers to work with culturally and linguistically diverse students and their families. Supported by a federal grant, TESOL for ALL, faculty participated in professional development in which they revised all elementary teacher education syllabi to be aligned with ESOL standards. They developed an ESOL concentration for elementary and middle grade candidates, and a required online ESOL course, Teaching English Learners with Diverse Abilities, for secondary and K-12 candidates in art, music, theater and dance. Internship and student teaching

placements are in highly diverse settings that include English language learners. The programs also ensure that candidates work with English language learners in field placements. Further integration of innovative technology will significantly strengthen the teacher education program. Pre-service teacher candidates will practice what they learn about classroom management and ESL instruction prior to internship experiences by using simulation technology such as Teach Live.

**Content Preparation:** Mathematics instruction will be enhanced through the use of tablet applications that draw upon social networking and embedded diagnostic assessments to provide instructional guidance for teachers. Various tablet apps can be used for data collection and analysis, creating and manipulating mathematical models, etc. and will support students in moving beyond contrived, textbook exercises to using mathematics to understand real phenomena. Moreover, the variety of easily accessed resources already available can be used flexibly to increase rigor and challenge for advanced students (e.g., Advanced Placement/International Baccalaureate) as well as addressing the needs of students with disabilities and English language learners. In science education, a number of valuable tools are available for data analysis. For example, students will collect and graph health data via Vernier electronic probes (e.g., heart rate and breathing rate) allowing development of graphing skills, communication skills and empirical thinking about cause-and-effect. Students will both collect water quality data with electronic probes and access water quality data at <http://nc.water.usgs.gov/realtime/index.html> in inquiry-based lessons.

### **Goal 1, Activity 2 – Development of Makerspaces as a Tool for Project-Based**

**Inquiry Learning:** TTtT will provide inquiry-based, hands-on approaches to instruction and learning in a UNCG makerspace, with opportunities for UNCG faculty, school district teachers,

and candidates to pose problems and answer them through exploration of multiple media, including technologies. The UNCG makerspace will be open to all teacher preparation programs, both for class and individuals. STEM faculty from Arts and Sciences and the Joint School of Nanoscience and Nanoengineering will support this makerspace as consultants. The project will also fund a makerspace in each partner school for K-12 students.

TTtT will build on five seed interdisciplinary makerspace projects funded by Project ENRICH that center on innovative, problem-based learning and on the preparation of faculty and teachers to use technologies effectively. For example, *Inventing to Learn: Tinkering, Engineering and Making in the SoE Makerspace* focuses on hands-on explorations around engineering questions. Faculty are developing a curriculum to enact project-based engineering challenges for elementary and middle grades initial and advanced teacher education students, cooperating teachers in two high needs urban middle schools, and participants in a science program at a recreation center that serves a poverty-dense population. The curriculum will provide opportunities for these stakeholders to be members of a makerspace community of practice in which they will develop their awareness and skills related to engineering and mathematics. Another project, *Exploring the Librarian-Teacher Dyad Partnership in a Makerspace*, provides the opportunity for educators to collaboratively explore the pedagogical and instructional tools that can be used in makerspaces, particularly with attention to K-8 science resources.

**Goal 1, Activity 3:** It is essential that faculty model the use of technology and incorporate it into expectations for candidates' learning and performance. While many faculty members have participated in professional development and have used instructional technology in their courses, it is to be expected that they will require additional training and support. TTtT

will expand learning and support opportunities for the faculty through extensive offerings: The project will develop and offer symposia, online and face-to-face workshops, one-to-one and just-in-time support for all teacher preparation faculty about the use of instructional technology in their course instruction, systemic integration of technology in their curricula, and candidates' use of content-appropriate methodologies.

**Goal 1, Activity 4:** The project will include ongoing self-study and program improvement. After the curricula are revised and implemented, candidate outcomes will be evaluated, using course and capstone projects, surveys, and value-added data to assess the impact of curricular changes and identify areas for continued growth. Faculty development activities will also be evaluated through faculty feedback and as elements in curricular improvement.

**Goal 2- Strengthen Clinical Experiences:** Transforming Teaching through Technology will provide clinical experiences that are consistent with the revised teacher education curriculum, state and national standards, and the needs of partner schools. UNCG provides a year-long clinical teaching experience in all programs, following extensive early internships. For example, in elementary education, teacher candidates have a minimum of 400 hours of classroom experience before they begin full-time student teaching. Subsequently, they are assigned to one field placement for their entire senior year: Interns begin planning with their cooperating teachers before school begins, attend initial school staff meetings, establish relationships with specialists and administrators, and are present for the first day of school. The interns become acquainted with students and their families, and develop a co-teaching relationship with their cooperating teacher prior to the beginning of student teaching in the second semester. They then co-teach for an entire semester. Throughout these experiences, the candidates are closely supervised by their cooperating teachers and field supervisors, who not

only observe and provide feedback on a regular basis, but participate in structured assessments a minimum of four times. Upon completing this program, teacher candidates have spent a minimum of about 1,000 hours teaching and learning in our partner schools. These extended field experiences reflect our commitment to meeting the North Carolina Professional Teaching Standards by creating opportunities for our teaching candidates to become immersed in classroom practices, to have extended apprenticeships with classroom teachers, to develop relationships with students and their families, and to become familiar and knowledgeable about how schools work. TTtT will strengthen the clinical experiences by establishing specific technology-focused partner schools as training sites, using technology enabled observation, supervision, and coaching, and providing professional development and coaching for in-service teachers related to technology and other aspects of supervision and co-teaching.

