Piedmont Teacher Residency Partnership (PTRP) Narrative

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Piedmont Teacher Residency Partnership (PTRP)

Introduction

In response to the growing need to support student development of computational literacy, the Piedmont Teacher Residency Partnership (PTRP) addresses the Absolute Priority of establishing an effective teaching residency program for high-need subjects and areas with two rural school districts — Rockingham County Schools and Surry County Schools. Both Surry County Schools and Rockingham County Schools meet the eligibility requirements for funding under the Rural and Low-Income School Program and have a high annual teacher turnover rate (see Needs Assessment). The PTRP also addresses Competitive Preference Priority 1 by developing and implementing an innovative teacher residency model designed to improve educational outcomes in computer science. Within the proposed teacher residency model, candidates, supported by university and school-based faculty, integrate computational content and practices into K-12 instruction to ensure that all students develop the knowledge and skills to engage with and design innovative technologies. The project focuses on both computation and design so that all students have an opportunity to apply their developing understanding of computation to long-term design projects worked on in school-based Makerspaces.

Significance

Society is increasingly reliant on various technologies for day-to-day activities, resulting in a need for educational systems to prepare all youth to engage with these technologies in productive ways. However, issues of access and opportunities, which have been described as a "digital divide," remain problematic for some students, primarily poor students, students of color, and students with disabilities (Wei & Hindman, 2011). Also, this digital divide represents more than just access to technology. Students need access to educational settings that develop

their computational literacy (Vakil, 2014), which for students with disabilities is vital to accessing, progressing, and achieving the general education curriculum (Swan, Hooft, Kratcoski, & Unger, 2005). By integrating computational thinking and interdisciplinary problem-solving, the PTRP prepares students and teachers for future advancements as the field of computer science expands across industries. For instance, "Code.org, a nonprofit industry aimed at expanding computing education opportunities in K-12, has predicted that approximately two thirds of all computing jobs will be outside of the technology industry in areas such as banking, retail, government, entertainment, manufacturing, and health care" (as cited in Israel et al., 2015, p. 45). This expands the concept of computer science and how computational literacy can be studied and applied in K-12 classrooms.

Computational literacy includes our ability to create, communicate, and problem solve through computation and requires an understanding of computational thinking, as well as the role and impact of computation on society (Berland, 2016). An expert panel report by the National Research Council (2010) states that computational thinking includes "a broad range of mental tools and concepts from computer science that help people solve problems, design systems, understand human behavior, and engage computers to assist in automating a wide range of intellectual processes" (p. 10). As students develop their computational literacy, they not only learn how to engage in computation to solve problems, but they also develop an understanding of why computation is an effective tool and how computational design impacts their lives and the lives of those around them (diSessa, 2001).

Unfortunately, computational literacy is generally narrowed to a set of computational practices in mathematics and science classrooms that resemble a step-by-step, problem-solving process led by teachers or curricular resources. Students rarely get opportunities to leverage their

understanding of computation to solve problems that are authentic to their lived experiences or to evaluate the role that computation plays in their day-to-day experiences. Teacher educators play a vital role in broadening the ways in which computational literacy is integrated across the content areas and developed in students. General and special education "teacher educators need to provide teachers with the content, pedagogy, and instructional strategies needed to incorporate computational thinking into their curricula and practice in meaningful ways, enabling their students to use its core concepts and dispositions to solve discipline-specific and interdisciplinary problems" (Yadav, Stephenson, & Hong, 2017, p. 56).

The PTRP will intentionally incorporate opportunities for residents and their mentor teachers to support students as they leverage their understanding of computation to develop problem-solving solutions that are authentic and meaningful to their lives and their communities (Lye & Koh, 2014). This approach to computing and integrating computational literacy gets away from approaches that are too narrow and rote. Traditional methods to teach computing can be highly analytical and use predefined problems or simple games. "These methods have been critiqued for failing to engage diverse students, or those who have less linear, creative or hands-on thinking styles" (Rode et al., 2015, p. 8). Computational making in makerspaces has been suggested as a more robust way to develop students' computational literacy and can attract a diverse range of students to computing fields (Rode et al., 2015).

Around the world, Makerspaces (MS) are gaining popularity as environments that amplify learning for people of all ages. They engage learners in "creating and exploring new possibilities through building and experimenting with tools, technology, and materials" (Lang, 2013, p. 22), as an important resource to support students' engagement with computational practices. Making is defined as "a class of activities focused on designing, building, modifying,

and/or repurposing material objects, for playful or useful ends, oriented toward making a 'product' of some sort that can be used, interacted with, or demonstrated" (Martin, 2015, p. 31). Making provides students access to tools to design innovative solutions for meaningful and authentic problems. As such, Kurti, Kurti, and Fleming (2014) posit that educational Makerspaces have the potential to revolutionize teaching and learning, lending themselves to opportunities for creativity and problem solving that lie at the heart of computational thinking essential to learning for the 21st century. UNC Greensboro's School of Education is uniquely positioned to include a focus on computational making in general and special education teacher education because it is home to the pioneering SELF Design Studio, a University-based makerspace. Students' engagement in design will be supported by school-embedded Makerspaces that will provide students access to tools and technologies for long-term and iterative design work.

Quality of Project Design

Rationale: To prepare teachers to engage students in activities that support their development of computational literacy, the PTRP takes a practice-based approach to teacher education (Ball & Cohen, 1999), which includes providing teachers access to 1) material resources including a framework for core teaching practices and access to makerspace technology, 2) social resources such as content experts and instructional coaches, and 3) experiential learning opportunities in the disciplines and with new forms of pedagogy. PTRP will result in an innovative and replicable teacher residency model for the integration of computational literacy in the teacher education curriculum, a model that will serve to transform approaches to teacher preparation.

The PTRP will provide residents and their cooperating teachers with a set of core research-based teaching practices that support the integration of computational thinking across

content areas in K-12 education. We focus on a framework that delineates core teaching practices to align with recent calls to focus teacher education on the integration of pedagogical knowledge with the practices of teaching (Grossman, Hammerness, & McDonald, 2009). These core practices will be foundational across pre-service, induction, and leadership support to provide a common vocabulary and vision for how to organize K-12 instruction that supports all students in developing computational literacy (McDonald, Kazemi, & Kavanagh, 2013).

In PTRP, educators in Teacher Education and Specialized Education Services will work together to map out core instructional practices that support student engagement with computation across each of the content areas. Core practices in teacher education should be practices that occur often in teaching, are easily enacted across different forms of instruction, are developmentally appropriate for novice teachers to enact and support them in learning more about the relationship between teaching and learning, represent the complexity of teaching, and are research-based with demonstrated potential to improve student achievement (Grossman, Hammerness, & McDonald, 2009, p. 277).

Practice-based teacher education requires that teachers have opportunities to work collaboratively to improve their teaching practice (Ball & Cohen, 1999). While teachers work primarily on their own in their classrooms, research has shown that teachers benefit from having time in their teaching schedule to meet with and to work with teachers in their content area and/or grade level (Heredia, Furtak, Morrison, & Renga, 2016; Little, 2002; 2003). Furthermore, teachers that have access to disciplinary and pedagogical experts show greater sustained changes to their classroom practices (Coburn & Woulfin, 2012). To support collaboration among residents and graduates of the residency program, residents will be placed in cohorts each year. These cohorts will be organized as one large cohort across grade levels and content areas for

more general and special education courses and be split into smaller collaborative disciplinary-based groups for content-specific instruction. Each grade band (elementary and secondary) and the special education residents will be provided with an instructional coach that will lead school-based seminars during the academic year to support collaboration across the cohort.

