**GSKyTeach: An Innovative Residency Program to Prepare**

**Math and Science Teachers for High-Need High Schools in Jefferson County, Kentucky**

## Table of Contents
## Application Narrative Section


| | |
|---|---|
| **Project Overview**……..... | 1 |
| A Unique Innovation Program Design……. | 2 |
| Potential for a Significant Impact on High-Need Target Schools…… | 3 |
| Systemic Redesign of Teacher Preparation……..... | 3 |
| **The Partners**……..... | 3 |
| WKU's College of Education and Behavioral Sciences (CEBS)…… | 3 |
| WKU's Ogden College of Science and Engineering (Ogden)…… | 4 |
| The Jefferson County Public Schools (JCPS)…….. | 5 |
| The Kentucky Education Professional Standards Board (EPSB)…… | 6 |
| The Center for Parent Leadership…… | 6 |
| **Assessment of Needs**……. | 7 |
| Jefferson County Public Schools……. | 7 |
| Western Kentucky University……. | 9 |
| **Project Goals and Objectives**……. | 10 |
| Overall Project Goal…… | 10 |
| **Part I – Project Design**…… | 11 |
| Collaboration in Designing the Residency Program…… | 11 |
| GSKyTeach – A Research-Based and Tested Unique, Original, and Innovative…… | 12 |
| The New Teacher Center Mentoring Model – A Tested Protocol……... | 14 |
| Three Key Roles in Preparation for Teaching and Learning……... | 15 |
| Master Teacher……. | 15 |
| Mentor Teachers…….. | 17 |
| University Graduate Course Instructor(s)…… | 18 |
| The Graduate Instruction and Clinical Experiences to be Provided to Participants…… | 18 |
| Summer Semester – July-August……. | 19 |
| SMED 501……. | 19 |
| SMED 510……. | 19 |
| SMED 520……. | 20 |
| Fall Semester – August to December……... | 21 |
| SMED 530……. | 21 |
| SMED 590……. | 22 |
| SMED 589……. | 22 |
| Spring Semester – January to May…….. | 23 |
| SMED 591……. | 23 |
| SMED 560……. | 23 |
| SMED 620……. | 24 |
| May Term……. | 25 |
| SMED 630……. | 25 |
| Teacher Resident Recruitment and Selection…….. | 27 |

| | |
|---|---|
| The Two-Year Induction Program…….. | 28 |
| Continuation of the Residency Program……. | 30 |
| Training of Master Teachers and Mentor Teachers……. | 30 |
| Training of Other Math and Science Teachers in High-Need Schools…… | 31 |
| Training of New Teachers in JCPS other than Residency Teachers…… | 31 |
| **Part II – Significance**……... | 31 |
| Producing System Change and Improvement…….. | 31 |
| Building Local Capacity and Providing Expanded Services……... | 32 |
| Importance and Magnitude of the Outcomes of the Proposed Project……. | 32 |
| Potential for Continued Support of GSKyTeach in JCPS after the Project Ends…… | 33 |
| **Part III – Management Plan**……... | 34 |
| Work Plan for Objectives 9 and 10……. | 39 |
| **Part IV – Project Evaluation**…….. | 39 |
| Formative Evaluation…….. | 41 |
| Matched Comparison Group…… | 42 |
| Data Collection…… | 42 |
| Project Records…… | 44 |
| GSKyTeach Teacher Data…… | 44 |
| Institutional Documents, Records, and Policies……... | 45 |
| Classroom Observation Data……... | 45 |
| Math and Science Teacher Survey……... | 46 |
| Interviews……. | 46 |
| Student Achievement Data…….. | 47 |
| Institutional Review Board…….. | 48 |
| Data Analysis……... | 49 |
| Reporting…….. | 50 |

# GSKyTeach: An Innovative Residency Program to Prepare Math and Science Teachers for High-Need High Schools in Jefferson County, Kentucky

## PROJECT OVERVIEW

The Ogden College of Science and Engineering and the College of Education and Behavioral Sciences at Western Kentucky University (WKU), in partnership with the Jefferson County Public Schools, the Commonwealth Center for Parent Leadership, and the Kentucky Education Professional Standards Board, request funding to establish an alternative certification residency program that prepares high-performing math and science teachers for high-need high schools in Louisville, Kentucky. The one-year residency experience will enable the teacher resident to work alongside an experienced teacher mentor for a school year while pursuing rigorous graduate studies in teacher preparation. Completion of the program will provide teacher certification and a WKU Master of Arts in Education degree for recent college graduates with science or math content majors but no preparation in teaching or for mid-career people with strong math or science preparation.

Program participants will experience a graduate level adaptation of the highly successful UTeach pre-baccalaureate program developed at the University of Texas at Austin and replicated at WKU at the undergraduate level under the name, SKyTeach, for Southern Kentucky Teach. The proposed graduate version of SKyTeach, called GSKyTeach, will be a newly implemented and highly innovative teacher residency program. The UTeach and SKyTeach programs are based on research described in a 2005 report for teachers entitled “How Students Learn” supported by the National Research Council (NRC) of the American Academy of Sciences. The NRC’s work clearly supports an inquiry approach to teaching and learning in science and math and provides a strong conceptual base for the creating the GSKyTeach teacher residency

program. Thus, GSKyTeach will simultaneously enhance teacher residents' math and science content knowledge as they learn research-based teaching and learning strategies (National Research Council, 2005).

To support GSKyTeach teacher resident development, a new mentoring program will be established and modeled after the protocols and processes for working with teacher residents developed in the New Teacher Center at the University of California at Santa Cruz. In addition, GSKyTeach will provide a rich culture for teacher preparation and professional development in the inquiry process of teaching and learning for not only teacher residents but also experienced math and science teachers in high-need schools as they mentor teacher residents.

The goal of this comprehensive effort is to improve teacher quality and schooling in communities designated as high need and to provide better opportunities for students to reach their highest academic potential despite barriers to their physical, mental, and academic development.

**A Unique Innovation Program Design**. GSKyTeach (as was its parent program in Texas) is being developed specifically to respond to the nation's initiatives to prepare more students for careers in science, technology, engineering, and mathematics (STEM). The program has the following features:

- A comprehensive program of teaching and learning based on latest research
- Modeling of inquiry teaching and learning by specially-trained Master Teachers
- Teacher residents working alongside a teacher mentor in a year-long residency
- Rigorous graduate studies on how students learn math and science
- Rich clinical experiences in a high-need school to apply research principles

- Learning communities of GSKyTeach resident cohorts, Mentor Teachers, Master Teachers, and university faculty
- Two years of mentored induction and professional development for each cohort

GSKyTeach contains the features of other highly successful teacher residency programs and those required by the Teacher Quality program initiative:

**Potential for a Significant Impact on High-need Target Schools**

- Development and implementation of an inquiry approach to teaching and learning
- Student-, content-, assessment-, and community-centered instruction
- Significant numbers of high-ability teacher residents are prepared and placed in high-need schools, and they form a network of supportive peers
- Professional development on inquiry learning for experienced teachers

**Systemic Redesign of Teacher Preparation**

- Real collaboration and participation of academic faculty, teacher educators, and school practitioners in teacher preparation and development
- Teacher training based on latest research on teaching and learning
- A year-long clinical experience with experienced and trained Mentor Teachers
- Establishment of a professional learning community among residents and practitioners
- An induction program during the first two years of teaching that is a joint effort of academic faculty, teacher education, and school practitioners

## THE PARTNERS

**WKU's College of Education and Behavioral Sciences (CEBS)** prepares about 400 new teachers each year and grants advanced certification to more than 300 school practitioners. In 2008, WKU's undergraduate teacher preparation program was one of two in the nation to receive

the American Association of State Colleges and Universities Christa McAuliffe Award for excellence in demonstrating their graduates can produce P-12 learning. Its teacher performance accountability system, frequently featured at the highly selective American Association of Colleges for Teacher Education preconference workshops, has also received national attention over the last several years. Furthermore, four years ago WKU was selected by the Carnegie Foundation as one of only 30 teacher preparation programs to participate in "The Learning Network." WKU received small grants from Carnegie and the Annenberg Foundation to restructure math and science content courses for K-6 teacher candidates and to prepare teacher educators, curriculum coordinators, and principals in WKU's service area to use the New Teacher Center Mentoring Model with new teachers. Finally, from 1999 through 2005, WKU was the grantee for a [redacted] Enhancing Teacher Quality grant that supported a collaborative partnership (called the Renaissance Partnership) among eleven state universities across the nation to develop, implement, and adapt accountability systems that provide evidence teacher graduates can produce learning with the students they teach. The use of teacher work samples as a tool for instruction and assessment of teacher performance in student teaching was tested and adopted at all eleven universities. Teacher work samples also provided evidence graduates could produce learning with all students they teach.

**WKU's Ogden College of Science and Engineering (Ogden)**, which includes the department of mathematics, has been a longtime collaborator with the College of Education and Behavioral Sciences to improve teaching and learning in local schools. Recent evidence of the strength of the Ogden and CEBS relationship is receiving a [redacted] grant from Exxon Mobil to develop SKyTeach, a replication of the University of Texas at Austin's highly successful UTeach Program, to produce more and higher quality secondary math and science teachers. The

SKyTeach program has already led to an NSF funded Robert Noyce Teaching Scholarship grant for nearly [redacted]. Additionally, last year Ogden College received a [redacted] NSF grant to develop a math and science partnership among 30 middle schools in West Kentucky. The College is been very active over the past five years in redesigning content courses for teachers that addressed P-12 content standards.

**The Jefferson County Public Schools (JCPS)**, which serves about 100,000 students in 155 school sites and is the 28th largest school district in the nation, has 21 high schools, 14 of which qualify as high-need schools. Whereas 42.6 percent of students qualify for free and reduced lunch program district wide, the free and reduced lunch proportion of students in the high-need schools is 60.4 percent. JCPS not only has some of the state's top-performing schools but also schools that have the greatest challenge of producing high levels of student achievement. The district has 15 schools for which students must apply and meet some academic or special qualifications to attend. These schools serve students from all family income levels and cultural backgrounds who meet specific criteria. While they have high levels of student achievement and nurture exceptional talent, their existence also contributes to the challenge of obtaining high levels of student performance in other schools, especially schools that serve the children of low-income families. Thirty-two percent of students in JCPS come from diverse cultural backgrounds, the highest proportion relative to other Kentucky districts. JCPS has implemented the "Every 1 Reads" initiative district wide with the help of 9,600 community volunteers and major funding from the business sector of the community. At the high school level, innovative programs in literacy and classroom management have contributed to improved instruction. A recent innovative classroom, Instructional Framework, has provided a structure around which to

plan and deliver lessons. All professional development in the district is delivered via the Gheens Academy and supported by district and foundation funds.

**The Kentucky Education Professional Standards Board (EPSB)** certifies all school personnel in the Commonwealth and approves all teacher preparation programs. GSKyTeach will serve as a pilot of an alternative certification option proposed by EPSB and approved by the Kentucky General Assembly but not used previously. The EPSB welcomes the opportunity to collaborate in this new venture and to provide support as necessary. The EPSB also operates the Kentucky Teacher Internship Program (KTIP) for first-year teachers. The EPSB will provide significant resources for this project by paying the Mentor Teacher and assigned higher education faculty a stipend to mentor new teachers during the first year of induction through KTIP. It should be noted that during another EPSB approved pilot program designed for first-year teachers, WKU's faculty developed 14 instructional modules to assist these teachers in providing high performance on the ten KTIP teaching tasks. These modules will be used as additional resources to support GSKyTeach graduates entering their first induction year as they complete KTIP requirements and experience professional development during the induction years.