**Goal 2, Activity 1:** In TTtT, partnerships will be developed with seven selected high need schools (four Guilford County elementary schools and two middle schools and one high school in Winston-Salem/Forsyth County). These partner schools will be established as training sites specifically to support the goal of implementing innovative uses of emerging technologies for teaching and learning in urban high need schools for 70 pre-service teachers each year.

**Goal 2, Activity 2:** It is essential that teaching be a continuum of learning and practice beginning with early pre-service experiences and continuing throughout the teacher's career. Teacher education programs revised through TTtT will include strong content preparation, coursework in pedagogy, early internships and one full year of student teaching. These academic and field experiences will be integrated and seamless; that is, theory and practice will inform each other. In the revised curriculum, technology will be learned and used in all of these experiences.

TTtT will ensure that teacher candidates are guided by expert teachers who model best practices and provide timely, critical feedback. In this rapidly evolving technological environment, candidates must have the opportunity to observe and use instructional technology in the schools. There must be a seamless connection between teacher preparation and school needs and practices. The reality is that teacher preparation programs have only begun to prepare teachers in this area, so that current cooperating teachers often have limited knowledge and skills regarding technology. There is a plethora of rapidly changing technologies, which must be evaluated and integrated into the P-12 curriculum. Therefore, TTtT will provide side-by-side professional development for teacher candidates and their cooperating teachers that focuses on the innovative use of emerging technologies for instruction and both formative and summative assessment. This professional development will be followed up by just-in-time coaching support.

**Goal 2, Activity 3:** The project will employ expert coaches for both teachers and candidates in the partner schools. As part of the earlier Teacher Quality Partnership grant, Project ENRICH, four coaches have already developed strong collaborative relationships in the partner districts. They will continue to deliver growth-oriented support through professional development followed up with frequent job-embedded coaching. In TTtT, this support will focus on the integration of technology in school curricula to promote active, rigorous, and innovative learning experiences for diverse students. The coaches will also ensure that candidates receive high quality mentoring by providing on-going professional development and coaching support for cooperating teachers in the area of pre-service teacher development.

**Goal 2, Activity 4:** Each year, these activities will be reviewed and evaluated through focus groups, interviews, observations, and surveys. Value-added data, over time, will provide additional information about the effectiveness of the professional development and coaching.

**Goal 3- Recruitment, Retention and Diversity:** Transforming Teaching through Technology will recruit and retain high quality, diverse teachers to work in high need schools in the partner school districts.

**Goal 3, Activity 1:** Each summer, TTtT will offer a maker camp for students in partner schools. High school students, teacher education candidates and faculty will facilitate K-12 students' explorations in the makerspace. The summer camp will provide opportunities for students to learn about and use technology, as well as professional development for teachers and UNCG faculty, who will have the opportunity to try out new methods in a lower-risk environment than the classroom presents.

The maker camp's hands-on experiences, collaborative explorations, and professional development will also serve as a venue for recruitment and support for teacher retention. Enrolling students from diverse backgrounds, the camp will provide modeling and learning experiences that will motivate students to select careers in teaching, including teaching in high need areas such as STEM and special education. In order to address one of Guilford County Schools' priorities, African American male high school students will be recruited to serve as mentors for campers. Midcareer professionals with interest in teaching in high need subjects will have the opportunity to serve as co-facilitators and may subsequently enroll in the UNCG alternative licensure programs. Adults from groups that are under-represented as teachers in the partner districts, recent immigrants to the community and former military personnel will be invited to participate. At the same time, professional development will support the growth of in-service teachers and their engagement in new approaches to teaching.

**Goal 3, Activity 2:** In the context of continually emerging technologies, it is essential to work with partner schools to support the induction of beginning teachers. TTtT will work closely

with the schools to provide coaching/mentoring support for these new professionals, modeling good practice, problem solving with the beginning teachers and generally providing guidance and support as they develop their skills.