Experiential learning of pedagogical practices will be woven throughout the residency program, as residents work alongside a master teacher in the classroom. Residents will also engage in experiential learning of computational content and practices, because the integration of computational thinking in content courses is a departure from the ways in which most teachers have gained discipline content knowledge. Teachers who have learned math and science primarily through lecture are likely to emulate those teaching practices in their own classrooms (McDermott & DeWater, 2000). Teachers require professional learning experiences that provide them with instruction on both the content and practices of the discipline, preferably taught by experts who also understand the needs of teachers (McDermott, Heron, Shaffer, & Stetzer, 2006). By learning in the way students are expected to learn, teachers gain the experience of working through the material and identifying potential difficulties their students might have while developing a deeper understanding of the content matter (McDermott & DeWater, 2000). This strategy places teachers in experiential learning situations to support metacognitive insights into ways of understanding how learning develops so as to help them replicate similar computational learning experiences with their students.

Preparation for Quality Teaching

The Piedmont Teacher Residency Partnership (PTRP) has three goals that address teacher recruitment, retention, and leadership and will be organized around the integration of pedagogy, practice, and teacher mentoring. PTRP's goals include: 1) the development of a reformed teacher

residency model replacing current university post-baccalaureate programs that lead to initial certification, 2) the coordination and development of leadership opportunities for mentor teachers in partner schools, and 3) recruitment and retention of high quality, diverse teachers in partner schools.

Goal 1 - Effective Pre-Service Teacher Preparation: The PTRP will prepare 20 teacher residents to work in the partner schools each year (a total of 80) with a focus on an understanding of teaching contexts and cultures (e.g., the rural setting, student culture, involvement with community) and the development and application of computational literacy. We describe three primary objectives to develop curriculum to support the effective development of pre-service teachers in high-need areas: 1) restructuring current Master of Arts in Teaching (MAT) to a residency model with content integration to support computational thinking, 2) integrating school-embedded makerspaces in each partner school, and 3) ongoing assessment of goal objectives to iterate on and improve implemented activities.

Goal 1, Objective 1: The current University of North Carolina at Greensboro School of Education MAT program will be restructured as a Residency Program. To respond to the teacher shortage in Surry County Schools and Rockingham County Schools, participants will seek an MAT degree that leads to an initial license in elementary education, middle and secondary science and math education, secondary English language arts, or special education. The educational preparatory component of the program includes 30 credit hours and will span 14 months complete with coursework and an 11-month teacher residency, where participants will receive a living stipend to work alongside a licensed master teacher within their respective specialty area.

UNCG currently has MAT programs in elementary, secondary science, and middle grades. The PTRP will add MAT programs in secondary math and English language arts and in special education and use existing programs as a basis for this restructuring. For example, the Department of Specialized Education Services MAT will be developed by overhauling the existing Pathway to Alternative Initial Licensure (PAIL) program to be a MAT that includes emphases on computational literacy, Universal Design for Learning (UDL), and non-cognitive skills (e.g., executive function, self-regulation, social, emotional competence). Teacher candidates in the residency program for the MAT in special education will have many opportunities to explore, research, design, create, and produce effective learning to meet diverse learner abilities with numerous occasions to collaborate with one another as they prepare, deliver, and assess instruction.

It is essential to the partnership model which lies at the heart of this project that we work with our partner districts (Surry and Rockingham) to design many details of the residency model of teacher preparation. The first year of the PTRP (the planning year) will therefore include many boundary-spanning conversations to calibrate the design of the Residency Model. Boundary spanning is key to successful collaboration when stakeholders from diverse organizations come together to achieve a common goal (White & Dozier, 1992). Boundary spanning stimulates reflection, assessment, and creativity (Aldrich & Herker, 1977), helps the team balance goals of the organizations with pressures from external audiences (Aldrich & Herker, 1977), helps the team set priorities (Adams, 1980), and prompts acts of meaning-making that assists external audiences in interpreting various behaviors, information, and events (White & Dozier, 1992). In a sense, boundary spanning conversations help align diverse stakeholders'

interpretive frames, priorities, and languages, making the definition and achievement of common goals more likely.

Computational Literacy Content Development. In conjunction with the design of the residency model, current courses will be modified to integrate aspects of computational literacy. Similarly, new courses will be developed in partnership with the College of Arts and Science to provide rigorous graduate level content support in computational literacy for residents. These courses will focus on providing residents with experiential learning opportunities to develop their computational literacy within their content area of expertise with coursework in biology, chemistry, and computer science.

Science and math methods courses will focus on integrating a set of computational thinking practices that connect disciplinary practices in science, math, and engineering as described in new Standards documents (Weintrop et al, 2015). Computation is a common thread in the work of scientists, engineers, and mathematicians. The intersection of disciplinary practices in math, science, and engineering provide an entry point to consider the ways in which math and science courses can support the development of students' computational literacy. The PTRP will use this set of computational practices as a tool for teachers to not only recognize the ways in which their content areas intersect with computation, but also support integration of these practices in their classrooms to build shared understanding across the content areas.

In the elementary programs, computational literacy will be developed through the integration of engineering curriculum in science methods coursework. Similar to the secondary math and science methods courses, the computational thinking practices related to engineering will be used as a way to coordinate student learning across grade levels. Engineering provides a context to enhance the integration of computational thinking in elementary curriculum because

of its interdisciplinary nature, which enables relatively easy integration with science, mathematics, literacy, and social studies. Our revised MAT curriculum will teach pre-service teachers how to creatively weave engineering into the existing time and curriculum structures in place in most elementary schools by integrating engineering design challenges through science methods.

Computational literacy is a relatively new content area for instruction in K-12 schools, leaving many general and special education teachers feeling ill prepared and less than equipped to support students with disabilities' learning in computing education (Israel et al., 2015a). Current recommendations for supporting students with disabilities in computer science suggest using explicit instruction embedded in inquiry-based approaches aligned with science standards, strategic instruction (e.g., mnemonic instruction), and peer-assisted learning (Therrien et al., 2011; Therrien et al., 2017). In accord, the SES MAT will focus on revising methods course content that emphasizes K-12 students with disabilities inclusion in science, technology, engineering, and math (STEM) instruction, in general, and computational literacy instruction, specifically, using the aforementioned recommended approaches as well as scaffolding, modeling, and peer collaboration (Israel et al., 2015b).

Supporting Students with Disabilities. The Individuals with Disabilities Education Act (IDEA, 2004) ensures students with disabilities access, progress, and achievement of the general education curriculum. Univerisal Design for Learning (UDL) offers a framework for supporting students with disabilities access, progress, and achievement in the general education curriculum by providing multiple means of representation, engagement, and expression (Meo, 2008; Rose & Meyer, 2002). Because STEM content-specific support, including computational literacy, for students with disabilities should be designed and carried out within a UDL framework

(Snodgrass, et al., 2016), we will embed UDL principles in courses each semester throughout the newly designed residency programs.

Researchers have identified non-cognitive skills, which include but are not limited to executive function, self-regulation, social, emotional competence, and inter and intrapersonal skills, as predictors of success in school, work, and life (Gabrieli, Ansel, & Krachman, 2015). Yet, for K-12 students with disabilities, non-cognitive skills, such as these, are especially problematic and may contribute markedly to chronic school failure, including poor academic performance (Moffitt et al., 2011). Revised curriculum in the SES MAT program will include not only a prerequisite and a stand-alone course on positive behavior interventions and supports but also an enhanced focus on non-cognitive skills throughout the program of study by embedding the topic in courses each semester. Furthermore, faculty from teacher education will work with faculty in special education services to integrate support for the development of non-cognitive skills in general education courses.