**The Center for Parent Leadership** is an arm of Kentucky's Prichard Committee for Education Excellence. The Prichard Committee, composed of citizen leaders in their communities across Kentucky, has been a powerful advocate of education reform in Kentucky. The Commonwealth Center for Parent Leadership has trained parents across Kentucky to assist them in communicating with schools and school practitioners. More recently, the Center has turned its attention to helping school practitioners learn to communicate more effectively with families. Preparation programs typically do not prepare teachers to understand and communicate

with the parents or caregivers of their students. In this residency program, the Center's Parent Leadership Institute will provide two days of parent communication training for resident teachers in the first month of the program and follow-up assistance throughout the residency year.

## ASSESSMENT OF NEEDS

**Jefferson County Public Schools**. The most telling evidence supporting the need for more high-performing science and math teachers in target high-need high schools is student achievement scores. Annually, all public school students take the Commonwealth Assessment and Testing System (CATS), which provides schools with an academic index that shows the degree to which students are making academic progress in various content areas relative to state expectations. The goal for all schools in Kentucky is to achieve an index of 100 by 2014. Table 1 below shows the most recent academic index for the 14 high schools that qualify as high-need.

**Table 1. CATS Index in Science and Math for 14 High-need Schools**

| School | Total Enrollment | % Fee/Reduced Lunch | CATS Science Index | CATS Math Index |
|---|---|---|---|---|
| Iroquois | 1257 | 78.4 | 44.2 | 49.9 |
| Central | 962 | 76.9 | 55.2 | 53.8 |
| Shawnee | 595 | 74.3 | 43.2 | 48.7 |
| Western | 870 | 74.3 | 33.9 | 33.1 |
| Valley | 874 | 71.2 | 55.1 | 50.5 |
| Doss | 1,073 | 65.7 | 45.4 | 53.9 |
| Fairdale | 889 | 64.2 | 58.8 | 48.4 |
| Waggener | 1,000 | 62.7 | 51.6 | 49.7 |
| Southern | 1,292 | 60.8 | 61.2 | 59.8 |
| Jeffersontown | 1,200 | 53.9 | 59.3 | 56.6 |
| Seneca | 1,570 | 50.2 | 62.4 | 64.6 |
| Pleasure Ridge Park | 1,919 | 48.7 | 58.7 | 60.1 |
| Fern Creek | 1,477 | 48.0 | 67.3 | 62.1 |
| Atherton | 1,132 | 47.0 | 24.7 | 70.1 |
| **District (JCPS)** | | **42.6** | **68.23** | **69.79** |

The science and math indexes in Table 1 are determined by the percent of students who score novice (the lowest level), apprentice, proficient, or distinguished (the highest achievement level). Proficient or higher performance for all students is the state's goal for all schools. Based

on CATS data, 70 percent of all students in the 14 high-need schools are below proficient for both science and math. While this statistic shows a high-need and challenge for this project, data for students in four "gap" groups in the 14 high-need schools shows an even greater need for improvement in instruction (Figures 1 and 2).

*Figure 1: Percentage of JC High-need High School Students with Various Characteristics Scoring Below Proficiency on State **Science** Tests*

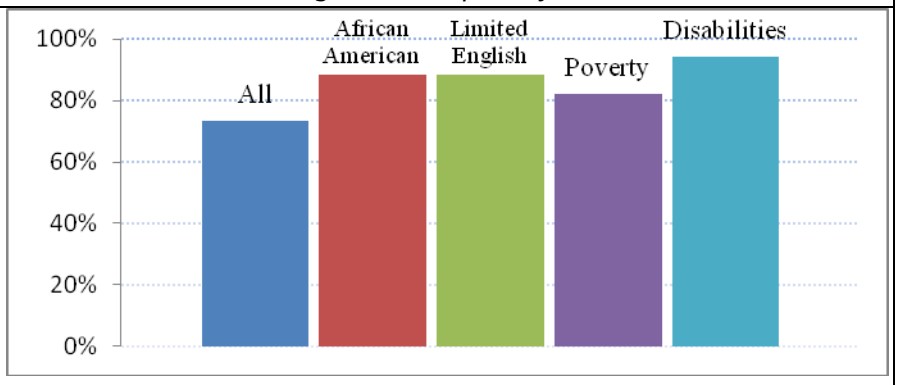
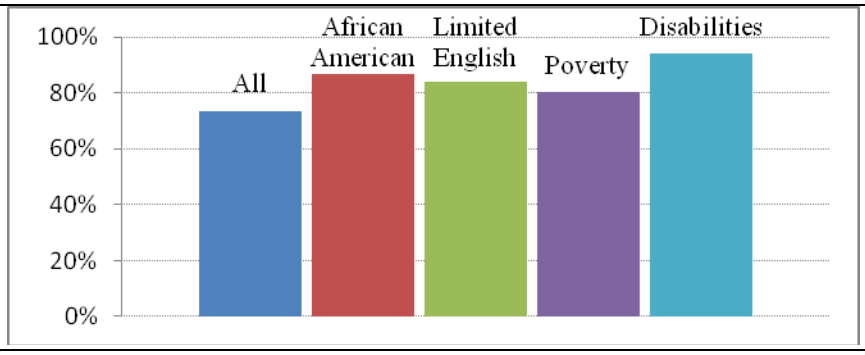



*Figure 2: Percentage of JC High-need High School Students with Various Characteristics Scoring Below Proficiency on State **Math** Tests*




It is obvious that these 14 schools are falling far short of Kentucky's expectations for all students. Another measure of the school's academic performance is the Education Planning and Assessment System (EPAS) assessments that indicate the extent to which students are being prepared to have access to college and other post-secondary education opportunities. Student achievement scores compared to "benchmark" scores indicate whether students are "on track" for educational opportunities beyond high school. Table 2 below shows the percent of students in

the five target high schools of the 14 high-need high schools in this project that are below benchmark with scores on the 10th grade plan test of EPAS.

| **Table 2. Percent of Students in Five High-need Schools with Achievement Below "On Track" for Post-secondary Education Opportunities** | | | | |
|---|---|---|---|---|
| School | Population | Percent Below Benchmark - Science | Percent Below Benchmark – Math | Percent Below Benchmark - Reading |
| Iroquois | 1,257 | 100% | 99% | 96% |
| Central | 962 | 100% | 98% | 96% |
| Shawnee | 595 | 100% | 99% | 99% |
| Western | 870 | 100% | 99% | 97% |
| Valley | 874 | 100% | 99% | 97% |

The above data present an overwhelming need for improved instruction in the five target schools of this project. While these five will be the focus of project efforts, we will work with the nine additional high schools that qualify as high-need and are schools in which graduates of the residency can also be placed.

A third measure of need is the retention rate of teachers in JCPS. One criterion measure of retention (B3) for this program is the percent of teachers with emergency, provisional, or temporary certification, with a percent of 1.37 or higher considered a demonstration of high-need status. The JCPS combined percent of 2.58 far exceeds this criterion.

**Western Kentucky University**. JCPS teacher residents participating in GSKyTeach enter one of the strongest teacher preparation programs in Kentucky. As mentioned earlier, WKU's teacher preparation program received the 2008 American Association of State Colleges and Universities' Christa McAuliffe Award for excellence in demonstrating its graduates can produce P-12 learning. Additionally, in any given year, nearly 95% of WKU graduates successfully pass state licensure exams and nearly 100% successfully complete the state's teaching internship program. Furthermore, three-year teacher retention rates of WKU graduates hover around 75%, well above the national average of 50%.

What WKU does **not** have but needs is a graduate version of its innovative SKyTeach program to prepare recent graduates or mid-career people with math or science content preparation. An alternative certification program would make a significant contribution to Kentucky's STEM initiative to prepare more students for careers in science, technology, engineering, and math. GSKyTeach is a sound solution for this need.

## PROJECT GOALS and OBJECTIVES

**Overall Project Goal**. Increase the achievement of all students in math and science for high-need secondary schools of Jefferson County as measured by Kentucky's State Assessments and Assessments of The Education Planning Assessment System (EPAS) – Explore 8th grade, Plan 10th grade, and ACT 12th grade. To achieve this goal, ten program objectives have been delineated:

1. Recruit, retain, and employ high quality and highly diverse math and science teacher residents through the GSKyTeach program (GPRA Short-Term Measure 1)
2. Prepare GSKyTeach graduates to meet all state certification requirements (GPRA 1) at high levels (GPRA 3)
3. Prepare GSKyTeach graduates to teach using the NRC's Inquiry-based Model for Teaching and Learning
4. Develop the capacity of all math and science teachers in high-need schools to use the NRC's Inquiry-based Model of Teaching and Learning in their classrooms
5. Build the capacity of math and science Mentor Teachers in high-need schools to use the New Teacher Center Mentoring Model to support teacher residents

6. Enhance the effectiveness of our newly prepared teachers (GSKyTeach program completers) as they begin their first years of teaching through a well-coordinated two-year induction program
7. Demonstrate the effectiveness of our newly prepared teachers through well-documented and defensible evidence of their impact on student learning
8. Demonstrate program effectiveness and efficiency by increasing one- and three-year teacher retention rates beyond current retention rates in Jefferson County High-need High Schools (GPRA 2, Efficiency Measure, and Short-Term Measure 2)
9. Institutionalize the GSKyTeach program as a continual source of high-performing new teachers for high-need schools in Jefferson County and throughout Kentucky
10. Use lessons learned in GSKyTeach development and implementation to improve other WKU preparation programs

## **Part I – PROJECT DESIGN** (40 Points)

**Collaboration in Designing the Residency Program**. Project planners from WKU met with key staff from JCPS on four days to plan a program that will meet their greatest needs in high-need schools (see Table 3). The dates were May 28, June 16, June 23, and June 30.

**Table 3. Planning Participants**

| **Planners from WKU** | |
|---|---|
| *Roger Pankratz* | Designated Executive Director and Assistant to the Dean - College of Education and Behavioral Sciences |
| *Tony Norman* | Associate Dean for Research and Accountability - College of Education and Behavioral Sciences |
| *Rico Tyler* | Program Designer and SKyTeach faculty – Ogden College of Science and Engineering |
| *Vicki Metzgar* | Co-director of SKyTeach – College of Education and Behavioral Sciences |
| **Planners from Jefferson County Public Schools** | |
| *Arthur Camias* | Director of the Gheens Center for Professional Development |
| *Marilyn Decker* | Director, Analytical and Applied Sciences |
| *Amy Herman* | Math Specialist |
| *Lee Ann Nickerson* | Science Specialist |
| *Joe Burks* | Assistant Superintendent of High Schools |
| *Don Corson* | Data Analyst for the Department of Accountability, Research, and Planning |

| | |
|---|---|
| *Marco Munoz* | Education Specialist for Department of Accountability, Research, and Planning |
| *Robert Rodosky* | Director of Accountability, Research, and Planning |

Through hours of detailed planning, the collaboration shaped the residency program to align with JCPS high school math and science curricula and develop the structures and processes of the program to provide maximum benefit to and impact on students in high-need schools.

**GSKyTeach – a Research-based and Tested Unique, Original, and Innovative Teacher Preparation Program**. GSKyTeach is a purposeful, sequenced program of instruction and clinical experiences that equips math and science teacher residents with the conceptual knowledge and skills to produce high levels of achievement with students through an inquiry approach to teaching and learning. This process is guided by decades of work in cognitive and developmental sciences that has provided the foundation for an emerging science (Donovan & Bransford, 2005). The research was first synthesized in the National Research Council (NRC) report (2000), *How People Learn: Brain, Mind, Experience, and School*. This work was further developed by NRC's Committee on *How Students Learn:* A Targeted Report for Teachers, which focused on three fundamental and well-established principals that are especially important for teachers to understand and incorporate in their teaching: (1) engaging student's prior understanding, (2) the essential role of factual knowledge and conceptual frameworks in understanding science and math, and (3) the importance of students' self-monitoring their own learning through metacognition (Donovan & Bransford, 2005, pp. 1-12).