Teachers in North Carolina have long benefitted from access to state-supported induction programs. Research tells us that beginning teachers' participation in induction programs leads to increased retention, higher satisfaction, and greater commitment (Ingersoll, 2012; Ingersoll & Strong, 2011). Furthermore, we know that teachers who receive high quality induction support are more effective in specific instructional practices, including developing lesson plans, classroom management, and creating a positive classroom climate conducive to learning (Ingersoll & Strong, 2011). Comprehensive programs that blend multiple types of support result in higher retention rates for new teachers (Ingersoll, 2012). However, when a variety of support initiatives are not coordinated they can overlap or even conflict with one another. Often, beginning teachers are caught in the middle of these efforts to offer support, wondering which support they should accept or even whose advice they should follow. In order to reap the benefits of high-quality, comprehensive support and avoid the pitfalls of uncoordinated efforts, TTtT will partner with existing induction programs in Guilford County Schools and Winston-Salem/Forsyth County Schools to coordinate supplemental support that meets identified needs of beginning teachers in high need schools.

Building on structures established through Project ENRICH, UNCG coaches will provide supplementary induction support to all graduates of UNCG teacher education programs who teach anywhere in the partner districts for the first two years and to all beginning teachers in the identified partner schools (see Goal 2, Activity 1). In order to support Guilford County Schools' goal of personalized learning, TTtT will also offer supplemental coaching to all beginning

teachers working in all high need middle schools in Guilford County, where a one-to-one tablet initiative is underway. UNCG coaches will provide a summer institute, using scientific research and empirically-based practice, for all participating first year teachers that will focus on helping teachers prepare for a successful start to the school year in high needs schools. A UNCG coach will follow up this institute with individual assistance for implementation. Ongoing coaching support will be available through UNCG's edWeb online community, bug-in-ear coaching (Rock et al, 2014) and face-to-face visits. A variety of resources, organized according to the NC Professional Teaching Standards, will be available on the UNCG website for all beginning teachers. These resources will include content-specific pedagogical resources that will be vetted by UNCG teacher education faculty from the relevant field. Finally, UNCG will offer a follow up institute for eligible teachers at the end of their first year that will assist teachers in making a smooth transition from focusing on themselves as teachers to focusing on their students as learners. Teachers will reflect upon their attitudes and assumptions about families and teachers' responsibilities when working with families; reflect about their attitudes and assumptions toward students from poverty, students with disabilities, and English language learners; and increase self-monitoring and thoughtful communication with others, particularly families. This institute will be funded with in-kind support from the Yopp endowment to the School of Education.

**Goal 3, Activity 3:** In collaboration with the schools, coaches and faculty will identify and offer professional development for career status teachers. UNCG coaches have particular skills and understandings about current practices in the schools, having taught long term in the partner schools and subsequently worked with school faculty during Project ENRICH. Faculty will also participate actively in the delivery of professional development, for example: 1) Building on an initiative with a local high need high school, teacher education and Arts and

Sciences faculty will collaboratively deliver professional development related to content knowledge and the theoretical basis for instructional practices. 2) UNCG's School of Education employs a number of literacy faculty, including Dean Karen Wixson who is an internationally recognized expert in the field. TTtT will support the preparation and delivery of online and face-to-face professional development that address the essential components of reading. 3) Both faculty and graduate students in the Joint School of Nanoscience and Nano-engineering will play a significant role by serving as technology and engineering experts for professional development and as models in the classroom for students and teachers. Overall, TTtT coaches and faculty will partner with high need LEAs to support professional growth that will ultimately benefit students in their schools.

**Goal 3, Activity 4:** Each year, these activities will be reviewed and evaluated through focus groups, interviews, observations, and surveys. Value-added data, over time, will provide additional information about the effectiveness of the professional development and coaching. Recruitment and retention will be tracked, as well. UNCG and the State Department of Public Instruction maintain employment records that will provide data for analyses of the project's effectiveness.

### **Intended Impact**

TTtT will result in a transformational, replicable model for teacher preparation. To this end, the UNCG teacher education programs will be revised to prepare teacher education candidates to integrate innovative uses of technology in instruction; to ensure that they have relevant experiences in field-based practica; to provide professional development for UNCG faculty and school-based teachers; and to provide coaching and induction support for candidates and beginning teachers respectively. Academic coursework, field experiences, hands-on

activities in “makerspaces,” and summer technology camps led by pre-service candidates, faculty and teachers will support the integration of technology in teaching and learning in all subject areas. It is expected that this project will result in public school students’ increased motivation, engagement and learning through innovation, creativity, problem-solving and entrepreneurship in collaborative project-based learning environments that utilize emerging technology and 21<sup>st</sup> Century skills.

### **Role and Commitment of Each Partner**

The UNCG School of Education and College of Arts and Sciences have long established partnerships with Guilford County Schools and Winston Salem/Forsyth County Schools, including funded projects such as the TQP Project ENRICH for simultaneous renewal of teacher education and P-12 education and the National Science Foundation GK-12 Grant in which graduate students and faculty model and support students in science education classrooms. Leaders in the SOE, CAS, JSNN and the districts collaborated to develop this proposal and to plan for its sustainability.