Literacy Instruction. At UNCG preparation for literacy instruction involves the integration of reading, writing, speaking and listening, and language, as defined in the North Carolina English Language Arts Standards. Reading includes instruction in phonemic awareness, phonics, fluency, vocabulary and comprehension. All initial licensure programs in general education include a focus on preparation for strong literacy instruction, as verified by regular program reviews. In Elementary Education, candidates take courses such as TED 641 (Literacy I: Reading Instruction), TED 642 (Literacy II: Language Arts Instruction), and TED 619 (Trends and Issues in Literacy Education).

At the secondary level, students will take a course on literacy across the content area (TED 535) that focuses on academic language development. The current course focuses

primarily on reading across the content areas and will be redesigned with the new residency program to focus on all aspects of academic language development through reading, writing, listening and speaking. Special attention will be given to the language demands of computation within each of the content areas, as well as how and why to communicate about computation to the public. Specifically, teachers will learn about how disciplinary literacy fosters computational thinking in a variety of ways.

In special education, pre-service and in-service teachers are required to take a course at the master's level, which focuses on literacy instruction for K-12 individuals with high incidence disabilities. Providing comprehensive reading instruction (i.e., phonemic awareness, phonics, fluency, vocabulary, comprehension) and strategic writing instruction (e.g., self-regulated strategy development, SRSD) are emphasized. Literacy intervention builds upon students' communication skills (speaking, reading, and writing) through the use of assessment data as a problem-solving process. Intervention planning emphasizes the use of UDL to ensure access to content and differentiated instruction to afford skill development. Intervention design addresses students' unique communication, motivation/engagement, and executive function needs. Teachers are taught to use extant program evaluations (e.g., What Works Clearinghouse) to determine which programs and strategies are effective for particular kinds of students. The use of evidence-based practices (e.g., explicit instruction) within a before, during, and after framework is used to ensure background knowledge is developed or elicited at the beginning of each lesson (e.g., vocabulary), attention is regulated and directed toward important aspects of texts (e.g., comprehension strategy instruction, SRSD), and finally, new information is integrated into students' existing knowledge. Taken together, this course is poised to help teachers address the unique computational literacy needs of individuals with high incidence disabilities.

Limited English Proficient Learners. Recent reform efforts in education stress the need to integrate content learning with student engagement in disciplinary practices. "Across these disciplines, learning and assessment tasks will require students to engage in greater written and oral discourse, as well as argumentation from evidence – a practice found across the disciplines (Santos, Darling-Hammond, & Cheuk, 2012; p. 105)". This type of classroom environment is integral for English Language Learners to have opportunities to develop their English language proficiency with their peers (Quinn, Lee, & Valdéz, 2012) and at the same time can prove challenging for these students without additional support (Santos, Darling-Hammond, & Cheuk, 2012). Teacher educators need to integrate various strategies across education courses to provide new teachers with an understanding of language demands of their discipline, how students language develops over time, and language scaffolds that support that development over time (Santos, Darling-Hammond, & Cheuk, 2012).

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. This initial work in our undergraduate program will be used as a model to ensure similar attention to ESOL standards in the residency program.

Goal 1, Objective 2: As a mechanism to support residents and their mentor teachers to leverage students' developing computational literacy to engage in design, each partner school will be equipped with a makerspace. Faculty at UNCG will consult with partner schools'

administrations to embed the makerspace in ways that work at each school. These could include maker carts that travel between classrooms, a dedicated classroom for making, or integration of making technologies and tools into the school's media center.

Making and Makerspaces are becoming increasingly popular in K-12 educational settings (Peppler & Bender, 2013) as an important space to support youth from minority communities to develop STEM identities and a sense of belonging in science (Calabrese Barton, Tan, & Greenberg, 2018; Vossoughi & Bevan, 2016). However, the integration of making into formal education is not without critique (Martin, 2015) and requires that educational experts work together with experts in the Maker Movement to integrate making in effective ways (Peppler & Bender, 2013). For example, some have critiqued the ways in which making has been transported into formal education settings as step-by-step construction or fabrication of objects, rather than a process of iterative design and tinkering (Resnick & Rosenbaum, 2013). To address these issues, three core elements of the Maker Movement are highlighted as essential to integrate making in P-12 schools (Martin, 2015). These three elements include access to technologies and tools, a community infrastructure to support making, and a stance toward learning as an iterative process, collaborative, and assets-based. We will attend to each of these elements through intentional programming for residents and mentor teachers in our program.

UNCG established a Makerspace in the School of Education as part of a previous TQP grant and subsequently in partner elementary and middle schools in local districts. The previous project focused on the integration of emergent technologies in undergraduate education programs through the use of Makerspaces. The project proposed here extends and scales up this previous work to reform the MAT program in partnership with two new, rural districts (Surry & Rockingham) and focuses technology integration to develop students' computational literacy.

As part of the MAT program, residents will be introduced to making and design in their coursework and will have as part of their weekly rotations scheduled time to work with students in the Makerspace on school-based problems. We will use the UNCG SOE SELF Design Studio as part of the PTRP, and each partner school will be fitted with a Makerspace to engage pre- and in-service teachers, and students, in "making," as well as in Maker camps. These opportunities will serve as an ideal learning environments for both students and teachers to practice and develop computational practices.

In the MAT in special education, teacher candidates in the residency program will experience how the makerspace becomes an accessible learning environment for students with high-incidence disabilities. Here they will learn how their students can receive support and guidance from parents, community mentors and area experts on creating, problem solving and developing skills that promote advanced critical thinking (Preddy, 2013). Teacher candidates will learn to facilitate their students' interactions with various tools, objects and high tech software to design, invent and explore possibilities through experimentation (Canino-Fluit, 2014; Lang, 2013).

Goal 1, Objective 3: Each year, these activities will be reviewed and evaluated through focus groups, interviews, observations, and surveys managed by our evaluation team (described in detail in the evaluation section).

Goal 2 - Integrated Leadership Opportunities for Mentor Teachers: PTRP will develop coordinated pathways for mentor teachers in partner schools to take on leadership roles focused on improving computational literacy. These leadership opportunities are consistent with state and national standards and the needs of partner schools. North Carolina's Department of Public Instruction provides criteria for selecting mentor teachers and these criteria will provide

the basis for how mentor teachers are selected for participation in PTRP. In North Carolina, mentor teachers must: a) be professionally licensed in the field of licensure sought by the student; b) have a minimum of three years of experience in a teaching role; c) have been rated, through the educator's most recent formal evaluations, at least at the proficient level as part of the North Carolina Teacher Evaluation System, or the equivalent on an evaluation system utilized by another state or partner school, as applicable, and have met expectations as part of a student growth assessment system used by a school in the field of licensure sought by the student; and d) have the recommendation of the principal. Mentor teachers for PTRP must also demonstrate appropriate instruction that engages all students, collaboration with colleagues, and demonstrated knowledge of content, pedagogy, and assessment. Once mentor teachers have been selected, we will work with school administration to select and provide professional development opportunities for mentor teachers during the initial planning year of the project.

The PTRP has three primary objectives to achieve Goal 2, which include 1) leveraging existing UNCG programs to identify and develop a cadre of mentor teachers at partner schools to mentor residents, 2) embedding instructional coaches in partner schools to work with school leaders to identify professional learning needs of cooperating teachers and provide professional development support, and 3) ongoing assessment of goal objectives to iterate on and improve implemented activities related to the goal of building the leadership capacity of mentor teachers in partner schools.