Principal 1 implies that the understanding students carry with them into the classroom will significantly shape how they make sense of what they learn. This principle is supported by the research of Needham and Baillargeon (1993), diSessa (1992), and Bruner (1960). Principle 2 addresses learning with understanding, which has two parts: (a) factual knowledge must be placed in a conceptual framework, and (b) concepts are given meaning by multiple

representations that are rich in factual detail (Brown, Bransford, Ferrara, & Campione, 1983; Chase & Simon, 1973; Bransford & Schwartz, 1999; Hunt & Minstrell, 1994). Principle 3 is supported by research on metacognition. A metacognitive or self-monitoring approach can help students develop the ability to take control of their own learning, consciously define learning targets, and monitoring their own progress in achieving them (Aleven & Koedinger, 2002; Brown, 1975; Flavell, 1973; Donovan & Bransford, 2005; White & Fredrickson, 1998).

Relying on these principles to develop a framework for thinking about teaching, learning, and the design of classroom and school environments, the NRC "Targeted Report for Teachers" further described four design characteristics that can be used as lenses to develop and evaluate the effectiveness of teaching and learning environments: "(1) The *learner-centered lens* encourages attention to preconceptions, and begins instruction with what students think and know. (2) The *knowledge-centered lens* focuses on what is to be taught, why it is taught, how it is taught, and what mastery looks like. (3) The *assessment-centered lens* emphasizes the need to provide frequent opportunities to make students' thinking and learning visible as a guide for both the teacher and the student in learning and instruction. (4) The *community-centered lens* encourages a culture of questioning, respect, and risk taking" (Donovan & Bransford, 2005, p. 13).

These four research-based "lenses" are at the heart of the content-based pedagogy developed and communicated in SKyTeach. The knowledge and teaching skills to engage student's prior understandings, placing factual knowledge in a conceptual framework, providing multiple representations of content, rich multiple representations, and facilitating student's self-monitoring of their own learning are complex and demand expert knowledge. They require teacher candidates to make professional judgments continually based on their pedagogical

content knowledge and their perception of the multiple learning processes at work in their classrooms from one moment to the next. In GSKyTeach, building the teacher resident's capacity to cause learning effectively and efficiently using the National Research Council's Inquiry-based Model of Teaching and Learning is facilitated by focused instruction, modeled by a mentor and master teachers, followed by extensive mentored practice. These four lenses are especially important in the context of high-need high schools and students with diverse learning styles and needs.

**The New Teacher Center Mentoring Model – A Tested Protocol for Impacting the Growth of New Teachers.** A key feature of the GSKyTeach residency program is the opportunity for the teacher residents to work alongside a Mentor Teacher for an entire school year while pursuing rigorous graduate studies in teacher preparation. The combination of learning content-focused pedagogy, while having rich clinical experiences, is an excellent strategy for linking theory to practice. Critical to this process is the ability of the Mentor Teacher to teach, guide, and coach the teacher resident to make the graduate studies/clinical experiences most productive. To provide the Mentor Teacher the necessary tools to fulfill these important roles, the project will use the highly successful mentoring model developed over the past 20 years in the New Teacher Center (NTC) at the University of California Santa Cruz. Through a Learning Network initiative sponsored by Carnegie Foundation, WKU teacher education, mathematics and sciences faculty have been prepared as trainers to train their colleagues in teacher preparation, both at the university and area schools, to use the NTC model for induction programs in our service area. The NTC model has five key elements: (1) a set of eight guiding principles, (2) a framework for differentiated mentoring, (3) a mentoring conversation protocol, (4) mentoring conversation tools, and (5) use of a collaborative assessment log.

The conceptual framework of the model focuses on three important roles of the mentor that are important at different levels of teacher resident development and in different situations - instructor, collaborator, and facilitator. The mentor/mentee conversation protocol has four phases: (1) accessing the teacher resident's needs, (2) establishing a focus for work, (3) supporting the teacher resident's movement forward, and (4) promoting accountability. Mentor/mentee conversation tools include paraphrasing, clarifying, mediate questions, suggestion stems, teachable moments, and non-judgmental responses.

The NCT project model will not only be used during the preparation year but also through the two years of induction and for mentoring all new teachers in high-need schools. The real value of the NCT Mentoring Model is that it helps focus the teacher resident or new teacher on the specific teaching area that needs work, requires development of a plan for growth in that area, and holds the resident teacher accountable for implementing the plan before the next mentoring session.

**Three Key Roles in Preparation for Teaching and Learning.** A majority of the influence on teacher residents during their preparation year and during their first two years of teaching will be the persons in three roles: a Master Teacher, a Mentor Teacher, and graduate program instructors. The first and second roles will each be filled by expert practitioners. The third role will be filled by the cadre of expert WKU faculty who will be part of the GSKyTeach Program.

**Master Teacher**. Master Teachers will play a crucial role of the program because they will serve as the bridge between the instruction and experiences of graduate studies and what happens in the classroom. Traditional teacher preparation programs have failed to give serious attention to this role and, consequently, there has been a disconnection between theory and practice for most teacher residents. Master Teachers will be selected from the JCPS ranks of seasoned high school

science and math teachers with highest performance in producing learning with the students they teach. Additionally, they will have demonstrated the necessary leadership qualities to mentor, coordinate, and consult relative to the JCPS high school math or science curriculum. The residency program will employ both a math and a science Master Teacher. In this role, Master Teachers will not only model expert teaching but will also serve as the "standard bearer" for the program in inquiry teaching and learning in math or science. They will "wear several hats" at different times to support teacher preparation. At times, they will be a teacher of teachers who are working with teacher residents. At others, they will periodically mentor teacher residents specifically for professional growth relative to Kentucky's Teacher Standards. Master Teachers will also arrange and coordinate teacher resident learning experiences outside the classroom, such as observations, interviews, and projects with teachers, school leaders, resource teachers, education agencies, parents, and community patrons. In addition, they will have the responsibility to arrange for teacher residents to be part of professional learning communities, established as an ongoing part of the GSKyTeach program. Furthermore, the Master Teacher will train other teachers, school leaders, and teacher educators and will consult with teacher residents, experienced teachers, and school leaders relative to the JCPS math and science curriculum. To facilitate coordination between the instruction and experiences of graduate studies with teacher resident experiences in the classroom and schools, the Master Teacher will meet bi-weekly with all Mentor Teachers and the graduate course instructor(s) during all semesters of the school year. Additionally, as teacher residents graduate and become new teachers, Master Teachers will serve as bridge support as new teachers move into the Kentucky Teacher Internship Program and are assigned higher education faculty mentors. Master Teachers will serve as a critical resource as WKU and JCPS collaborate to design a meaningful and individualized second-year induction.

Finally, Master Teachers will work with JCPS administrators to assess the clinical practice of all teacher residents.

**Mentor Teachers**. Persons in this role will be experienced high school math or science teachers with demonstrated expertise in effecting student learning. They will be the "host" teachers with whom the teacher residents will work alongside during the year of preparation. Mentor Teachers will engage the teacher resident in the clinical/practitioner component of the program. Working with the teacher resident four days each week, each Mentor Teacher will model good practice (especially inquiry teaching and learning), co-teach with the teacher resident to demonstrate appropriate practice, coach the teacher resident in learning to teach, provide a variety of in-class experiences essential to learn the roles of teaching, and coordinate class experiences for the teacher resident with his/her graduate studies. The Mentor Teacher's clinical practice will complement the residency program and be aligned with the GSKyTeach program objectives. To facilitate this alignment, the Mentor Teacher will meet once every two weeks with the science or math Master Teacher and the university instructor(s) teaching the graduate course during a given semester. Finally, the EPSB (Standards Board) will work with JCPS to assign the same Mentor Teachers to GSKyTeach graduates as they become new teachers and enter KTIP.

For the extra responsibilities assigned, the Mentor Teacher will receive a [redacted] stipend. Selection of Mentor Teachers will be the responsibility of JCPS in concert with the Master Teacher. Selection will be based on observed teaching skills, including communication of content, design of instruction aligned with state content standards, the use of diagnostic formative and summative assessments, multiple and appropriate instructional strategies, ability to collaborate with colleagues, and, most of all, the ability to produce learning with their students.

**University Graduate Course Instructor(s)**. The persons fulfilling this role in the GSKyTeach Program will be expected to (1) develop the capacity to model inquiry teaching and learning with teacher residents; (2) provide multiple representations of school applications related to key concepts they develop with teacher residents; (3) use formative assessments to gauge learning progress with teacher residents and give frequent feedback to improve their learning; (4) not only present teaching and learning concepts but also challenge teacher residents to expand their horizons to do "out of the box" thinking; and, (5) meet bi-weekly with Master Teachers and Mentor Teachers to inform them of current course content to suggest ways to reinforce and support each teacher resident's graduate study and clinical experiences.

**The Graduate Instruction and Clinical Experiences to be Provided to Participants in this Residency Program.** The 30-hour GSKyTeach program will be delivered via multiple methods (e.g. face-to-face or online) and will correlate with clinical experiences and mentoring processes adopted to guide teacher resident development. Below is a description of the nine courses that lead to certification and a Master of Arts in Education degree. Note that the prefix on the courses is SMED for specially designed pedagogy for **S**cience and **M**ath **Ed**ucation. Because GSKyTeach is an adaptation of the undergraduate SKyTeach, all nine courses are new and will be further developed through collaboration among WKU CEBS teacher educators, Ogden math and science faculty, and JCPS school practitioners and district staff. Therefore, the descriptions below should be considered as draft. Upon input from all project partners, the GSKyTeach program and course proposals will be submitted to WKU for adoption and to the Kentucky EPSB for approval as an alternative certification program. All instruction will be presented to the cohort as a whole and learning together will be in cohort structure. Subgroups of the cohort will be members of a learning community described under SMED 560.

**SUMMER Semester ▶ July-August--Prior to Start of School (9 hours)**

**SMED 501 Designing Instructional Sequences in Secondary Math and Science (3 hrs)**. This course will introduce GSKyTeach students to the foundational knowledge of science and mathematics content standards with a pedagogical perspective. The primary purpose is to develop the teacher resident's knowledge of and strategies for planning and teaching highly effective math and science lessons. Instruction in SMED 501 will focus on (1) what research says about how students learn science and mathematics; (2) understanding state and national standards for science and math; and (3) learning the science and math curriculum objectives of JCPS and their relationship to Kentucky's core content standards. Each teacher resident will work with university instructors and Master Teachers to design instruction for all learners and use pre-teaching, formative, and summative assessments. Teacher residents will experience actual teaching alongside Master Teachers at either the WKU Center for Gifted Studies' nationally renowned summer programs for gifted youth or the Governor's Scholars Program held in Louisville. Such opportunities will provide teacher residents with a rich experience working with gifted and talented students alongside exemplary science and math practitioners.

**SMED 510 Knowing and Learning Mathematics and Science (3 hrs).** It is the purpose of this course to enable teacher residents to understand deeply what it means to learn and know content and concepts of science and mathematics. Based on the primary source material in *How Students Learn* (Donovan & Bransford, 2005), teacher residents will learn to use the 5E – **E**ngage, **E**xplore, **E**xplain, **E**laborate, **E**valuate strategy as a learning cycle tool for inquiry teaching. They will interview peers engaged in solving a problem to determine how different teaching and learning strategies affect the degree to which people understand content in math and science at different knowledge levels. SMED 510 Instruction will focus on (1) the conceptual

framework for the 5E learning cycle and inquiry teaching and learning; (2) research on effective assessment for learning (Chappuis & Stiggins, 2002); (3) types of instruments appropriate and productive in pre-teaching, formative, and summative assessments and their use for designing and decision making in instructional design; (4) providing reflective feedback to students; (5) conceptual understanding of depth of knowledge; (6) the use of clinical interviews to uncover misconceptions and facilitate problem solving; and (7) alternative instructional strategies for different levels of learning, learning styles, temperaments, abilities, and special needs.