**UNCG School of Education.** The School of Education and the Teachers Academy will provide leadership for the project, including coordinating the revision of the curriculum in all teacher education programs and faculty development efforts. Project staff will be housed in the School of Education and will report to Dean Karen Wixson, Lead Principal Investigator.

**UNCG College of Arts and Sciences.** Faculty in the College of Arts and Sciences will serve as content experts as well as program faculty for programs housed in the College of Arts and Sciences, such as Secondary Science, Mathematics, English, Social Studies, Latin, French and Spanish.

**Joint School of Nanoscience and Nanoengineering.** The Joint School of Nanoscience and Nanoengineering will partner with the School of Education to provide faculty and graduate student experts in science and engineering content and methods. JSNN faculty and students will assist with the development and delivery of professional development for partner school faculty and will serve as mentors for P-12 students in partner schools.

**Guilford County Schools.** Guilford County Schools will select four high need elementary schools to serve as clinical training sites for TTtT. Teachers in these schools will serve as cooperating teachers/field supervisors for UNCG interns and student teachers. GCS school-based and central office administrators will serve as advisors to the project team and will assist with supervision of students in the field. They will also participate in and oversee professional development for partner school faculty. GCS will also provide facilities for professional development activities related to the project and for teacher candidate learning communities.

**Winston-Salem/Forsyth County Schools.** Winston-Salem/Forsyth County Schools will select two high need middle schools and one high need high school to serve as clinical training sites for TTtT. Teachers in these schools will serve as cooperating teachers/field supervisors for UNCG interns and student teachers. WS/FCS school-based and central office administrators will serve as advisors to the project team and will assist with supervision of students in the field. They will also participate in and oversee professional development for partner school faculty. WS/FCS will also provide facilities for professional development activities related to the project and for teacher candidate learning communities.

### **Management Plan**

At UNCG, teacher education programs are located in five different schools or colleges. The School of Education (SOE) is the designated administrative unit for professional education programs at UNCG and the Teachers Academy is the organizational umbrella for all professional education programs on campus. Sponsored by the SOE, the central purposes of the Teachers Academy are the coordination of teacher education on the UNCG campus and the creation and maintenance of community among all university faculty who are involved in professional education. All programs involved in the preparation of teachers, principals, and other school personnel have a representative on the Teachers Academy Council of Program Coordinators (CPC). CPC acts as the policy-making body of teacher education programs at UNCG, including course approval and changes in program requirements. Many of the activities of TtT will be coordinated through the Teachers Academy.

**Dr. Karen Wixson**, Dean of the School of Education, will serve as Lead Principal Investigator. Dr. Wixson has been Dean at UNCG since January 2011 and has served as Principal Investigator for Project ENRICH since June 2011. Previously, she served as dean of the School of Education at the University of Michigan. She has been a longtime consultant to the National Assessment of Educational Progress (NAEP) reading tests and currently serves as a member of the NAEP Validity Studies Panel. She served as a member of an extended work group for the Common Core English language arts standards and is co-editor of two books on implementing the new standards. Dr. Wixson was a member of the board of directors of both the National Reading Conference and the International Reading Association (IRA), was co-chair of the IRA's Commission on Response to Intervention, and is currently a member of IRA's Literacy Research Panel. Dr. Wixson has published widely in the areas of literacy curriculum, instruction,

and assessment in books and journals such as Reading Research Quarterly, The Reading Teacher, Elementary School Journal, Review of Research in Education, and the Handbook of Reading Research. She is also an author of Scott Foresman Reading Street™ and co-author of a popular text on the assessment and instruction of reading and writing problems.

**Dr. Christina O'Connor**, Co-Director of the Teachers Academy, will serve as Co-Principal Investigator and Project Director. Dr. O'Connor will be responsible for the day-to-day operations of the project. Dr. O'Connor has served as the Project Director for Project ENRICH, a Teacher Quality Partnership project. She has coordinated all aspects of Project ENRICH, including serving as liaison between University and partner district staff, managing the recruiting and selection processes for residents and mentors, and managing all administrative aspects of the project including writing reports, managing the budget and supervising other project personnel. Dr. O'Connor previously directed the Wachovia Teacher Mentoring Network at UNCG. She has presented nationally and at the state level about partnership work between Schools of Education and K-12 schools. Dr. O'Connor has a Ph.D. in Teacher Education and Development and Master's degrees in School Administration and Literacy Education. Prior to coming to work at UNCG she served as a teacher, curriculum facilitator and principal in the Guilford County Schools for twelve years.