Goal 2, Objective 1: To enact the leadership component of our three-pronged approach, we plan to draw on the established and successful leadership programs that currently exist at UNCG that focus on STEM, Clinical Teacher Preparation, Making, and Academic Literacy. Thus, we have developed a smaller cadre of teachers who are poised to serve as mentors for the

MAT students in the residency program. We aim to increase the size of this cadre of teachers with the addition of teachers from the partner schools. The funding from PTRP will grow and sustain this network of STEM and special education teacher leaders.

Mentor teachers will have an opportunity to choose from a variety of leadership pathways, dependent on the grade level and content that they teach. Each of these programs immerse educators in problems of practice related to teaching and learning and focus on the integration of knowledge, pedagogy, and mentoring. These programs will happen in conjunction with residents' coursework and alongside youth summer programs at UNCG. The integration of mentor teacher development and new teacher training with youth summer programming provides experiential learning opportunities for mentor teachers to work with novice teachers in non-threatening environments in which teacher candidates can experiment with new teaching practices (Ferry, 1995). The research literature points to the following benefits of learning in informal spaces for teacher education: (1) positive affective outcomes, such as increasing confidence in one's teaching abilities (Spencer, Cox-Petersen, & Crawford, 2005); (2) exposure to and practice with more active learning teaching practices (McGinnis, Hestness, Riedinger, Katz, Marbach-Ad, and Dai, 2012); (3) increased expertise in meeting the needs of diverse learners (Spencer, et al., 2005); and (4) broader perspectives on disciplinary teaching and learning (Kelly, 2000). We briefly describe some of these existing leadership programs and how they will be incorporated into PTRP below.

- **Clinical Teacher Academy:** UNCG, in collaboration with the New Teacher Center, developed a Clinical Teacher Academy in 2011. This three-day training has been delivered annually since 2011 to prepare teachers to be strong mentors. The training focuses on inquiry, formative assessment, and problem-solving skills and prepares

mentors to apply professional teaching standards using evidence. Mentor teachers for PTRP will participate in the Clinical Teacher Academy in the summer before hosting a resident to ensure that they have a sufficient understanding of the role and have developed mentoring skills.

- **Making and Design:** Mentor teachers will each receive professional development in making and Makerspaces. They will then have an opportunity to extend their study of making through participation in the Design and Making in Education post-baccalaureate certificate program for practicing teachers. Over the summer, UNCG holds a variety of making camps for local area youth. Residents will have opportunities to work with students in these camps and mentor teachers will work with residents to develop and iterate on activities residents will use with small groups of campers.
- **Engineering in the Elementary Classroom:** Mentor teachers from partner elementary schools will join the UNCG STEM Teacher Leader Collaborative (STEM TLC), an existing network of approximately 150 elementary teachers, to engage in robust professional learning related to integrating science and engineering throughout their curriculum. This network continues to grow each summer, with some teachers deciding to engage the STEM TLC's activities with more depth (e.g., in small teacher inquiry groups), as teacher leaders for introductory institutes, and ambassadors at conferences.
- **Special Education:** In special education through an OSEP funded preparation grant, 20 elementary education teachers have earned master's degrees in special education. Their preparation included extensive leadership preparation (e.g., developing personal leadership qualities, coaching and mentoring peers, presenting their work at state and

national conferences) to better meet the needs of students with disabilities who are included in general education settings.

- **Gate City Writes:** A professional development workshop over one summer to focus on the teaching of writing in teachers' content area. Teachers work with youth that participate in a Young Writers camp. Digital literacy is a primary component of Gate City Writes and teachers will have the opportunity to use and plan for digital tools that support literacy learning and computational thinking.

Goal 2, Objective 2: PTRP will collaborate with our partner schools to develop opportunities for leadership that fit the needs of the schools. For example, we will support the development of long-term professional learning opportunities (e.g., professional learning communities and teacher inquiry groups) that situate our teachers as leaders within their school and community.

PTRP will employ expert coaches for teachers and residents in the partner schools. This coaching component has been a promising practice from both of our two previous TQP projects and act as the face of the project for the partner schools. The coaches will provide direct support to schools, helping to implement innovative practices and facilitating bi-directional communication between the schools and the teacher preparation program. Three coaches will be selected, one with expertise in secondary school teaching, one with expertise in elementary school teaching, and a half-time coach with expertise in special education. All three will have earned doctorates and will serve as university supervisors and cohort leaders for the residents.

Finally, the PTRP will incorporate TeachFX technologies at each of the partner schools to facilitate classroom data collection and analysis in school inquiry groups. TeachFX is an interactive app that teachers can use to audio record classroom interactions. The app transcribes

classroom conversations and quantifies the amount of teacher and student talk throughout the lesson. Instructional coaches and mentor teachers will be able to use this data in their inquiry groups to provide feedback to residents about their implementation of core teaching practices related to facilitation of student disciplinary-based talk in the classroom. Instructional coaches will initially work with mentor teachers during the initial planning year to learn how to use the app and engage with the data in their inquiry groups.

Goal 2, Objective 3: Each year, these activities will be reviewed and evaluated through focus groups, interviews, observations, and surveys as a mechanism to iterate on activities related to the goal of teacher leadership.

Goal 3- Recruitment, Retention and Diversity: PTRP will recruit and retain high quality, diverse teachers to work in high need schools in the partner school districts. The partnership with Rockingham County Schools and Surry County Schools addresses the TQP's Invitational Priority: Spurring Investment in Opportunity Zones. Rockingham County has three Census tracts that are designated Opportunity Zones: 37157040900; 37157040200; and 37157041300. The latter two are home to students in the K-5 Moss Street Partnership School, one of the high-need, rural schools served through the PTRP program. Surry County also has three Opportunity Zones in which SCS students live: 37171930400; 37171930600 and 37171931002. To further exhibit high need and TQP eligibility, Franklin Elementary School in the SCS district has a 74.2% free and reduced price school lunch rate (FRPSL). The Moss Street Partnership School (a K-5 elementary school) in RCS has a 100% FRPSL rate.

PTRP has three primary objectives to meet this goal; 1) increase and expand recruitment efforts through events and outreach; 2) expansion of UNCG new teacher induction program to partner districts; and 3) ongoing assessment and evaluation of recruitment and retention efforts.

Goal 3, Objective 1: Over a five-year period, PTRP will recruit, select, prepare, and induct 80 individuals who possess baccalaureate degrees in approved disciplines, a cumulative grade point average (GPA) of 3.0 or higher and a desire to improve the academic achievement and life readiness of K-12 students in high-need schools. In alignment with other successful residency programs, potential residents will demonstrate their communication skills and dispositions for teaching through a collaborative interview process. Residents will be required to meet all state licensure requirements within 14 months and upon application for the stipend will agree to teach for a minimum of three academic years following completion in a high-need school in the partnership. To recruit high quality, diverse teachers to work in high-need schools in the partner districts, PTRP will: (1) host weekend recruitment events each year, modeled after our successful Student Affairs in Administration in Higher Education (SAAHE) program, which almost doubled the number of applicants to their master's program, particularly for students from minority backgrounds; (2) increase the visibility of the residency program by expanding our recruitment efforts with the help of a graduate student in SAAHE; (3) widely broadcast the availability of residencies in special education to groups of individuals working in fields adjacent to special education (e.g., psychology, social work, paraeducators); (4) solicit the names from department chairs and program coordinators from our local universities (e.g., NC A&T) of recent graduates in various disciplines (e.g., science, engineering, psychology, social work) who might be interested in general and special education teaching careers, and (5) solicit the names of prospects from community leaders who reside in the area of proposed residency sites.