**SMED 520 Management for Positive Learning Environments (3 hrs).** The primary purpose of this course is to explore teacher-student interactions and their role in the management of instruction, time, space, materials, and supplies. Teacher residents will develop an understanding of best practices in classroom management to provide efficient and safe learning environments. Moreover, teacher residents will learn how to make learning equitable and effective for all students, regardless of cultural or language differences, home backgrounds, academic abilities, and/or special needs. Primary resources for this course will focus on culturally responsive classroom management, building community in classrooms, constructive communication with students, parents, administrators, and colleagues; and routines and rituals that support efficient and effective instruction, as developed in the JCPS Classroom Instructional Framework. Teacher residents will learn innovative uses of technology, coupled with curriculum, to build positive learning environments and support effective teaching and learning. More specifically, teacher residents will be given instruction, feedback, and resources to prepare for highly successful first days of school. They will peer teach typical school situations where they will be expected to manage effectively with helpful feedback from peers and instructors. The focus of SMED 520 instruction will include: (1) teaching students from diverse cultures and

backgrounds; (2) culturally responsive classroom management; (3) structures and processes to establish positive learning environments; (4) building a community of learners through collaboration with colleagues, administrators, and community patrons; (5) modifications in teaching to meet diverse needs of students, such as English language learners, students with disabilities, and students who are gifted in science and/or mathematics; (6) ensuring safety in science laboratories and regular classrooms; and (7) JCPS' Classroom Instructional Framework.

**FALL Semester ▶ August to December (10 hours)**

Teacher residents will work in a classroom alongside a trained Mentor Teacher four days per week. They will alternate between observing classroom interactions, preparing and teaching instructional sequences that are part of the JCPS curriculum framework, and reflecting on teaching and learning under the guidance of their Mentor Teacher. Initially, instructional sequences will be short but will increase in depth and complexity as teaching skills develop. Graduate course instruction and studies will occur outside school hours.

**SMED 530 Designing Instruction for Students with Special Needs and Promoting Literacy (3 hrs).** The goals of this course are (1) to develop an understanding of the diverse needs of the population described as "exceptional" and (2) to develop concepts of vocabulary, reading comprehension, and reading/study skills and develop strategies for instruction in the content areas of science and math. Teacher residents will prepare and teach math and science inquiry lessons with imbedded reading experiences that challenge, motivate, and actively involve all students in reading; and modifications to instruction for exceptional learners in the classroom. They will also learn about the JCPS math and science initiatives related to notebooking and developing student's abilities to write evidence-based claims. Teacher residents will be instructed on best practices for dealing with students with ADHD, autism, auditory and visual

impairments, language barriers, physical and emotional disabilities, and gifted and talented students. They will investigate cooperative learning, cultural diversity, innovative uses of educational technology, integrating literature into content area reading, inclusion and mainstreaming, effects of disabilities on families, the legal basis for special education (IDEA), and adaptations that provide the "least restrictive environment" for students with special needs.

**SMED 590 Teaching Internship (4 hrs)**. In this supervised internship in the classroom of a Mentor Teacher for the fall semester, teacher residents will not only observe and support the Mentor Teacher, but will also be provided structured co-teaching opportunities. Master Teachers will monitor teacher resident clinical experiences and will organize and monitor the PLC.

**SMED 589 Internship Seminar (3 hrs)**. Concurrent with SMED 590, this course connects theory to practice by completing teaching tasks that demonstrate performance in Kentucky's New Teacher Standards. This is accomplished through a Teacher Work Sample (TWS) that consists of completing seven teaching tasks in an instructional unit that teacher residents design based on JCPS curriculum and teach to their students before the end of the fall semester, while recording their work and learner results in a portfolio. The seven tasks are related to seven teaching processes that focus on student learning. They are (1) using student conceptions and context to design instruction; (2) identifying and writing measurable and student friendly learning goals aligned with Kentucky's core content standards; (3) designing an assessment plan that includes pre-, formative, and summative assessments with adaptations for students with special needs; (4) designing instructional strategies aligned with unit learning goals and assessments addressing appropriate depth of knowledge levels and learning options for all students; (5) using formative assessments during instruction to make sound decisions; (6) collecting and analyzing the learning results data of all students and appropriate "gap" groups;

and (7) reflecting on teaching and learning in the unit--describing what happened, explaining the results, and evaluating their own teaching performance. Moreover, teacher residents will analyze their teaching results and design an action research project together with the Mentor Teacher. Topics addressed include the code of professional ethics, the KTIP internship process, the TWS, collaborating with families and other professionals/agencies, and professional development.

**SPRING Semester ▶ January to May (10 hours)**

**SMED 591 Teaching Internship (4 hrs)**. During this supervised internship, the teacher resident is fully responsible for instruction in a secondary school math or science class for a minimum of six weeks. The Mentor Teacher and the Master Teacher will guide and coach the teacher resident in a manner that facilitates continuous improvement and development of teaching skills and abilities. The class(es) selected for the internship will reflect the likely teaching assignment residents will have during the following year as first-year teachers.

**SMED 560 Professional Learning Communities (3 hrs)**. Teacher residents will work in a professional learning community (PLC) to analyze student performance data in order to improve teaching and learning. The PLC will consist of teacher residents, Mentor Teachers, Master Teachers, at least one WKU faculty, and math and/or science teachers from other JCPS high-need schools. Working in the PLC will enable teacher residents to support each other throughout the year of internship and beyond by creating a network of professionals with whom they can consult. Data for PLC work will be derived from performance data of students in the teachers' classes and reflections on the lessons taught by the teacher residents. The PLC will be guided by *Learning by Doing: A Handbook for Professional Communities at Work* (Dufour, Dufour, Eaker, & Many, 2005). Principles of inquiry will be used to identify problems, plan solutions to improve instruction, and then design action research projects to be conducted by teacher

residents in their classes. Teacher residents will develop a conceptual framework for working in a PLC and apply their knowledge to participate and reflect on their experience in the PLC. With this effort, the teacher resident will be practicing principle 3 of the inquiry mode of reflecting on and managing their own learning. SMED 560 instruction will focus on (1) the rationale, structure, and processes of highly successful PLCs; (2) the rationale, purpose, and structure of action research; (3) processes for group analysis of data; (4) group developed, data-based plans for improving teaching and learning; (5) content literacy issues related to learning needs; (6) cultural and language issues related to learning needs; and (7) protection of human subjects and developing proposals for Institutional Review Board (IRB) consideration.

**SMED 620 Collaborative Research to Improve Mathematics and Science Teaching (3 hrs).** A co-requisite with SMED 560, the primary purpose of this course is to develop the skills and processes for the design and development of a data based action research project. After instruction in research design, validity and reliability issues, and statistical treatment of data, teacher residents will work under the direction of both their Master Teacher and their course instructor to design and develop a sound action research project to be implemented during the semester. Specific attention will be given to (1) the research question; (2) appropriate research design; (3) how data will be collected; (4) what teachers and students will be involved; (5) how data will be analyzed; (6) threats to internal and external validity; (7) FERPA and privacy issues; and (8) the proposal for IRB approval of the Action Research Project .

Instruction in this course will focus on research design (experimental, quasi-experimental, correlation, and quantitative research), the data collection processes, data analysis structures and processes, validity and reliability issues, structures for data reporting, and FERPA laws and requirements for privacy of individuals and IRB requirements.

## MAY TERM - (1 hour)

**<u>SMED 630</u> Action Research Seminar (1 hr)**. Teacher residents will present the findings of their action research project to the entire cohort, faculty, Mentor Teachers, and Master Teachers in a seminar setting. In their report, they will analyze and present the results of the instructional innovation that was implemented and develop a conclusion about the success and efficacy of the new practice or process that was implemented. SMED 630 will focus on (1) developing leadership skills with regard to the preparation of the research project presentation; (2) management of individual professional development as needs are identified by the research project findings and other coursework completed; and (3) development of plans for projects that will include colleagues, parents, and community members in ongoing action research related to teaching in the content area of specialization that teacher residents will enter the next fall.

At the end of the May term and the action research seminar, teacher residents will be awarded a Master of Arts in Education degree and be recommended to Kentucky's Professional Standards Board for provisional teaching certification and the Kentucky Teacher Internship Program.

**Table 4. Graduate SKyTeach Program Calendar of Events**

| | Summer | Fall | Spring | May Term |
|---|---|---|---|---|
| Monday-Thursday | SMED 501<br>SMED 510<br>SMED 520 | Teaching Internship<br>SMED 590 | Teaching Internship<br>SMED 591 | Monday-Wednesday<br>SMED 630 |
| Friday | | SMED 589<br>SMED 530 | SMED 560<br>SMED 620 | |
| | 9 Hours | 10 Hours | 10 Hours | 1 Hour |

**Table 5. Relationship of Program Objectives to Courses/Teacher Resident Expectations**

| GSKyTeach Objectives* | SMED Courses | Objective Related Assessments—"Students will …" |
|---|---|---|
| Designs standards-based teaching and learning | 501 520<br>530 589<br>590 591 | • Complete a Standards "Crosswalk"<br>• Write lesson plans aligned to JCPS & KY Content standards<br>• Design/teach unit that incorporates contextual factors |

| | | |
|---|---|---|
| Uses context to design instruction | 501 520<br>530 560<br>589 590<br>591 620<br>630 | • Design lessons according to KTIP protocol<br>• Engage in classroom observations and journaling, describing the contextual factors<br>• Design/teach unit that incorporates contextual factors<br>• Work with PLCs: identify contextual factors affecting learning<br>• Analyze results of action research to redesign instruction |
| Uses pre-, formative, and summative assessments | 510 520<br>560 589<br>590 591<br>620 630 | • Design pre-assessments, formative assessments, and summative assessments<br>• Design/teach unit with imbedded assessments<br>• Work with PLCs to design and utilize common assessments<br>• Utilize assessment results to plan reteaching/new instruction |
| Develops and uses instructional strategies for different students, purposes, and learning levels | 510 520<br>530 560<br>589 590<br>591 620 | • Design KTIP Lesson Plan for students with ability differences<br>• Work with PLCs to identify strategies for working with special needs students |
| Uses principles and processes of inquiry teaching and learning | 501 510<br>520 589<br>590 591 | • Design/teach KTIP Lesson Plan incorporating inquiry and depth of knowledge criteria<br>• Analyze lesson plans for inclusion of inquiry in teaching |
| Analyses data and reports learning results | 510 520<br>530 560<br>589 590<br>591 620<br>630 | • Design pre-assessment, formative assessment, and summative assessments<br>• Analyze student data and design a lesson/unit to address learning gaps that exist<br>• Share data with PLCs to plan common teaching/assessments<br>• Report results of Action Research Project |
| Reflects on and evaluates teaching and learning | 510 520<br>530 560<br>589 590<br>591 620<br>630 | • Reflect on peer-teaching in writing with suggestions for improvement<br>• Utilize results of assessments to reflect on teaching and plan for reteaching or enhancement<br>• Submit written analyses of observations of teaching in PLC |
| Uses technology for planning, implementing, and assessing instruction (new technology applications) | 501 510<br>520 530<br>589 590<br>591 620<br>630 | • Prepare and utilize technologies such as graphing calculators, probe ware, “clickers,” etc. in teaching<br>• Assess student use of learning technology<br>• Assess teaching and plan for reteaching/new instruction<br>• Prepare and utilize assistive technologies (special needs) |
| Provides instruction for literacy for math and science content | 501 530<br>589 590<br>591 630 | • Demonstrate strategies for literacy learning in all planning and teaching<br>• Prepare and utilize technologies to assist in literacy learning |
| Provides instruction for students with limited English speaking ability | 510 520<br>530 589<br>590 591 | • Design lessons for students with limited English abilities<br>• Demonstrate strategies for teaching ELL students |
| Provides instruction for students with disabilities | 501 520<br>530 589<br>590 591 | • Create/modify lesson plans for students with disabilities<br>• Demonstrate strategies for teaching students with disabilities |