**Ms. Cydney Conger** will serve as the Winston-Salem/Forsyth County School project coordinator. Ms. Conger, Program Manager for Professional Development and coordinator of Supporting Teachers All Year (STAY), WS/FCS' new teacher support program, has worked in education as a teacher, coordinator and program manager in the areas of career development, afterschool care, professional development, Title II and beginning teacher support programs for 30 years. She holds a BA degree from Elon University and M.Ed. degree from Gardner Webb

University. She will be a liaison to the district for all project related needs and will work closely with the Project Director.

**Dr. Misti Williams** will serve as the Guilford County Schools Project Coordinator. Dr. Williams, Executive Director of Induction and Professional Development for Guilford County Schools, has served as the GCS project coordinator for Project ENRICH. Dr. Williams directs all of the district's efforts in professional development and induction support for teachers and administrators. She has previously served as a clinical faculty member in the UNCG Department of Educational Leadership and Cultural Foundations and as a principal and central office administrator in Guilford County Schools and Stokes County (NC) Schools. She will be a liaison to the district for all project related needs and will work closely with the Project Director.

**Dr. Robert Petrusis** will serve as the external evaluator for TTtT. Dr. Petrusis is the principal consultant at EPRE Consulting. With more than 20 years' experience as an evaluator, researcher, change agent and teacher, he has worked with educational leaders and stakeholders in colleges, universities and schools to promote positive, evidence-based change in education, including serving as the external evaluator for Project ENRICH.

**Dr. Holly Downs** and **Dr. Jill Chouinard** of the Office of Assessment, Evaluation, and Research Services (OAERS) at UNCG will lead the internal evaluation activities related to TTtT. Dr. Downs is currently Assistant Professor of the Department of Educational Research Methodology at UNCG. She completed her Ph.D. in Educational Psychology from the University of Illinois at Urbana-Champaign. Dr. Downs specializes in the areas of program evaluation and mixed methodology. Her current scholarly interests include the theory and practice of mixed methods evaluation of K-16 programs, particularly those in Science, Technology, Engineering, and Mathematics (STEM) fields, delivered via online, hybrid, and

traditional learning environments. Dr. Chouinard received her Ph.D. from the University of Ottawa in 2010 where she studied under famed program evaluation expert Dr. Brad Cousins. Since completing her Ph.D., Dr. Chouinard has been a part-time professor in the Faculty of Education of the University of Ottawa, a program evaluator in the educational, social services, mental health, and international sectors, and an affiliate researcher at the Centre for Research on Educational and Community Services at the University of Ottawa. Dr. Chouinard has published widely in the areas of participatory evaluation and cross-cultural evaluation, with her scholarship appearing in journals such as *American Journal of Evaluation*, *Journal of Multidisciplinary Evaluation*, and *Educational Assessment, Evaluation, and Accountability*.

Additional project staff will include Ms. Allyson Lugo Ward, who will serve as the program assistant. Barbara Brown, Evan Hill, Rita Jennings and Saija Washington will serve as Academic Coaches, providing professional development and induction coaching to project participants in the partner schools and districts. Academic programs will be responsible for the administration and delivery of their programs and for providing staff development in their content area. From the School of Education, the following faculty will serve as project leaders: Literacy (Dr. Karen Wixson, Dr. Sam Miller), Special Education (Dr. Marcia Rock), English Language Learners (Dr. Ye He), Elementary Education (Dr. Scott Howerton) and Library and Information Science (Dr. Rebecca Morris). From the College of Arts and Sciences, the following persons will be project leaders: Dr. Jerry Walsh, (Chemistry), Dr. John Lepri (Biology). All have a strong commitment to working in schools. In addition to providing staff development in their content area, these faculty members will serve on an Advisory Council for TTtT along with senior administrators from Winston-Salem/Forsyth County and Guilford County.

## Transforming Teaching through Technology

<b>Goal 1:</b> Reform UNCG teacher education curricula for 300 candidates per year in all 23 initial teacher licensure areas.			
<b>Objectives</b>	<b>Activities</b>	<b>Timeline</b>	<b>Person(s) Responsible</b>
Revise curriculum based on review of program data and study of existing and emerging technologies	<ul style="list-style-type: none"> <li>Review program data</li> <li>Revise courses and field experience seminars to include existing and emerging technologies</li> </ul>	<ul style="list-style-type: none"> <li>Begin Fall 2014 and semiannually</li> <li>Begin Spring 2015 and ongoing</li> </ul>	Program Faculty Project Director
Utilize and expand a university-based makerspace	<ul style="list-style-type: none"> <li>Steering Committee meets to review current and potential use</li> <li>Regular study of faculty use and needs</li> <li>Study of makerspace use in other fields and other educational applications</li> <li>Increase resources based on usage and faculty needs</li> </ul>	<ul style="list-style-type: none"> <li>Fall 2014</li> <li>Fall 2014 and ongoing</li> <li>Fall 2014 and ongoing</li> <li>Fall 2014 and ongoing</li> </ul>	Makerspace Steering Committee Program Faculty Project Director
Provide faculty development related to the integration and use of instructional technology	<ul style="list-style-type: none"> <li>Develop and deliver relevant faculty development content through the Teachers Academy</li> <li>Provide individual support for faculty development through the SOE IT department and TTtT IT Coordinator</li> </ul>	<ul style="list-style-type: none"> <li>Fall 2014 and ongoing</li> <li>Fall 2014 and ongoing</li> </ul>	Project Director SOE IT Department TTtT IT Coordinator
Implement and evaluate revised teacher	<ul style="list-style-type: none"> <li>Deliver revised</li> </ul>	<ul style="list-style-type: none"> <li>Beginning Fall</li> </ul>	Program Faculty