Goal 3, Objective 2: To foster computational thinking in schools, it is essential to work with partner schools to support the induction of beginning teachers. This project 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 demonstrates 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 results 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. To reap the benefits of high-quality, comprehensive support and avoid the pitfalls of uncoordinated efforts, PTRP will partner with the North Carolina New Teacher Support Program and other existing induction supports in the partner LEAs to coordinate supplemental support that meets identified needs of beginning teachers in high-need schools.

UNCG is currently a regional partner in the NC New Teacher Support Program (NC NTSP). The NC NTSP is a comprehensive, university-based induction program offering a research-based curriculum and multiple services designed to increase teacher effectiveness, enhance skills, and reduce attrition among beginning teachers. The NC NTSP provides each teacher: (1) intensive institute "boot camps"; (2) intensive, individualized classroom coaching; & (3) aligned professional development sessions. Coaches are fully released, highly qualified

teachers employed full time by the University to conduct weekly face-to-face visits with each beginning teacher. The coaching framework builds upon contextual factors of the community, school, teacher, classroom environment, and students. It is also aligned to the research-based constructs underlying the edTPA, which is a requirement for all new teachers in NC beginning in the 2019-2020 academic year. The NC NTSP is a well-established program that receives half of its funding from the state of NC, based on a record of success in beginning teacher retention, satisfaction, and impact on student learning. PTRP will provide the other half of the funding necessary to provide NC NTSP support for teacher residents in their first two years as teachers of record.

In addition to the NC NTSP, UNCG will offer a follow up institute for teacher residents and other beginning teachers in the partnership 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 1) reflect upon their attitudes and assumptions about families and teachers' responsibilities when working with families, 2) reflect about their attitudes and assumptions toward students from poverty, students with disabilities, and English language learners, and 3) 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, Objective 3: Each year, these activities will be reviewed and evaluated through focus groups, interviews, observations, and surveys. Recruitment and retention will be tracked using UNCG and the State Department of Public Instruction maintained employment records that will provide data about teacher retention for analyses of the project's effectiveness.

Sustainability

The revision of the MAT curriculum through PTRP will create a sustainable model for post-baccalaureate teacher preparation at UNCG. The state of North Carolina has recently established a residency model for teacher licensure in which qualified individuals who hold a bachelor's degree, and have sufficient content preparation, can become teachers of record for one year while completing an approved educator preparation program. The revision of the MAT programs in special education, elementary education, middle and high school math and science and high school English Language Arts to accommodate a residency will not only accommodate residents recruited through PTRP, but will also allow teachers pursuing the NC Residency license to complete a high quality preparation program while serving as teachers of record in high need NC public schools. To ensure that all residents receive the full two years of induction support, the partner districts will provide the funding necessary to supplement state funding for the NC NTSP for each resident in cohort 3 for one additional year and in cohort 4 for two years. The UNCG School of Education will continue to provide the Yopp Professional Development Institute to all eligible first year teachers from the partnership.

Adequacy of Resources

Institutional Support: Founded in 1891, The University of North Carolina at Greensboro (UNCG) is a comprehensive doctoral research institution with approximately $30,000,000 in annual federal research funding support serving 16,238 degree-seeking undergraduates and 3,083 degree-seeking graduate students in Fall 2018. Of these students, 38% of undergraduates (n=6211) and 35% of graduate students (n=1096) are enrolled in Science and Math departments at UNCG. UNCG is classified by The Carnegie Foundation as a Research University with

"Higher Research Activity-R2" and a "Community-Engaged Institution", one of only 50 such institutions in the country to have both.

Of the 17 constituent institutions that comprise the University of North Carolina system, UNCG has the most diverse student population. UNCG is a Minority Serving Institution with an undergraduate student body in 2018 consisting of approximately 34.7% African Americans and 10.5% Hispanic or Latino Americans. Furthermore, the percentage and count of students from groups underrepresented in science has increased by approximately 60% since 2009. Females now make up 67% of undergraduate students at UNCG. UNCG also serves a significant proportion of students with financial need, with approximately 52.2% of UNCG students eligible for need-based Pell Grants in 2018, leading the U.S. Department of Education to officially recognize us as a Title III Part A institution. In Fall 2018, UNCG enrolls 20,106 students in 100 baccalaureate programs, 33 certificate/specialist/licensure programs 56 master's programs and 28 doctoral programs. These students came from North Carolina and 46 other states and 75 foreign countries/regions. According to the most recent state educator preparation report card (2017-18), 86% of undergraduate teacher education graduates passed professional and content area exams, and 97% of graduate level teacher education graduates passed professional and content area exams.

School and Departmental Support

School of Education (SOE). The School of Education is a vibrant and inclusive learning community that embodies access, equity, diversity, cultural relevance, and collaboration in teaching, research, service, and community engagement. The school houses 75 full-time faculty and 6 academic departments: Specialized Education Services (SES), Teacher Education and Higher Education (TEHE), Counseling and Educational Development (CED), Educational

Leadership and Cultural Foundations (ELC), Educational Research Methodology (ERM), and Library and Information Studies (LIS). SOE networks, offices and centers include the Coalition for Diversity in Language and Culture (CDLC) and the Office of Assessment, Evaluation and Research Services (OAERS). This project will be administratively housed in the UNCG School of Education. UNCG personnel on the proposed project will have office space and computer resources available to the project. Meeting space is also readily accessible, equipped with video conferencing for use among project team members, consultants and other stakeholders.

SOE Office of Research. Research and engagement are central to the mission of the school. The Office of Research provides unit-level support for creative scholarship. Staff includes a Pre-Award Coordinator to assist with proposal development, pre-award budgets, and proposal submission through the university's sponsored programs office. A Post-Award Coordinator is available to support financial management and expenditures, and to coordinate project administration in cooperation with central administrative offices. A Grant Specialist supports pre- and post- award activities.

Department of Teacher Education and Higher Education (TEHE). The TEHE Department brings together outstanding faculty mentors with scholars from all levels of educational experience to pursue one common goal: to become leaders driven to make a difference in the lives of learners, who, in turn, are prepared to make their own positive difference in the world. TEHE programs offer exceptional value and opportunity. As a result, dedicated students are empowered to create a path to their own success. Graduates become teachers, improve their current teaching practice, work in colleges or universities as instructors or administrators, and work with preservice or in-service teachers in university teacher educator programs and school district offices.

Department of Specialized Educational Services (SES). The SES Department promotes the successful inclusion of individuals with disabilities in society through excellence in the education of teachers and leaders, learning new skills, and the application of existing knowledge. Through community-engaged teaching, research, and service, students gain the knowledge, skills, and hands-on experience necessary to make valuable contributions in institutions of higher education, state education systems, school systems, and community services.

The Office of Assessment, Evaluation, and Research Services (OAERS). OAERS is a division of the Department of Educational Research Methodology (ERM) in the UNCG School of Education. The purpose of OAERS rests at the intersection of two goals. The first goal is to offer exceptional consulting services and technical resources in the areas of assessment, program evaluation, and data analysis to individuals and organizations in the Piedmont Triad, North Carolina, and beyond. The second goal is to provide graduate students in ERM extensive hands-on applied experiences to support their training and professional growth. Through meeting these two goals, OAERS delivers valuable research and evaluation support to organizations while providing a rich training ground for the next generation of leaders in the fields of assessment, program evaluation, and data analysis.

SOE Information Technology Services (ITS). ITS staff provide technology service and support to faculty, staff, and students in the School of Education. In the digital age, technology is an integral part of effectively and efficiently carrying out professional research, personnel development, and policy advancement endeavors.