*Aligned with Kentucky Teacher Standards, KTIP requirements, and EPSB initiatives

| | | |
|---|---|---|
| Builds and maintains a positive environment for learning | 520 530<br>560 589<br>590 591 | • Create plans for rules and procedures to conduct classes the first days of school<br>• Plan with PLC for department-wide and school-wide celebrations of learning<br>• Demonstrate strategies for positive learning environments |
| Demonstrates positive classroom management | 520 530<br>560 589<br>590 591 | • Submit written observations of classrooms identifying management strategies<br>• Create plans for successful first days of school<br>• Demonstrate strategies for maintaining positive learning environments |
| Collaborates with parents and other professionals for special needs of students | 520 530<br>560 590<br>591 620<br>630 | • Conduct parent and student conferences<br>• Design plans for meeting the needs of students of differing abilities |
| Self-assesses and manages own professional development | 589 590<br>591 620<br>630 | • Create teaching reflections in writing that address areas in need of improvement |
| Demonstrates teacher leadership | 560 589<br>590 591<br>620 630 | • Lead PLC meetings<br>• Lead Internship Seminar meetings<br>• Identify and conduct a collaborative project to improve student learning |
| Understands concepts and principles of research | 510 560<br>590 591<br>620 630 | • Create timeline of critical findings in research related to how people learn<br>• Identify research question using shared data with PLCs<br>• Write application for IRB approval of research plan |
| Demonstrates the ability to conduct an Action Research Project | 560 589<br>590 591<br>620 630 | • Identify "learning gaps" that exist and plan methods to address gaps<br>• Submit action research plan using data shared within PLC<br>• Conduct research with PLC |

*Aligned with Kentucky Teacher Standards, KTIP requirements, and EPSB initiatives

**Teacher Resident Recruitment and Selection**. Using various types of media, GSKyTeach teacher resident recruitment will be nationwide and one of the most important project activities. Recruiters will visit institutions within a 100-mile radius of Louisville, Kentucky, including those with graduates from underrepresented groups who reflect the JCPS student population. Both recent graduates with majors in science or math and midcareer professionals outside the field of education with strong content backgrounds will be sought. Because of the incentives in the residency program and the potential strength of GSKyTeach, we anticipate recruiting teacher residents with exceptional qualities for becoming a teacher. Program and graduate studies

admission requirements include a grade point average (GPA) of 3.0 or higher overall and in their major; a GRE writing score of 3.5 or higher; a GAP score (combination of GPA and GRE) of 2200 or higher; a passing Praxis score in their content area; a convincing application essay on why potential teacher residents believe they would make a good science or math teacher in high-need schools; and previous experience in programs that serve adolescents.

Selection of the 20-teacher cohort will be a three-step process. Step 1 will involve screening all applications for minimum admission requirements. In Step 2, a committee composed of JCPS staff and WKU faculty will review qualified applicants and select those who are the best 40 potential teacher residents. Applicants selected during this step will be subject to a background check. Step 3 will consist of an interview with a selection committee composed of four JCPS staff, one WKU Ogden representative, and one CEBS representative. Teacher residents or alternates will be selected based on consensual approval of JCPS and WKU representatives. At that time, selected participants will sign a contract that clearly delineates that they will receive a one-year stipend of [redacted] plus benefits, that upon program completion they agree to serve in a JCPS high-need school for an additional three years, and that they agree to repayment terms if they do not complete the program or the three-year teaching requirement. A description of the contractual obligations of the teacher resident agreement to serve for a minimum of three years in a JCPS high-need school, repayment penalties for teacher residents who fail to serve out their three years, and use of repayments is presented in Appendix D3.

**The Two-Year Induction Program**. As was mentioned earlier, the Education Professional Standards Board (EPSB) will partner with the residency program in the first year of induction. EPSB operates the Kentucky Teacher Internship Program (KTIP) for all first-year teachers. A three-member Assistance and Assessment Committee (consisting of the school principal, a

resource teacher who is paid for extra services by EPSB, and a university faculty member) meets with the first-year teacher at least four times and each member makes three classroom observations. First-year teachers must complete ten teaching tasks that relate to the GSKyTeach objectives on pages 25 - 27 of this proposal. The resource teacher mentors the new teacher in producing ten teaching exhibits in three areas: classroom interaction – three tasks; professional responsibilities – 3 tasks; and the design, implementation, and evaluation of a unit of instruction – 4 tasks. The resource teacher mentors the first-year intern and the committee meetings are to check progress and evaluate the intern on performance relative to Kentucky's Ten Teaching Standards. In the residency program, the KTIP resource teacher will be the teacher resident's mentor from GSKyTeach and the university member will be a GSKyTeach faculty. In addition to the KTIP teaching tasks, the GSKyTeach graduate and his/her committee will have student achievement data from the teacher resident preparation year. This data will be collected and processed by Edvantia and fed back in a user-friendly format. Then, with the guidance of the committee, the first-year teacher will learn to use real student data for improvement of instruction.

The second year of induction will be a continuation of year one but will focus on increasing the new teacher's capacity to produce learning with all students. Instead of the ten teaching tasks of KTIP, a self-managed and committee-guided professional growth plan toward specific objectives will be the focus. Again, student data from the New Teacher's first year of teaching will be collected and processed by Edvantia and provided to the second-year teacher and his/her Assistance and Assessment Committee for improvement of instruction. In year two of the induction, the new teacher Assistance and Assessment Committee will be the school principal, a GSKyTeach faculty member, and a JCPS master teacher who will replace the mentor teacher of

induction year one. The three Committee members will use the New Teacher Center Mentoring Model with second-year teacher growth toward producing higher levels of achievement with all students.

**Continuation of the Residency Program beyond the Five years of the Project and the Size of Cohorts**. In collaboration with JCPS, WKU has assessed the ability to continue GSKyTeach as an ongoing program to prepare math and science teachers for Louisville's high-need schools. Based on living standards in Jefferson County, it was determined that a living wage should be [redacted] per year plus benefits (approximately an additional [redacted]), which is approximately [redacted] for salaries per year for a cohort of 20. The planners decided that a realistic plan for the future would include support for 10 teacher residents annually through local funds from various sources, including scholarships. Of course, with a recovered economy and recognition of the success of GSKyTeach, more than 10 residents could be supported annually. However, planners projected what they were confident could be sustained beyond federal funding. Thus, in consideration of the initial need for high-quality math and science teachers in JCPS and in light of what could be supported and sustained, it was decided that the size of cohorts should be 20 for cohort 1, 15 for cohort 2, 10 for cohort 3, and 10 for each cohort in subsequent years.

**Training of Master Teachers and Mentor Teachers.** Because both inquiry teaching and learning and the New Teacher Center Model of Mentoring are two bodies of knowledge and practice that are new for most Master Teachers and Mentor Teachers, training for these will be ongoing throughout the school year via scheduled sessions of instruction and on-the-job coaching by WKU faculty trainers. For the first project year, an additional two days of intense training for inquiry teaching and learning and two days for mentoring will be scheduled,

followed by coached practice sessions to insure that all Mentor Teachers are prepared to work immediately with the first cohort of teacher residents. Both Master and Mentor Teachers will manage their professional development and request instruction or clinical coaching as needed.

**Training of Other Math and Science Teachers in High-Need Schools**. Following the close of school, training workshops for all math and science teachers will be scheduled as requested or needed by JCPS staff. WKU faculty will conduct workshops on the following topics: (1) inquiry teaching and learning; (2) mentoring new teachers; (3) use of student work to diagnose needs; (4) assess learning; (5) strategies and processes of formative assessment; (6) teaching literacy in science and math; and (7) teaching students with special needs. Trainer costs and travel to Jefferson County will be in-kind contributions to the project.

**Training of New Teachers in JCPS other than Residency Teachers**. A component of assistance for new teachers completing KTIP tasks is instruction in teaching skills and processes required by Kentucky's teacher standards. WKU has developed 14 web-based instructional modules that focus on specific KTIP teaching tasks. These will be available to all new teachers in JCPS with some person-to-person assistance and mentoring.

## **Part II – SIGNIFICANCE** (20 Points)

**Producing System Change and Improvement**. **First**, this project will change the way math and science teachers are prepared. The GSKyTeach program, like the pre-baccalaureate SKyTeach, not only prepares teachers to use the principles of inquiry teaching and learning but also prepares them to use inquiry-based strategies with the specific math and science content in the high-need school's curriculum. **Second**, this project will change and improve the induction of new teachers. Having trained Mentor Teachers who use the New Teacher Center model in working with new teachers for two years builds the capacity of JCPS. **Third**, preparing 55 new

math and science teachers, with more to come, for high-need schools for at least three years should greatly improve student math and science achievement. Each year, 7,000 students in high-need schools now performing at low levels will be taught to use inquiry learning and the research-based principles that improve achievement. **Fourth**, the GSKyTeach program will establish an innovative alternative certification program to attract, prepare, and place teachers from under-represented populations who have math or science content backgrounds but no teacher preparation. This will be a change and improvement both for WKU and JCPS.

**Building Local Capacity and Providing Expanded Services to Address the Needs of High-need Schools in JCPS**. **First**, this project will place a significant number of high-performing new math and science teachers in the lowest performing high schools and guarantee their services for three or more years. By the end of the project resources, 55 inquiry-trained and mentored new math and science teachers will be affecting the performance of nearly 7,000 students each year. **Second**, by the close of this project, 55 Mentor Teachers will be prepared to model and mentor other new teachers in research-based teaching strategies recommended by the National Research Council of the Academy of Sciences. **Third**, other math and science teachers in JCPS's 14 high-need schools will have received professional development in specific math and science teaching strategies o improve the performance of their students. **Fourth**, by 2014, four Master Teachers will be highly prepared and experienced to work with teachers and school leaders to improve science and math instruction. JCPS will have doubled the number of Master Teachers – called Resource Teachers in JCPS – in math and science.

**Importance and Magnitude of the Outcomes of the Proposed Project**. **First**, the potential of improving teaching and learning in math and science for the 7,000 students each year taught by the 55 teacher residents prepared and placed in high-need high schools is great.

However, the plan of continuing the residency program after project support makes both the importance and magnitude even greater for Jefferson County, Kentucky. **Second**, this project enables WKU to establish a new alternative certification program that far exceeds the intensity, quality, and preparation for the teacher residents prior to taking over a classroom relative to other alternative certification programs at Western or in Kentucky. **Third**, GSKyTeach is an expansion of the pre-baccalaureate SKyTeach at WKU and UTeach in Texas. UTeach has proven highly successful in increasing ten-fold the number of math and science teachers produced and increasing retention by 30 percent. As a graduate version of this successful program, GSKyTeach will serve as a national demonstration of how to translate the successful qualities of UTeach within the context of an alternative teacher certification program. **Fourth**, GSKyTeach, as a residency program, is an innovation that responds directly to national and Kentucky's STEM initiatives, recruits, and prepares teachers from a new group of potential candidates.

**Potential for Continued Support of GSKyTeach in JCPS after the Project Ends**. **First**, the potential for continuation is great because it has been collaboratively planned by WKU and JCPS project developers with the support of both administrations. In the management work plan, a fifth cohort is recruited before the project ends with plans to complete the residency program for cohort five after September of 2014. **Second**, residency program begins with 20 teacher residents per cohort that is reduced to 10 per year for the fourth and fifth cohort, a level that both WKU and JCPS believe sustainable without Teacher Quality grant support. Thus, the design for continuation is realistic. **Third**, GSKyTeach is a very important extension to WKU's SKyTeach and contributes to WKU and Kentucky's STEM initiative. Recently, WKU received a [redacted] Robert Noyce grant from the National Science Foundation for scholarships for SKyTeach, the undergraduate program. It is highly likely that WKU will obtain program scholarships for

GSKyTeach if it is shown to be as successful as its predecessor. **Fourth**, WKU presently does not have an urban school system as a laboratory with clinical experiences for teacher residents. This program will establish a major presence in JCPS that both WKU and the school system want to sustain.