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education curricula	<p>curriculum</p> <ul style="list-style-type: none"> <li>• Regular review of data regarding revised curriculum</li> <li>• Make improvements as indicated by data review</li> </ul>	<p>2015</p> <ul style="list-style-type: none"> <li>• Fall 2015 and semiannually</li> <li>• Fall 2015 and semiannually</li> </ul>	<p>Project Director Director of Assessment Internal Evaluation Team</p>
<p><b>Goal 2:</b> Provide clinical experiences that are consistent with the revised teacher education curriculum, state and national standards, and the needs of partner schools.</p>			
<b>Objectives</b>	<b>Activities</b>	<b>Timeline</b>	<b>Person(s) Responsible</b>
Establish partner schools in GCS (4) and WS/FCS (3)	<ul style="list-style-type: none"> <li>• Select Schools</li> <li>• Assign coaches</li> <li>• Meet with school teams</li> <li>• Place students</li> </ul>	<ul style="list-style-type: none"> <li>• Schools selected Fall 2014</li> <li>• Coaches assigned Spring 2015</li> <li>• Team meetings held Spring 2015</li> <li>• First students placed Fall 2015 and ongoing</li> </ul>	<p>Project Director District Coordinators School teams</p>
Provide professional development for P-12 teachers and UNCG teacher candidates	<ul style="list-style-type: none"> <li>• Develop and deliver professional development as needed for school staffs in selected schools to prepare for UNCG students</li> <li>• Develop and deliver professional development as needed for cooperating teachers and UNCG Interns</li> </ul>	<ul style="list-style-type: none"> <li>• Beginning Spring and Summer 2015</li> <li>• Beginning Fall 2015</li> </ul>	<p>Coaches Project Director Faculty Content Experts</p>

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Provide coaching for in-service teachers	<ul style="list-style-type: none"> <li>• Provide coaching for teachers in partner schools on working with a student intern and on integrating technology, including makerspaces</li> </ul>	<ul style="list-style-type: none"> <li>• Beginning Fall 2015</li> </ul>	Coaches Project Director
Implement and evaluate revised clinical experiences	<ul style="list-style-type: none"> <li>• Deliver revised field experiences</li> <li>• Regular review of data regarding revised field experiences</li> <li>• Make improvements as indicated by data review</li> </ul>	<ul style="list-style-type: none"> <li>• Beginning Fall 2015</li> <li>• Fall 2015 and semiannually</li> <li>• Fall 2015 and semiannually</li> </ul>	Program Faculty Project Director Director of Assessment Internal Evaluation Team
<b>Goal 3:</b> Recruit and retain high quality, diverse teachers to work in high need schools in the partner school districts			
<b>Objectives</b>	<b>Activities</b>	<b>Timeline</b>	<b>Person(s) Responsible</b>
Develop and implement an annual summer maker camp for P-12 students, facilitated by high school and university students and faculty	<ul style="list-style-type: none"> <li>• Plan MakerCamp curriculum</li> <li>• Recruit student participants</li> <li>• Recruit adult participants</li> <li>• Hold MakerCamp</li> </ul>	<ul style="list-style-type: none"> <li>• Fall &amp; Spring 2015</li> <li>• Spring 2015 (&amp; subsequent)</li> <li>• Spring 2015 (&amp; subsequent)</li> <li>• Summer 2015 (&amp; subsequent)</li> </ul>	Project Director
Develop and implement induction support for graduates of UNCG teacher preparation programs and other beginning teachers in high needs schools in the partner districts, with a particular focus on the development of instructional technology skills and the use of existing and emerging technologies in the classroom.	<ul style="list-style-type: none"> <li>• Develop curriculum for Summer Induction Boot Camp</li> <li>• Deliver Summer Induction Boot Camp</li> <li>• Provide coaching support for program</li> </ul>	<ul style="list-style-type: none"> <li>• Spring/Early Summer 2015</li> <li>• Late Summer 2015 (&amp; subsequent)</li> <li>• Beginning Fall 2015</li> </ul>	Project Director Coaches