Relevance and Demonstrated Commitment of Partners

The UNCG School of Education and College of Arts and Sciences have long established partnerships with Rockingham County Schools and Surry County Schools. Leaders in the SOE,

CAS, and the districts collaborated to develop the proposed project and will continue working together to implement and sustain the project. Recent funded projects collaborating with Rockingham County Schools include: NC2ML North Carolina Collaborative for Mathematics Learning (NC DPI / Dr. Holt Wilson); CMaPSS II: Sustaining Core Mathematics Instructional Practices in Secondary Schools (NC QUEST / Dr. Holt Wilson); and **BRIDGES** for socioenvironmental good: **BR**oadening **I**dentities for **D**iverse **G**roups **E**ngaging with **S**TEM (National Science Foundation / Dr. Heidi Carlone). Recent grants collaborating with Surry County Schools and Rockingham County Schools include: Principal Preparation for Excellence and Equity in Rural Schools (PPEERS) (NC Alliance for School Leadership Development (NCASLD) / Dr. Kimberly Hewitt).

UNCG School of Education. The School of Education and the Collaborative for Educator Preparation will provide leadership for the project, including coordinating the revision of the curriculum in the MAT program to align it with the residency model and to add licensure areas to the MAT that are of high need to the partner districts (high school mathematics, high school English language arts, and special education). Project staff will be housed in the School of Education and will report to [redacted], Lead Principal Investigator.

Moss Street Partnership School. The School of Education also operates Moss Street Partnership School, an innovative K-5 public school that serves an eligible population of students 80% of whom qualify for free or reduced price meals. Moss Street Partnership School will serve as a clinical training site for PTRP and MSPS teachers will serve as cooperating teachers/field supervisors for residents.

SELF Design Studio. The **Student Educator Learning Faculty (SELF) Design Studio** in the UNCG School of Education will serve as a makerspace where students can learn and create with

hands-on resources and activities. In collaboration with partner schools, the makerspace will help prepare pre-service teachers to become educational leaders who engage students with innovative and creative learning models. The SELF Design Studio will provide opportunities for in-service and pre-service teachers to utilize a variety of emerging technologies and tools including 3D printers, robotics, art supplies, and circuitry kits.

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 the MAT programs in science and mathematics. These faculty serve as Program Coordinators in the Collaborative for Educator Preparation.

Rockingham County Schools. Rockingham County Schools will select two high schools, two middle schools, and three elementary schools that have not less than 45% of students eligible for FRPSL at the secondary level and not less than 60% of students eligible for FRPSL at the elementary level. These high need schools will serve as clinical training sites for PTRP. Teachers in these schools will serve as cooperating teachers/field supervisors for teacher residents and will participate in the leadership development aspects of this project. RCS school-based and central office administrators will serve as advisors to the project team and will help supervise students in the field. They will also participate in and oversee professional development for partner school faculty. RCS will also provide facilities for professional development activities related to the project and for teacher resident learning communities.

Surry County Schools. Surry County Schools will select two elementary schools, one middle school and one high school that have not less than 45% of students eligible for FRPSL at the secondary level and not less than 60% of students eligible for FRPSL at the elementary level. These schools will serve as clinical training sites for PTRP. Teachers and SCS school-based and

central office administrators will serve in the same manner as those described above for Rockingham County Schools, ensuring continuity and replicability across the partner LEAs.

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 Collaborative for Educator Preparation (CEP) is the organizational umbrella for all professional education programs on campus. Sponsored by the SOE, the central purposes of the Collaborative for Educator Preparation 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 CEP 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 PTRP will be coordinated through the Collaborative for Educator Preparation.

[redacted], Director of Professional Education Preparation, Policy, and Accountability and Co-Chair of the Collaborative for Educator Preparation will serve as Lead Principal Investigator and Project Director. [redacted] will be responsible for the day-to-day operations of the project. [redacted] has served as the Project Director for two previous Teacher Quality Partnership projects: Project ENRICH, funded in 2010, and Transforming Teaching through Technology, funded in 2014. She has coordinated all aspects of these projects, 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.

[redacted] also serves as Regional Director for the UNCG Region of the NC New Teacher Support Program and is Co-Director of UNCG's public laboratory school, Moss Street Partnership School, which is located in Rockingham County. [redacted] 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.

[redacted] will serve as the Rockingham County Schools project coordinator. [redacted], Assistant Superintendent of K-12 Curriculum and Instruction, has worked in education as a teacher and administrator in Rockingham County Schools for 20 years. He holds Master of Education, Master of School Administration, Educational Specialist and Doctor of Education degrees. He has previously served as a teacher, assistant principal, principal, and director of school administration, all in Rockingham County, where he is a lifelong resident. He will be a district liaison for all project needs and will work closely with the Project Director.

[redacted] will serve as the Surry County Schools project coordinator. [redacted], Assistant Superintendent of Curriculum and Instruction for Surry County Schools, directs all of the district's efforts in professional development and instructional support for teachers and administrators. She has previously served as a teacher and administrator with Wilkes County (NC) Schools and as a middle school instructional specialist, assistant principal, principal, and director of both Career and Technical Education and Technology and Media for Surry County Schools. She has written and lead several previous grants funded by organizations such as Golden LEAF Foundation, Z. Smith Reynolds Foundation, Education Workforce Innovation Fund, and Burroughs Wellcome Fund. [redacted] is an adjunct instructor in the

Educational Leadership program at High Point University. She will be a liaison to the district for all project related needs and will work closely with the Project Director.

[redacted] will serve as the external evaluator for PTRP. [redacted] is the principal consultant at EPRE Consulting. With more than 25 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 two other TQP projects.

[redacted] of the Office of Assessment, Evaluation, and Research Services (OAERS) at UNCG will lead the internal evaluation activities related to PTRP. [redacted] is currently a Senior Evaluation Specialist in the Department of Educational Research Methodology at UNCG. Dr. Smith specializes in the areas of program evaluation and stakeholder communication.

[redacted] will serve as a co-Principal Investigator. [redacted] is a science educator in the Department of Teacher Education and Higher Education and will lead the program revision for the MAT program in Middle and Secondary Science and the professional learning aspects for science teachers and residents. [redacted] is Co-Principal Investigator on the Broadening Identities for Diverse Groups Engaging with STEM (BRIDGES) grant funded by the National Science Foundation that is currently working with science teachers at Reidsville Middle School, one of the partner schools for PTRP. She teaches Introduction to Equity Education, Teaching Practices and Curriculum in Science, Middle Grades Science Education, Science Education in Elementary School, Contemporary Problems: Advances in Student Assessment in Math & Science, and Environmental Education. [redacted] will serve as PTRP faculty for the MAT in Elementary Education, teaching its revised science method course.

[redacted] will serve as a co-Principal Investigator. [redacted] is an English educator in the Department of Teacher Education and Higher Education and will lead the program revision for the MAT program in English Language Arts and the professional learning aspects for literacy. [redacted] has served as Director of the UNCG Young Writer's Camp since 2012 and as co-director of Gate City Writes since 2017. She co-organized the Triad Teacher Researcher Conference in 2010 and co-led that conference and the affiliated teacher researcher group from 2010-2018. [redacted] teaches Literacy in the Content Area, Teaching Practices and Curriculum in English Education, Identity Matters, Gender and Education, Teacher as Researcher and Leader I and II, Youth Literacies, and Qualitative Research Design in Education.

[redacted] will serve as a co-Principal Investigator. [redacted] is a mathematics educator in the Department of Teacher Education and Higher Education. He will co-lead the program revision for the MAT program in middle and secondary mathematics and the professional learning aspects for mathematics with [redacted] in the Math department. [redacted] was Principal Investigator of the NC Collaboration for Mathematics Learning (NC^2ML) funded by the NC Department of Public Instruction and Project Director for CMaPSSII: Sustaining Core Mathematics Instructional Practices in Secondary Schools, funded by NC QUEST (ESSA Title II). Both of the projects included teachers from Rockingham County Schools and NC^2ML also included Surry County Schools. He has extensive experience in developing and delivering high quality professional learning experiences for mathematics teachers and will lend his expertise to this project.