## **Part III – MANAGEMENT PLAN** (15 Points)

The ten objectives of the project are about (a) recruiting and preparing new math and science teachers and building their capacity to be effective in high-need high schools (Objectives 1-3); (b) building the capacity of experienced school practitioners to be more effective in high-need high schools (Objectives 4 and 5); and (c) reforming teacher preparation (Objectives 6-10). The primary vehicles for effective improvement are an innovative inquiry-based program GSKyTeach and a results-based mentoring process. A partnership project team to monitor and ensure project progress will consist of the following members with the following defined responsibilities:

- Executive Director – monitors overall program administration and progress
- GSKyTeach Education Co-director – develops/coordinates pedagogy in the graduate studies (GSKyTeach) portion of residency program
- GSKyTeach Math/Science Co-director – coordinates math and science content integration in the graduate studies (GSKyTeach) portion of residency program
- Clinical Experiences Co-director – coordinates/monitors all clinical experiences to align with the residency program objectives
- Two Master Teachers – arrange teacher resident clinical experiences, model inquiry teaching and learning, and organize/monitor PLCs at each high-need school
- The JCPS Data Provider – collects/organizes student and teacher data for Edvantia

The members of the partnership project team all are experienced professionals with excellent performance records. The designated Executive Director directed a highly successful 1999-2005 Teacher Quality Project with an eleven-university partnership. The designated GSKyTeach Education and Math/Science Co-directors already co-direct SKyTeach, WKU's highly innovative pre-baccalaureate preparation program. The Education Co-director served for some time as the coordinator of the Vanderbilt Graduate Teaching Fellows program, as well as serving as Nashville Public Schools' Science Coordinator. The Math/Science Co-director has served as a consultant and conducted research related to pedagogical challenges in STEM disciplines. The Clinical Experiences Co-director is the director of Analytical, and Applied Science in JCPS and was formerly Assistant Superintendent for Curriculum and Instruction of Boston Public Schools. The Master Teachers employed in this project will be selected from the ranks of JCPS' best, experienced model teachers and practitioner leaders. The JCPS Data Provider is the Director of Accountability, Research, and Planning and has data analysts and research specialists to assist with data collection. Such team member expertise and experience increase the probability of successfully meeting program objectives and impacting student learning in high-need schools.

In addition, other important contributors to program success are the graduate university faculty who will provide instruction to teacher residents and Mentor Teachers who will host and provide rich classroom experiences for teacher residents. Other key supporting players are

- *Edvantia* - "third party" formative and summative assessment/evaluator; an education research and development not-for-profit corporation, Edvantia partners with educators, agencies, and service providers to improve learning and advance student success
- *Center for Parent Leadership* – providing training on communicating with parents

- *Kentucky Education Professional Standards Board* – providing resources for the first year of induction for new teachers (KTIP)

The project will include an Executive Advisory Board (Board) consisting of heads of project partners: (1) Dean of WKU's College of Education and Behavioral Sciences, (2) Dean of WKU's Ogden College, (3) Superintendent of Jefferson County Public Schools, (4) Executive Director of the Prichard Committee (parent organization for the Center for Parent Leadership), and (5) Executive Director of Kentucky Education Professional Standards Board. The Board will meet three times each year (October, February, and July) to review data on the progress and products of the project supplied by Edvantia, our third party evaluator. These meeting times coincide with recurring phases of the project: recruitment, selection, and startup; full implementation; and completion (graduation, certification, and employment) of each cohort cycle. The Board will provide recommendations about continuation of successful practices and potential improvement where needed. Board members also will keep partner leaders informed and involved in combined efforts to improve the quality of teaching and learning for students.

Below is a project work plan of the start-up and following four years showing activities, timelines, persons involved, persons responsible, and alignment to project objective.

**Table 6. Start-Up Year - Work Plan Year 1 (October 1, 2009 – September 30, 2010)**

*Legend ► Executive Director-**ExDir**; Education SKyTeach Co-director-**ESD**; Math/Science SKyTeach Co-director-**MSD**; Clinical Experiences Co-director-**CED**; Master Teacher-**MAT**; Mentor Teacher-**MET***

| Activity | Project Objective | Timeline | Person(s) Involved | Person(s) Responsible |
|---|---|---|---|---|
| Project team organization and responsibilities | 1 – 6 | 10/15/09 – 12/15/09 | ExDir, ESD, MSD, CED, JCPS Staff | ExDir |
| Recruitment and selection of math and science Mentor Teachers (MET) | 1 – 6 | 10/15/09 – 12/15/09 | CED, JCPS Science Coordinator, JCPS Math Coordinator, ESD, ExDir | CED |
| Recruit residency program teacher residents | 1 | 11/15/09 – 04/15/10 | CED, ESD, MSD, MATs | CED |
| Employment of math and science Master Teachers (MAT) | 1 – 6 | 01/01/10 | CED, ExDir | ExDir |

| | | | | |
|---|---|---|---|---|
| Orient WKU faculty to JCPS math and science programs | 1 – 6 | 01/01/10 – 03/10/10 | MATs, CED, WKU faculty, ESD, MSD | CED |
| Advisory Board meets | 7 | 02/15/10 – 03/15/10 | Ogden Dean, CEBS Dean, Supt of JCPS, Chair of Prichard Committee, EPSB Executive Director, TQ Project staff | ExDir |
| Orient JCPS staff to GSKyTeach | 1 - 6 | 03/01/10 – 06/15/10 | EST, MSD | ESD |
| Train Mentor Teachers (20) Inquiry Teaching and Learning Mentoring Model | 5 | 04/01/10 – 06/15/10 | ESD, MSD, MATs, WKU trainer | ESD |
| Select residency teacher residents (20) | 1 – 6 | 04/15/10 – 06/15/10 | JCPS Staff, CED, ESD | JCPS staff |
| Prepare for summer graduate studies | 1 – 6 | 05/15/10 – 06/15/10 | ESD, MSD, WKU faculty | ESD |
| Employ 20 teacher residents | 1 | 07/01/10 | ExDir | ExDir |
| Summer training – 3 graduate courses | 2,3 | 07/01/10 – 08/15/10 | WKU Faculty, ESD, MSD, CED, MATs, METs, Teacher Residents | ESD |
| School start up JCPS | 2 | 08/10/10 – 08/15/10 | JCPS staff, MATs, METs, Teacher Residents, ESD, CED | CED |
| Arrange for clinical experience in JCPS for teacher residents | 2,3 | 09/01/10 – 10/15/10 | MATs, JCPS staff, JCPS teachers | MATs |
| Organize learning communities | 2 | 09/15/10 – 10/15/10 | MATs, JCPS teachers and principals | MATs |
| Online parent communication and involvement training | 2 | 08/15/10 – 10/15/10 | Teacher Residents, MATs, Parent Training Institute | MATs |
| Conduct graduate studies for fall semester | 2,3 | 09/15/10 – 12/15/10 | WKU faculty, Teacher Residents, MATs, ESD | WKU faculty ESD |

| **Table 7. Work Plan Year 2- 5 (October 1, 2010 – September 30, 2014)** | | | | |
|---|---|---|---|---|
| Activity | Project Objective | Timeline | Person(s) Involved | Person(s) Responsible |
| *Note: Since project activities from October 1 (start of project year) to September 30 (end of project year), Years 2 through 5 are recurring, only one set of activities is listed.* *Induction Year I (KTIP) begins September 2011 and Induction Year II begins September 2012.* | | | | |
| Advisory Board meets | 7,10 | 10/15-10/30 | Ogden Dean, CEBS Dean, Supt of JCPS, Chair of Prichard Committee, EPSB Executive Director, TQ Project staff | ExDir |
| Recruit teacher residents for cohorts 2-4 | 1 | 11/15–04/15 | CED, ESD, MSD | ESD |
| Collect and report mid-term teacher and/or student data | 7,8 | 11/15–12/15 | JCPS Data Provider, Edvantia | Edvantia |

| | | | | |
|---|---|---|---|---|
| Conduct graduate studies spring semester for cohorts 1- 4 | 2,3 | 01/03–05/15 | WKU Faculty, MATs, METs | WKU faculty |
| Arrange for clinical experiences spring semester cohorts 1-4 | 2,3 | 01/01–02/01 | MATs, METs | |
| Collect and report mid-term teacher and/or student data | 7,8 | 01/15-02/15 | JCPS Data Provider, Edvantia | Edvantia |
| Monitor PLC | 2 | 01/03–05/15 | MATs, METs | |

| | | | | |
|---|---|---|---|---|
| Advisory Board meets | 7,10 | 02/1 – 03/01 | All partner leaders, Project staff | ExDir |
| Prepare for summer training and graduate studies | 1 – 6 | 04/01–06/03 | WKU Faculty | ESD |
| Recruit and select METs for new cohort | 1 – 6 | 03/01–05/30 | MATs, JCPS staff, CED, ESD | CED |
| Train new Mentor Teachers for next cohort | 5 | 04/10–06/15 | MATs, CED, EST, MSD, WKU faculty | CED |
| Wrap-up residency program for cohort – recommend for Induction I KTIP cohort 1-4 | 1 | 05/01–05/30 | MATs, ESD, MSD | ESD<br>MSD |
| Wrap-up Induction I KTIP for last year's cohort 2-4 | 1,6 | 05/01–05/15 | MATs, KTIP committee, WKU faculty, CED | CED<br>ESD<br>MSD |
| Wrap-up Induction II cohorts 3, 4 | 1,6 | 05/01-05/30 | Principal, MAT, WKU faculty | MATs<br>ESD<br>MSD |
| Professional development for JCPS teachers | 4 | 05/15-06/30 | WKU faculty, ESD, MSD, CED | ESD<br>MSD |
| Employ teacher residents for next cohort | 1 | 07/01 | ExDir | ExDir |
| Summer training graduate studies next year's cohort | 2,3 | 07/01-08/15 | WKU faculty, ESD, MSD, CED, MATs, New Mentor Teachers, New Teacher Residents | ESD<br>MSD |
| Advisory Board meets | 7,10 | 07/01-07/15 | Ogden Dean, CEBS Dean, Supt of JCPS, Chair of Prichard Committee, EPSB Executive Director, TQ Project staff | ExDir |
| School start-up for next cohort | 2 | 08/10-08/25 | JCPS staff, Next cohort, CED, Teacher Residents, MATs | CED |
| Conduct graduate studies fall semester for next cohort | 2,3 | 09/01-12/15 | WKU faculty, MATs | WKU faculty |
| Arrange for teacher resident clinical experiences | 2,3 | 09/01-10/15 | CED, MATs | CED |
| Organize learning communities | 2 | 09/15-11/01 | CED, MATs | CED |
| Kick off Induction I KTIP | 1,3,5,6,8 | 09/15-09/30 | KTIP committee, MATs, CED | CED |

| | | | | |
|---|---|---|---|---|
| for last year's cohort | | | | |
| Kick off Induction II cohort in training 2 years ago | 1,3,5,6,8 | 09/15-10/15 | Principal, MAT, WKU faculty | WKU faculty |
| Collect and report annual teacher and/or student data | 7,8 | 09/15-10/15 | JCPS Data Provider, Edvantia | Edvantia |
| Training for cohort in parent communication and involvement strategies – 2 day plus follow-up all year | 2 | 08/15-10/30 | Commonwealth Parent Leadership, New cohort Teacher Residents, MATs | MATs |

**Work Plan for Objectives 9 and 10**. The work plan for Objectives 9 and 10 is not as complex as for other objectives and is described as follows. Institutionalizing GSKyTeach as an approved graduate program at WKU and advertised as a teacher preparation option (Objective 9) requires moving the new program through six WKU committees for approval. WKU faculty will prepare program and course descriptions by January 2010, and the Dean of Education will guide the program through the complete WKU approval system by May 2010. Once approved by all WKU committees, GSKyTeach will be submitted to Kentucky's Education Professional Standards Board in May of 2010 and become a state-approved alternative certification program by fall of 2010. The work plan for using lessons learned in GSKyTeach (Objective 10) also is simple but important. In September of each year, it will be the responsibility of the Executive Director of this project to report outcomes and lessons learned from GSKyTeach to WKU School of Teacher Education faculty for consideration of how elements of GSKyTeach can improve other WKU teacher preparation programs. It will then be the responsibility of program leaders to work with faculty to incorporate successful elements in programs as appropriate and the Dean of Education to ensure that processes for incorporating lessons learned are completed.