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	<ul style="list-style-type: none"> <li>graduates in partner districts</li> <li>Deliver Yopp Institute for teachers completing their first year</li> </ul>	<ul style="list-style-type: none"> <li>Early Summer 2015 (&amp; subsequent)</li> </ul>	
<p>Develop and implement professional development for P-12 teachers in high needs schools in the partner districts, with a particular focus on the development of instructional technology skills and the use of existing and emerging technologies in the classroom.</p>	<ul style="list-style-type: none"> <li>Develop and deliver professional development as needed for school staffs in selected schools to prepare for UNCG students</li> <li>Develop and deliver professional development that meets the needs of partner school faculties</li> </ul>	<ul style="list-style-type: none"> <li>Spring &amp; Summer 2015</li> <li>Fall 2015 and ongoing</li> </ul>	<p style="text-align: center;">Project Director Coaches Content Faculty</p>
<p>Evaluate effectiveness of recruitment and retention activities</p>	<ul style="list-style-type: none"> <li>Deliver MakerCamp</li> <li>Regular review of data regarding MakerCamp, recruitment and retention</li> <li>Make improvements as indicated by data review</li> </ul>	<ul style="list-style-type: none"> <li>Summer 2015 (&amp; subsequent)</li> </ul>	<p style="text-align: center;">Program Faculty Project Director Director of Assessment Internal Evaluation Team</p>

### **Evaluation Plan**

EPRE Consulting LLC, an evaluation and research firm located in Columbia, SC will conduct the independent evaluation of this project in collaboration with an internal evaluation team from the Office of Assessment, Evaluation and Research Services at UNCG. Dr. Robert Petrusis is Principal Consultant with EPRE Consulting LLC, and will lead the external evaluation team. Dr. Petrusis leads the evaluation of UNCG's current TQP grant, Project ENRICH, as well as a portfolio of education-related project evaluations with other organizations. The collaboration between Dr. Petrusis and OAERS will create opportunities for graduate students in the UNCG Educational Research Methodology Department to conduct data collection and analysis activities under the supervision and guidance of the OAERS evaluation team.

**Evaluation dimensions: Program monitoring, formative feedback, impact assessment, reporting, and summative evaluation.** The project evaluation has several purposes. Initially, the emphasis will be on *monitoring* the implementation of the program, and on providing *formative feedback* to key project staff to assist in short-term measurement of benchmarks and project metrics. Since this project involves a large number of components, early identification of areas that might need attention is of crucial importance. *Program monitoring* will remain a focus throughout the term of the project. Evaluation data will be provided regularly and as needed for *reporting* to stakeholder groups and to the funding agency. In the program's second year, *impact assessment* will begin to take a more prominent role, as the makerspace is fully implemented and revisions to the teacher preparation curricula are tested.

Because this project places a large emphasis on the development of evidence of its effectiveness, evaluation strategies will be implemented to provide quantitative measures of both short-term outcomes of project activities, and longer-term impacts on the students and faculty at

UNCG, and on the students and teachers at the project’s partner schools in Guilford County and Winston-Salem/Forsyth County Schools. Quantitative measures will be supplemented by data from interviews and observations, to provide a nuanced picture of the project’s work.

The evaluation measures are guided by the project’s logic model, a conceptual map that identifies the major project components and their relationships to one another. The articulation of the initial project logic model has begun to surface an institutional theory of change, and has allowed the project’s underlying assumptions to be made explicit in the project’s rationale. The logic model and change theory drive the evaluation approach, project metrics, and evaluation strategies.

The TQP program includes a complex set of Government Performance and Results Act (GPRA) and short-term performance measures which are incorporated into the project evaluation plan. In addition, these measures have been incorporated into the project’s logic model as Expected Impacts numbers 4 through 6.

**Table: Project impacts**

Expected Impacts (from logic model)	Evaluation metrics and strategies
1. UNCG teacher candidates complete their programs able to demonstrate high levels of knowledge skills and dispositions as measured by UNCG assessments.	Improvement in teacher candidate performance on UNCG assessments (TGAP and Dispositions).
2. Partner schools implement appropriate technology-related strategies to improve teaching and learning and increase teacher retention.	Observations of UNCG graduates’ classrooms using the RTOP observation protocol with added technology items. Bi-annual teacher survey (Years 1, 3, 5)
3. Capacity to use “above the line” SAMR strategies is increased in practicing teachers and teacher candidates as measured by an annual inventory of strategies in use and classroom observations.	Observations of UNCG graduates’ classrooms using the RTOP observation protocol with added technology items. Bi-annual teacher survey (Years 1, 3, 5)
4. Improvement in teacher candidate performance, persistence, and graduation rates.	GPRA Measures 1 & 3; Short-term performance measure 1. Measures taken from UNCG records and compared to baseline years of 2011-2014.