[redacted] will serve as a co-Principal Investigator. [redacted] is a learning scientist and middle grades teacher educator in the Department of Teacher Education and Higher Education and will lead the program revision for the MAT program in Middle

Grades and the professional learning aspects for learning sciences and makerspace integration. [redacted] will serve as Program Coordinator for the revised MAT program in Middle Grades. She partners with teachers and adolescent students at diverse, high-needs schools to co-construct transformational learning spaces, including Reidsville Middle School in Rockingham County, a partner school for PTRP. She teaches Educational Implications of Learning and Developmental Theory, Middle Grades Curriculum and Instruction, and Seminar in Middle Grades Education.

[redacted] will serve as a co-Principal Investigator. [redacted] is Clinical Assistant Professor of Elementary Education in the Department of Teacher Education and Higher Education and will lead the revision of the MAT program in elementary education. He teaches a variety of courses including: Advanced Teaching Methods, Differentiated Instruction and Educational Psychology, and Implications of Educational Theory. He also facilitates online teacher preparation courses in ESL and educational psychology and co-chairs the Elementary Education faculty committee.

[redacted] will serve as a co-Principal Investigator. [redacted] is an Associate Professor of Special Education in the Department of Specialized Education Services. [redacted] will lead the revision of the PAIL program into a MAT program in special education as well as professional learning aspects for special education. She will collaborate with faculty from the Department of Teacher Education and Higher Education to incorporate high-quality preparation in the teaching of students with disabilities into the general education courses. [redacted] has over 30 years of experience as a teacher, administrator, and university professor, specializing in the education of students with behavioral challenges. She was Principal Investigator for Project LINK-2-LEAD, a $1.25 million special ed. leadership development project funded by OSEP.

Additional project staff will include a part-time program assistant and two and a half positions for Academic Coaches who will work with the cohorts of teacher residents and on-site teacher educators to ensure alignment between preparation and practice and will also serve as instructors for seminars and field supervisors for the residents. Academic programs will be responsible for the administration and delivery of their MAT programs and for supporting professional development in their content areas. From the School of Education, the following faculty will provide program support: Special Education [redacted]), Elementary Education [redacted]) Science Education ([redacted]). From the College of Arts and Sciences, [redacted] (Chemistry and Biochemistry) and [redacted] (Biology) will consult on the development of science content courses for the revised MAT curriculum. [redacted] (Mathematics) will consult on the development of math content and methods course for the revised MAT curriculum. [redacted] (Computer Science) will consult on the computational literacy aspects of the project, both in terms of the curriculum revisions and the professional development. In addition to providing instruction in their content area, these faculty members will serve on an Advisory Council for PTRP along with senior administrators from Surry County and Rockingham County. A timeline and responsibilities list for the PTRP management plan:

Goal 1: Prepare 20 teacher residents per year (80 over four years) by reforming UNCG's Master of Arts in Teaching (MAT) to become a teacher residency program. Graduates will be prepared to work in LEA partner schools with a focus on understanding teaching contexts and cultures, and the development and application of computational practices.

Objectives	Activities	Timeline	Person(s) Responsible
Restructure the MAT curriculum in partnership with partner LEAs to best prepare graduates to include computational content and practices in their teaching.	· Work with partner districts to co-design elements of the residency program · Gain curriculum approval · Revise courses and field experience seminars	· Begin Fall 2019, complete Spring 2020 · Begin Spring 2020	Program Faculty
Integrate school embedded makerspaces in each partner school	· Equip each partner school with a makerspace ·Prepare partner school teachers to integrate makerspaces into the curriculum ·Prepare residents to integrate makerspaces into learning	· Spring 2020 · Spring 2020 and ongoing · Summer 2020 and ongoing	Program Faculty Project Director

Implement and evaluate revised MAT program	·Deliver revised curriculum ·Regular review of data regarding revised curriculum ·Make improvements as indicated by data review	·Beginning Fall 2020 ·Fall 2020 and semiannually · Fall 2020 and semiannually	Program Faculty Project Director Internal Evaluation Team
Goal 2: PTRP will develop coordinated pathways for teachers to take STEM teacher leadership roles focused on improving computational literacy in their schools and districts. PTRP will also provide multiple leadership opportunities that are consistent with state and national standards and the needs of partner schools.			
Objectives	**Activities**	**Timeline**	**Person(s) Responsible**
Grow and sustain a network of STEM and special education teacher leaders to serve as mentors in the partner districts.	Deliver Clinical Teacher Academy for selected mentors Offer existing professional development opportunities for	Summer 2020 and subsequent	Program Faculty Project Director Coaches

	partner school faculty teachers		
Provide professional development for P-12 teachers in partner schools	· Develop and deliver professional development as needed for school staffs in selected schools to prepare for residents · Develop and deliver professional development as needed for cooperating teachers	· Beginning Fall 2019 · Beginning Summer 2020	Coaches Project Director Faculty Content Experts
Collaborate with partner schools to develop opportunities for leadership that fit the schools	·Establish communities of inquiry · Provide coaching for in-service teachers	· Beginning Fall 2019	Coaches Project Director Program Faculty

Implement and evaluate leadership opportunities	· Deliver leadership opportunities ·Regular review of data regarding leadership opportunities · Make improvements as indicated by data review	· Beginning Fall 2019 · Fall 2020 and semiannually · Fall 2020 and semiannually	Program Faculty Project Director Internal Evaluation Team
Goal 3: Recruit and retain high quality, diverse teachers to work in high need schools in the partner school districts			
Objectives	**Activities**	**Timeline**	**Person(s) Responsible**
Increase and expand recruitment efforts through events and outreach	Weekend recruitment events Expand recruitment activities with help of SAAHE graduate assistant Outreach to local Universities	Spring 2020 and ongoing	Project Director Program faculty SAAHE Graduate Assistant

	Outreach in partner communities		Alternative licensure advisor Recruitment Coordinator
Provide coaching support and professional development for teacher residents in their first three years of teaching	Enroll residency completers in the NC New Teacher Support Program Yopp Professional Development Institute	Fall 2021 and subsequent Summer 2020 and subsequent	Project Director NC NTSP Coaches
Evaluate effectiveness of recruitment and retention activities	Implement recruitment plan · Regular review of data regarding recruitment and retention · Make improvements as indicated by data review	· Spring 2020 (& subsequent) Summer 2020 (& subsequent)	Program Faculty Project Director Internal Evaluation Team

Evaluation Plan

EPRE Consulting LLC, an evaluation and research firm, will conduct the independent evaluation of this project in collaboration with an internal evaluation team led by [redacted] and conducted by the Office of Assessment, Evaluation and Research Services (OAERS) at UNCG. [redacted] is Principal Consultant with EPRE Consulting LLC, and will lead the external evaluation. The collaboration between [redacted], and OAERS will create opportunities for graduate students in the UNCG Educational Research Methodology Department to conduct data collection, analysis, and reporting activities under the supervision and guidance of the OAERS evaluation team.

The approach to evaluation will follow Patton's *Utilization-Focused Evaluation[1]*, which structures the implementation of the evaluation process to maximize its value to project stakeholders. It does this by explicitly identifying the key evaluation users and proactively addressing their needs and concerns. The aim is to provide both formative and summative feedback in a useful and timely manner for key evaluation stakeholders, so that they can use that information in the planning and management of the program.