## Part IV - PROJECT EVALUATION (25 Points)

Edvantia will evaluate the GSKyTeach project by applying a combination of descriptive and comparative designs. For the primary research focus on outcomes, evaluators will employ a quasi-experimental repeated measures design with a matched comparison group to assess the

extent to which GSKyTeach participants demonstrate differential outcomes in classroom practice, student achievement (Competitive Preference Priority 1), and employment retention. A naturalistic, or observational, design will be used to examine Master and Mentor Teachers' preparation and practices, training all math and science teachers in high-need schools receive to use inquiry-based teaching and learning, school performance and district-wide teacher retention, and changes in policy or practice that support or inhibit program sustainability.

GSKyTeach will target new teacher candidates who have baccalaureate degrees in math and science (i.e., demonstrated content knowledge) and will provide them with rigorous training and rich experiences in pedagogy and content-related classroom practice. Although project staff anticipate that activities will ultimately contribute to improved student learning (see, for instance, Holland, 2005), detecting those long-term impacts will require several years. Thus, the evaluation questions align not only with the TQP program's GPRA measures and project objectives but also with the TQP short-term performance measures. These eight evaluation questions can be used to generate both formative and summative data for the GSKyTeach project (the GPRA, short-term performance measure [STPM], or objective [Obj.] with which each aligns is noted in parentheses).

1. To what extent is each component of GSKyTeach implemented as planned? (Obj. 10)
2. What changes to GSKyTeach (and its components) are made during implementation and for what reasons? (Obj. 10)
3. How well are Master and Mentor Teachers prepared to support GSKyTeach participants through the NTC Mentoring Model? (Obj. 5)

4. How are teacher achievement (e.g., on certification/licensure assessments, in graduate degree attainment) and performance affected by participation in GSKyTeach and the two-year induction program? (GPRA 1 and 3; STPM 1; Obj. 1, 2, 3, and 6)
5. To what extent are all teachers in Jefferson County's high-need high schools provided training to build capacity for inquiry-based teaching and learning? (Obj. 4)
6. To what extent does participation in GSKyTeach influence teachers' retention 1, 2, and 3 years into their teaching careers? (GPRA 2; Efficiency Measure; STPM 2; Obj. 1 and 8)
7. To what extent does GSKyTeach produce diverse, highly qualified teachers who teach in areas of critical need (i.e., math and science in high-need high schools)? (Obj. 1 and 8)
8. To what extent are GSKyTeach participants trained in the effective use of technology in the classroom and to improve student achievement?
9. What influence does GSKyTeach participation have on student performance? (Obj. 7)
10. To what extent is part or all of the GSKyTeach program incorporated into WKU training or induction programs and Jefferson County Schools' standard operating procedures? (Obj. 9)

***Formative evaluation***. The evaluation will focus both on outcomes assessment and formative evaluation for program improvement. As evidenced by evaluation questions 1 and 2 above, attention will be paid (and data gathered) to determine the extent to which the project is progressing according to its time line and objectives. All data collected as part of the evaluation will have both summative and formative purposes—the outcomes from cohort 1, for instance, will help inform improvements to the program for later cohorts. The evaluators will feed back data informally as results are analyzed; formally, the evaluators will provide summaries of findings and make recommendations regarding program implementation and improvements three

times yearly to coincide with Advisory Board meetings. The formative evaluation will serve as an integral component to address Objective 10: lessons learned.

***Matched Comparison Group***. With the assistance of project and JCPS staff, evaluators will select a matched sample of new (first 2 years) high school math and science teachers to serve as a comparison group. The matched teachers will be graduates of traditional teacher preparation and certification programs who are hired to teach in JCPS. They will be matched with GSKyTeach completers, to the extent possible, on degree attainment and demographic characteristics. Both groups will be followed during first two years of teaching.

**Data Collection.** A variety of methods will be used to evaluate the GSKyTeach project, including surveys, interviews, observations, extant data, documents/records, and policy reviews. Triangulating data through multiple methods will provide a more comprehensive picture than can be obtained by using only one method (Brewer & Hunter, 1989). Further, the strengths of each method will compensate for weaknesses in others, ultimately providing a stronger, more rigorous evaluation. Table 8 displays the alignment of data collection methods with evaluation questions; it further lists preliminary planned analyses. Data collection methods are described below.

**Table 8: Alignment of GSKyTeach Evaluation Questions with Key Measures, Data Collection Methods, and Preliminary Analyses**

| Evaluation Question | Alignment | Data Collection | Preliminary Analysis |
|---|---|---|---|
| **1.** To what extent is each GSKyTeach component implemented as planned? | Obj. 10 | • Project records / Annual Performance Report | Descriptive<br>Comparative[a] |
| **2.** What changes to GSKyTeach (and its components) are made during implementation? For what reasons? | Obj. 10 | • Project records / reports | Descriptive |
| **3.** How well are Master and Mentor Teachers prepared to support GSKyTeach participants through the NTC Mentoring Model? | Obj. 5 | • Master and Mentor Teacher interviews | Descriptive |

| | | | |
|---|---|---|---|
| **4.** How are teacher achievement (e.g., certification assessments, graduate degrees) and performance affected by participation in GSKyTeach and the two-year induction program? | GPRA 1, 3, STPM 1 Obj. 1, 2, 3, 6 | • Project records (i.e., standard WKU teacher candidate data, including degrees, certification assessment, KTIP scores) | Descriptive Comparative[b] |
| **5.** To what extent are all math and science teachers in Jefferson County's high-need high schools provided training to build capacity for inquiry-based teaching and learning? | Obj. 4 | • Classroom observations<br>• Math and science teacher survey<br>• School-level CATS Science and Math scores | Descriptive |
| **6.** To what extent does participation in GSKyTeach influence teachers' retention 1, 2, and 3 years into their teaching career? | GPRA 2, EM, STPM 2 Obj. 1, 8 | • Project / JCPS records<br>• GSKyTeach Interviews | Descriptive Comparative[b] |
| **7.** To what extent does GSKyTeach produce diverse, highly qualified teachers who teach in areas of critical need (i.e., math and science in high-need high schools)? | Obj. 1, 8 | • Resident demographics<br>• Classroom observations<br>• Project records (including TWS scores, KTIP task scores and completion) | Descriptive |
| **8.** To what extent are GSKyTeach participants trained in the effective use of technology in the classroom and to improve student achievement? | | • Classroom observations<br>• Interviews<br>• Project records (e.g., scores on course tasks related to technology) | Descriptive |
| **9.** What influence does teacher participation in GSKyTeach have on student performance? | Obj. 7 | • ACT Educational Planning and Assessment System (EPAS) student scores on the EXPLORE, PLAN and ACT<br>• JCPS Core Content Assessment (CCA) scores | Descriptive Comparative[b] |
| **10.** To what extent is part or all of the GSKyTeach program incorporated into WKU training or induction programs and Jefferson County standard operating procedures? | Obj. 9 | • JCPS and WKU policies, documents<br>• Project records | Descriptive |

*Note.* GPRA: Government Performance and Results Act measures; STPM: Short-term Performance Measure; EM: Efficiency Measure; Obj.: project objective.
a. Comparisons will be based on analyses of the project as planned and the project as implemented.
b. Comparisons will be based on analyses of GSKyTeach participants and matched comparison teachers.

***Project Records***. Data collected as a regular part of WKU's teacher preparation programs in general and GSKyTeach in particular will be used as part of the evaluation as will project implementation data maintained by the project leader. Specifically, recruitment effort documentation, retention of teacher candidates in the program and in the teaching profession, teaching internship school placement and ratings, bi-weekly meeting attendance and minutes, collaborative assessment logs, professional development records and records of coaching by WKU faculty for Master and Mentor Teachers, documentation of individualized second-year induction processes, number of and participation in math and science training workshops at high-need high schools, participation of new JCPS math and science teachers who are non-GSKyTeach residents in WKU's 14 instructional modules that focus on KTIP teaching tasks, and other such data will be used for the evaluation of the project.

***GSKyTeach Teacher Data***. Standard data such as basic teacher qualification, certification, and demographic information will be collected by project staff and used for both project and evaluation purposes. The evaluation team will gather as extant data the assessments embedded in the GSKyTeach and KTIP programs. Grades on assignments aligned to each GSKyTeach Objective (see Table 5) and Teacher Work Sample scores will be incorporated into the project evaluation. The evaluators will obtain the GSKyTeach residents' licensure exam scores and the Kentucky Teacher Internship Program Intern Performance Record (IPR) scores, which are completed as part of the teacher candidate process and are based on multiple reviews of lesson and assessment plans, interviews, contextual information, and observations. The IPR assesses teacher performance against nine Kentucky Teacher Standards: (1) Demonstrate applied content knowledge, (2) design and plan instruction, (3) create and maintain a learning climate, (4) implement and manage instruction, (5) assess and communicate learning results, (6) demonstrate

the implementation of technology, (7) reflect on and evaluate teaching and learning, (8) collaborate with colleagues/parents/others, and (9) evaluate teaching and implement professional development. These data will be obtained by the evaluation team during the course of the candidates' residency and induction years, as they occur in the preparation sequence.

***Institutional Documents, Records, and Policies***. The evaluation team will record the outcome of the submission of the GSKyTeach program and courses to WKU for adoption and to the Kentucky EPSB for approval as an alternative certification program. In addition, formal incorporation of elements of the GSKyTeach model (e.g., NRC Inquiry-based Model of Teaching and Learning, NTC induction model) into JCPS' district practices.

***Classroom Observation Data***. Effective management and instructional behaviors of the teacher are important prerequisites to positive student outcomes. Therefore, the evaluation team, well trained in several observation protocols, will conduct ongoing rounds of classroom observations. Classroom observation data will be collected on the GSKyTeach teachers, matched comparison new teachers, and other math and science teachers at the high-need high schools in which the GSKyTeach graduates are placed. The Science Management Observation Protocol (SMOP; Sampson, 2004) and Reformed Teaching Observation Protocol (RTOP; Piburn et al., 2000) will be used for observing physics and chemistry classrooms; in math classrooms, the RTOP and a modified version of the SMOP will be used. The SMOP is designed to assess management issues related to inquiry-based science instruction, including (1) classroom characteristics and routines, (2) use of time and transitions, (3) collaboration among students, (3) safety, and (4) care and use of materials. The RTOP measures (1) lesson design and implementation, (2) propositional pedagogic knowledge, (3) procedural pedagogic knowledge, (4) communicative interactions, and (5) student/teacher relationships. The GSKyTeach residents

will be observed by evaluators twice during their spring teaching internship (SMED 591) and four times (2x fall / 2x spring) during each of their two induction years. Matched comparison teachers and math and science teachers in the high-need schools where the GSKyTeach graduates teach will be observed on the same schedule as the GSKyTeach graduates. Both observation protocols have been validated in previous studies. To the extent possible and relevant, the JCPS Classroom Instructional Framework (CIF) essential components will be addressed in the final observation protocols used for this third-party evaluation.

***Math and Science Teacher Survey***. Edvantia will administer an online survey to math and science teachers in the 14 high-need high schools during the spring of years 2-5 of the grant. The survey will focus on professional development, preparedness, and efficacy beliefs related to inquiry-based teaching. Items from the "Inquiry-based Instruction in Secondary Science Classrooms: A Survey" (IISSC; Gejda & LaRocco, 2006) will form the core of the survey, with additional items added that relate to other constructs central to GSKyTeach. The IISSC, which is easily adaptable for math teachers, measures teacher self-reported frequency of use of inquiry strategies based on the 5E learning cycle tool (Donovan & Bransford, 2005). The IISSC also contains questions relating to factors influencing inquiry-based instruction. In addition, efficacy beliefs will be assessed using an adaptation of the "Self-efficacy Teaching and Knowledge Instruction for Science Teachers" (SETAKIST; Roberts & Henson, 2000), a 16-item instrument that measures teaching efficacy and knowledge efficacy.