Expected Impacts (from logic model)	Evaluation metrics and strategies
5. Improvement in the retention of program completing new teachers as specified in the evaluation plan.	GPRA Measure 2; Short-term performance measure 2. Year 1 and Year 3 retention rates of new teachers graduated from UNCG’s programs compared to new teachers from other programs, and compared to UNCG graduates from 2011-2014.
6. Improvement in the performance of new teachers’ students.	GPRA Measure 4. Proportion of new teachers’ students who outperform their initial EVAAS scores.

In the table below, an outcome is associated with each project objective. In turn, one or more evaluation metrics and strategies have been identified for each objective.

**Table: Goals, Objectives, Outcomes and Evaluation Strategies**

Goals and Objectives	Outcomes	Evaluation Metrics & Strategies	Timetable
Goal 1: Reform UNCG teacher education curricula for 300 candidates per year in all 23 initial teacher licensure areas.	Impacts 1, 3, 4, 5, 6	See table above	Summer, each project year as data are available
Objective 1.1: Revise curriculum based on review of program data and study of existing and emerging technologies	All curricula will incorporate appropriate technology strategies using the SAMR model and TPACK framework.	Number of curriculum revisions incorporating SAMR/TPACK elements submitted for faculty review.	June, each project year
Objective 1.2: Utilize and expand a university-based makerspace	A makerspace community of practice will be developed.	Record of technologies added to the makerspace each year. Utilization statistics, including number of courses which incorporate the makerspace, number of users per month.	June, each year

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<b>Goals and Objectives</b>	<b>Outcomes</b>	<b>Evaluation Metrics &amp; Strategies</b>	<b>Timetable</b>
Objective 1.3: Provide faculty development related to the integration and use of instructional technology	75 faculty members will participate in PD.	Proportion of School of Education faculty who participate in PD annually. Criterion: 90% of faculty participate at some time during the project period.	Ongoing collection of rosters and PD evaluations.
Objective 1.4: Implement and evaluate revised teacher education curricula	Self-study process will be initiated in Year 1 and carried throughout the project.	Review of self-study progress and document.	Summer, each year.
Goal 2: Provide clinical experiences that are consistent with the revised teacher education curriculum, state and national standards, and the needs of partner schools.	Impacts 1, 3, 4, 5, 6	See table above	Summer, each project year as data are available
Objective 2.1: Establish partner schools in GCS and WSFCS	Partnerships with 4 GCS and 3 WS/FCS high need schools will be formed.	Number of partnerships formalized.	April, each year
Objective 2.2: Provide professional development for P-12 teachers and UNCG teacher candidates	PD for teacher candidates and cooperating teachers implemented.	Number of participating teachers and teacher candidates. Feedback from participating teachers from workshop evaluations.	Ongoing data collection; summaries in June, each year
Objective 2.3: Provide coaching for in-service teachers	Support provided to partner schools by 4 UNCG coaches.	Number and kind of coaching support from coach's logs. Feedback from participating teachers from annual survey.	Data from logs compiled annually in June; annual teacher survey in April, each year.
Objective 2.4: Implement and evaluate revised clinical experiences	Evaluation-supported continuous improvement of clinical experiences, PD and coaching will be implemented.	Annual clinical teacher and graduating student surveys.	May, each year

<b>Goals and Objectives</b>	<b>Outcomes</b>	<b>Evaluation Metrics &amp; Strategies</b>	<b>Timetable</b>
Goal 3: Recruit and retain high quality, diverse teachers to work in high need schools in the partner school districts	Impacts 2, 3, 4, 5, 6	See table above	Summer, each project year as data are available
Objective 3.1: Develop and implement an annual summer maker camp for P-12 students.	Each year, maker camp engages 45 students from high-need partner schools and 30 teacher candidates.	Number of participating P-12 students and teacher candidates. Camp agendas, observations and survey feedback from participants.	Summer, each year.
Objective 3.2: Develop and implement technology-focused induction support for beginning teachers in high needs schools in the partner districts, in collaboration with existing induction support programs.	New teachers receive coordinated, high quality PD workshops and coaching to support implementation of classroom technology-related skills and strategies.	Rosters, descriptions and evaluation surveys of PD workshops. Data on coaching from coach's logs. Observations of new teachers using RTOP protocol with added technology items.	Observations in January through April, each year. Other data collected as available and summarized in June, each year.
Objective 3.3: Develop and implement technology-focused PD for P-12 teachers in high needs schools in the partner districts.	Teachers receive high quality PD workshops and coaching to support implementation of classroom technology-related skills and strategies.	Rosters, descriptions and evaluation surveys of PD workshops. Data on coaching from coach's logs. Observations of new teachers using RTOP protocol with added technology items.	Observations in January through April, each year. Other data collected as available and summarized in June, each year.
Objective 3.4: Evaluate effectiveness of recruitment and retention activities	Increasingly diverse and representative groups of teacher candidates and new teachers. Improved 1 and 3-year new teachers retention rates.	Statistics on the demographics and retention of teacher candidates and new teachers.	Data compiled and reported annually in June.

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