Evaluation Dimensions: Monitoring, Formative Feedback, Impact Assessment, 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 and other stakeholders 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 and findings will be provided regularly and

as needed for reporting to the project's key personnel, stakeholders 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. 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 Rockingham and Surrey Counties. These quantitative measures will be supplemented by data from interviews and observations, to provide a nuanced, more holistic picture of the project's work.

As described in the proposal narrative, and summarized in the PTRP logic model, the project's goals, objectives, outcomes, and impacts form the basis for the evaluation plan. The following general evaluation questions provide foci for the implementation of the plan. In collaboration with the project's management and key personnel, it is expected that these questions will be prioritized and refined throughout the life of the project.

1. What aspects of the project's activities have been implemented as planned; what opportunities, challenges, and difficulties have been encountered; and how have the project's activities been modified as a result?

2. What have been the direct results of the project's activities in terms of the numbers of project participants and events, and participants' immediate outcomes?

3. How effectively are the key components of the Program operating? What is working well and for whom? What are areas for improvement?

4. What have been the impacts of this project on the UNCG teacher preparation curriculum, UNCG teacher-candidates (students), teachers in partner schools, and their students on computational literacy and other proposed project outcomes?

5. What has been learned over the life of this project, and how and to what extent are elements of the program being institutionalized and sustained at the university or partner schools?

The two tables below summarize the project's goals and objectives, and identify evaluation metrics and strategies that will be used to assess them. Table ! lists the project's goals and objectives, related outcomes and evaluation criteria, and indicates the evaluation metrics and strategies to be used. Table 2 provides additional detail about the planned evaluation metrics and strategies. It is recognized that this project is likely to evolve over its five-year timeframe, and the specific metrics and strategies may be modified to fit the project's changing circumstances.

Table 1: Goals, Objectives, Evaluation Questions, Outcomes and Evaluation Strategies (detail of Activity 3 for Goals 1, 2, and 3).

Goals, Objectives, Evaluation Questions	Outcomes and Criteria	Evaluation Metrics & Strategies	Timetable
Goal 1: Effective pre-service teacher preparation. The PTRP will prepare 20 teacher residents to work in the partner schools each year (a total of 80).			
Goal 1, Activity 1: Restructure UNCG's Master of Arts in Teaching (MAT) to become a teacher residency program	Restructured MAT program approved by UNCG by end of Year 1. 20 teacher residents per year (total 80 students) complete the MAT residency program (Years 2 – 5)	Implementation Review (a) Review of enrollment statistics (b)	June, Year 1 June, Years 2 – 5

	80% of teacher residents are employed by the partner LEAs after program completion	Review of employment statistics (c)	June, Years 3 - 5
Goal 1, Activity 2: Equip each partner school with a makerspace	New educational makerspaces installed in 17 K-12 partner schools	Document during Implementation Reviews (a)	June, all years
	Professional development provided to teachers in partner schools	PD evaluation surveys (d)	Following all PD events
	Use of relevant pedagogies increases by 100% by Year 5	Interviews of partner teachers (e)	March, each year
		Teacher interviews (e)	March, each year
	K-12 students demonstrate 30% increase in computational literacy by Year 5	Classroom observations (f)	September and April, each year
		Computational thinking	March each year.

		assessment rubric (g)	
Goal 2: Leadership: Develop coordinated pathways for teachers to take STEM teacher leadership.			
Goal 2, Activity 1: Draw on the established and successful programs that already exist at UNCG that focus on STEM, Teacher Leadership, Making, and Academic Literacy to develop teacher-leaders in the partner schools.	At least 3 teachers from each partner school participate in one or more leadership programs. By Year 2, two teachers from each partner school are prepared to serve as mentors for the MAT students in the residency program.	Review of teacher participation in leadership programs (h) Interviews of MAT mentor teachers (i)	June, all years March, each year
Goal 2, Activity 2: Develop opportunities for leadership that fit the needs of the schools.	PTRP provides expert coaches for teachers and residents in the partner schools.	Implementation reviews (a)	June, all years

Goal 3: Recruitment, Retention and Diversity: recruit and retain high quality, diverse teachers to work in high need schools in the partner school districts.			
Goal 3, Activity 1: Recruit, select, prepare, and induct 80 diverse, well-qualified individuals for the MAT residency program.	Number and characteristics of MAT program recruits. Number and characteristics of MAT graduates hired by partner LEAs.	Review of enrollment statistics (b) Review of employment statistics (c)	June, Years 2 – 5 June, Years 3 - 5
Goal 3, Activity 2: Provide coaching & mentoring support for early service teachers in partner schools.	2- and 3-year retention of new teachers increases by 25% by Year 5	Review of employment statistics (c)	June, Years 3 - 5
Evaluation Questions			
EQ1: Project implementation successes, challenges, modifications?	Annual review of the project's progress toward completion of goals and objectives	Implementation review (a)	June, each year and as needed

EQ2: Direct results of the project's activities? EQ3: Effectiveness: How effectively are the key components of the Program operating?	Annual evaluation planning may identify needed additional evaluation strategies	Strategies a through h and others	As scheduled.
EQ4: Impacts: What have been the impacts of this project on computational thinking and other project outcomes?	Theory of Change: Increased computational literacy will result in improved student performance and success measures	Computation literacy assessment rubric (g) Review of student and school outcomes and performance on EOG/EOC and EVAAS measures (j)	March, all years Annually, when scores become available
EQ5: Sustainability: What has been	Data review meetings with stakeholders	Data review meetings (k)	As scheduled

learned that should be institutionalized and sustained?	Annual implementation review	Implementation reviews (a)	June, each year and as needed

Table 2: Evaluation Strategy Details

Evaluation Strategies	Related Goals, Objectives, Evaluation Questions	Details
a. Implementation review meetings	All	An annual, structured, reflective review of all project goals, objectives, and activities with the Project Director and other key stakeholders.
b. Review of enrollment statistics (restructured MAT residency program)	Goal 1 Activity 1, Goal 3 Activity 1, EQ 2, 3	Review of enrollments, characteristics of students, and progress through the program.
c. Review of employment statistics	Goal 1 Activity 1, Goal 3 Activities 1 & 2, EQ 2, 3	Proportion of MAT completers employed and retained by partner LEAs.

d. PD evaluation surveys	Goal 1 Activity 2, Goal 2, EQ 2, 3	Evaluation survey to be developed for project-sponsored professional development
e. Interviews of teachers in partner schools	Goal 1 Activity 2, Goal 2, EQ 2, 3	Annual interviews of teachers in partner LEAs to collect data on perceptions of project implementation, effectiveness, and impacts.
f. Classroom observations	Goal 1 Activity 2, EQ 2, 3	Observations in partner school classrooms will use Kolb's *Triple-E Framework[2]* to assess implementation of project-advocated pedagogies.
g. Computational thinking assessment rubric	Goal 1 Activity 2, EQ 2, 3, 4	This will be a project-designed measure, aligned with the project's definition of computational thinking.
h. Review of teacher participation in leadership programs	Goal 2 Activity 1, EQ 2, 3	Review of records to determine extent of participation in the programs
i. Interviews of MAT mentor teachers	Goal 2 Activity 1	Annual interviews of MAT mentor teachers to collect data on perceptions of project implementation, effectiveness, and impacts.

j. Review of student and school outcomes on EOG/EOC and EVAAS measures	EQ 2, 3, 4	These are standardized, state-mandated measures of student performance
k. Data review meetings	EQ 5	Meetings to be held at least annually throughout the project to invite stakeholder review of data and evaluation findings, and input and advice into both the project's activities and the evaluation process.

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