***Interviews***. Two sets of interviews will be conducted annually to gather perceptual data on GSKyTeach. Master and Mentor Teachers will be interviewed regarding their capacity-building efforts, perceived impacts, and needed supports at the GSKyTeach participant and school-wide levels. Each cohort of GSKyTeach participants will be interviewed using a mix of semistructured

and structured questions to garner perceptual data on the GSKyTeach courses, mentoring, and preparedness for teaching in general and inquiry-based science/math instruction in particular.

***Student Achievement Data***. Several types of student performance data will be collected to examine both GSKyTeach graduates' impact on students over time and their impact versus that of the matched comparison teachers. Scores on the Jefferson County Schools Core Content Assessments (CCAs), which are classroom benchmark assessments, will be collected on students of the GSKyTeach graduates, matched comparison teachers, and other math and science teachers in the schools in which the GSKyTeach graduates are placed. Each student's scores will be aggregated into one score per student, then aggregated to the teacher level so that they may be analyzed across groups and over years. The evaluation team will examine trends in PLAN and ACT scores in the high-need high schools before and after placement of GSKyTeach graduates. At a broader level, the CATS Science and Math Index scores for each high-need high school in which GSKyTeach graduates work will be examined longitudinally, starting three years prior to cohort 1's first induction year.

Evaluation staff will conduct interviews and classroom observations. Project staff and the JCPS Data Provider will upload the other data relevant to the evaluation to a secure Web portal. Evaluators will ensure reliability and validity in data collection through training (as needed) and ongoing, candid communication with GSKyTeach project staff, WKU faculty, JCPS research staff, and teachers. The data collected through evaluation efforts will be used formatively to adjust and refine project activities. Ultimately, the data will be used to gauge the extent to which project participants and stakeholders accomplish the stated goals and objectives (summative evaluation). Table 9 displays project goals, objectives, and tentative project benchmarks. These benchmarks will be finalized in collaboration with project and JCPS staff.

***Institutional Review Board***. As part of its commitment to protect the rights of all evaluation participants, Edvantia requires its evaluators to submit all evaluation protocols and instruments to the Institutional Review Board (IRB) for review and approval before data collection begins. Any changes in initially approved plans must also be accepted by the IRB.

| **Table 9: *GSKyTeach* Project Goal, Objectives, and Annual Performance Targets** | |
|---|---|
| **Project Goal**<br>Increase the achievement of all students in math and science for high-need middle and high schools in Jefferson County as measured by Kentucky's state assessments and assessments of the Education Planning Assessment System (EPAS)—Explore 8th grade, Plan 10th grade, and ACT 12th grade. | |
| **Objective** | **Targets (*Benchmark*)** |
| **1.** Recruit, retain, and employ high quality and highly diverse math and science teacher candidates through the GSKyTeach program. | • 20 recruited for cohort 1, 15 for cohort 2, 10 for cohorts 3 and 4<br>• 90% GSKyTeach graduation rate<br>• 100% placement rate for graduates |
| **2.** Prepare GSKyTeach graduates to meet all state certification requirements at high levels. | • 100% pass rate on state certification requirements |
| **3.** Prepare GSKyTeach graduates to teach using the NRC's Inquiry-based Model for Teaching and Learning. | • 100% pass rates in SMED courses (esp. SMED 510) |
| **4.** Develop the capacity of <u>all</u> math and science teachers in high-need schools to use the NRC's Inquiry-based Model of Teaching and Learning in their classrooms. | • By June 2012, 70% of math and science teachers in high-need schools attend at least one workshop on inquiry-based teaching<br>• By June 2013, 70% of math and science teachers in high-need schools attend at least two workshops on inquiry-based instruction<br>• Survey results over time indicate more frequent use of inquiry-based strategies<br>• Classroom observations of math and science classes during the 2013-14 school year indicate higher quality instruction than classrooms observed in 2011-12 |
| **5.** Build the capacity of <u>mentor</u> math and science teachers in high need schools to use the New Teacher Center induction model to support program candidates. | • Mentor teachers trained: 20 (total) by 6/2011, 30 (total) by 6/2012, 40 (total) by 6/2013, 45 (total) by 6/2014<br>• 90% of mentor teachers annually report being "very prepared" to support new teachers; master teachers report that 95% of mentor teachers' work adds value to the GSKyTeach students' preparation<br>• 95% of GSKyTeach students annually report being supported by mentor teachers<br>• 90% of mentor-GSKyTeach pairing are multiyear |

| | | |
|---|---|---|
| | **6.** Enhance the effectiveness of newly prepared teachers (GSKyTeach program completers) as they begin their first years of teaching through a well-coordinated two-year induction program. | • 90% of GSKyTeach completers<br>• Classroom observations indicate higher quality instruction in first-year induction teachers from the SGKyTeach program compared to other new teachers<br>• Classroom observations indicate improving instructional practice among GSKyTeach participants from their teacher internship through their second induction year |
| | **7.** Demonstrate the effectiveness of the newly prepared teachers through well-documented and defensible evidence of their impact on student learning. | • Student CCA scores improve significantly from the GSKyTeach completer's first to second induction year<br>• GSKyTeach completers' student CCA scores are significantly higher than the scores of students of comparison teachers<br>• PLAN science or math scores of students who had GSKyTeach graduates are at least 1 point higher than the scores of students who had comparison teachers and the average scores in those schools |
| | **8.** Demonstrate program effectiveness and efficiency by increasing one- and three-year teacher retention rates beyond current JCPS High-Need High Schools retention rates. | • One-year retention rates at least 90%<br>• Three-year retention rates at least 80% |
| | **9.** Institutionalize the GSKyTeach program as a continual source of high-performing new teachers for high-need schools in Jefferson County and throughout Kentucky. | • By December 2010, GSKyTeach is a state-approved alternative certification program |
| | **10.** Use lessons learned in the development and implementation of GSKyTeach to improve other WKU preparation programs. | • By the end of the project, WKU has made at least 2 improvements to its other preparation programs based on lessons learned in this project |

**Data Analysis.** Appropriate techniques will be employed to analyze quantitative and qualitative data. For quantitative measures, descriptive statistics will be generated and analyzed. Such statistics will include measures of central tendency and dispersion, as well as correlations among selected items. Comparative analytic techniques (e.g., repeated measures analyses of covariance) will be employed to determine statistically significant differences between participating and comparison teachers; effect sizes to denote the magnitude of those differences will also be determined. Depending on the characteristics of the data, multilevel analyses may be performed on the student CCA data to incorporate teacher-level variables (e.g., classroom

observation and KTIP scores, self-reported 5E instruction, demographics). For qualitative data (e.g., open-ended survey and observation items, interviews), prevalent themes and emerging issues will be identified via thematic coding.

**Reporting.** Data gathered to assess progress toward attainment of project goals will be reported to project staff in a timely manner to allow staff to make programmatic changes and prepare for Executive Advisory Board meetings. Based on the project management plan, the Advisory Board meets each year in February, July, and October. Formative data will be collected and processed to align with the Board meeting schedule. Evaluators will maintain regular communication with project staff and attend Board meetings to clarify data summaries and answer Board members questions. Edvantia will assist project staff in the completion of the annual performance report (APR) and accompanying project status chart (ED524B). At the end of the second through fourth project years, Edvantia will deliver annual reports of data collected on each cohort. At the end of the project, Edvantia will submit a final evaluation report that incorporates data from all five years. It is expected that the conclusions and recommendations offered by Edvantia based on evaluation will contribute to project Objective 10 (lessons learned). Edvantia has an established Quality Assurance (QA) process that ensures products are grammatically correct, technically sound, and visually attractive. Additionally, all Edvantia evaluations adhere to The Program Evaluation Standards authored by the Joint Committee on Standards for Educational Evaluation (1994).

The evaluation team will coordinate with GSKyTeach staff to ensure that the vendor chosen to conduct the national evaluation has timely access to data, participants, and sites as delineated in the national evaluation study proposal.

## BIBLIOGRAPHY


Aleven, V., & Koedinger, K. (2002). An effective metacognitive strategy—Learning by doing and explaining with a computer-based cognitive tutor. *Cognitive Science, 26,* 147-179.

Bransford, J.D., & Schwartz, D.L. (1999). Rethinking transfer: A simple proposal with multiple implications. *Review of Research in Education, 24*(40), 61-100.

Brewer, J., & Hunter, A. (1989). *Multimethod research: A synthesis of styles*. Newbury Park: Sage.

Brown, A.L. (1975). The development of memory: Knowing about knowing and knowing how to know. In H.W. Reese (Ed.), *Advances in child development and behavior* (p. 10). New York: Academic Press.

Brown, A.L., Bransford, J.D., Ferrara, R.A., & Campione, J.C. (1983). Learning, remembering, and understanding. In J.H. Flavell & E.M. Markman (Eds.), *Handbook of child psychology: Cognitive development volume 3* (pp. 78-166). New York: Wiley.

Bruner, J. (1960). *The process of education.* Cambridge, MA: Harvard University Press.

Chappuis, S., & Stiggins, R.J. (September, 2002). Classroom assessment for learning. *Educational Leadership,* 40-43.

Chase, W.G., & Simon, H.A. (1973). Perception in chess. *Cognitive Psychology, 4*(1), 55-81.

diSessa, A. (1982). Unlearning Aristotelian physics: A study of knowledge-based learning. *Cognitive Science, 6*(2), 37-75.

DuFour, R., DuFour, R., Eaker, R. & Many, T. (2007). *Learning by doing: A handbook for professional learning communities at work.* Bloomington, IN: Solution Tree.

Flavell, J.H. (1973). Metacognitive aspects of problem-solving. In L.B. Resnick (Ed.), *The nature of intelligence.* Mahwah, NJ: Lawrence Erlbaum Associates.

Gejda, L. M., & LaRocco, D. J. (2006, October). *Inquiry-based instruction in secondary science classrooms: A survey of teacher practice.* Paper presented at the annual meeting of the Northeast Educational Research Association, Kerhonkson, NY.

Holland, H. (2005). Teaching teachers: Professional development to improve student achievement. *Research Points, 3*(1), 1-4. Retrieved from http://www.aera.net/uploadedFiles/Journals_and_Publications/Research_Points/RPSummer05.pdf

Hunt, E., & Minstrell, J. (1994). A cognitive approach to the teaching of physics. In K. McGilly (Ed.), *Classroom lessons: Integrating cognitive theory and classroom practice* (pp. 51-74). Cambridge, MA: MIT Press.

Joint Committee on Standards for Educational Evaluation. (1994). *The program evaluation standards* (2nd ed.). Thousand Oaks, CA: Sage.

National Research Council. (1999). *How people learn: Brain, mind, experience, and school.* Committee on Developments in the Science of Learning. J.D. Bransford, A.L. Brown, & R.R. Cocking (Eds.). Commission on Behavioral and Social Sciences and Education. Washington, DC: National Academy Press.

Needham, A., & Baillargeon, R. (1993). Intuitions about support in 4½- month-old infants. *Cognition, 47*(2), 121-148.

Piburn, M., Sawada, D., Falconer, K., Turley, J. Benford, R., Bloom, I. (2000). Reformed Teaching Observation Protocol (RTOP). Retrieved from http://physicsed.buffalostate.edu/AZTEC/RTOP/RTOP_full/

Roberts, J. K., & Henson, R. K. (2000, November). *Self-efficacy teaching and knowledge instrument for science teachers (SETAKIST): A proposal for a new efficacy instrument.* Paper presented at the annual meeting of the Mid-South Educational Research Association, Bowling Green, KY.

Rossi, P. H., Lipsey, M. W., & Freeman, H. E. (2004). *Evaluation: A systematic approach* (7th ed.). Thousand Oaks, CA: Sage.

Sampson, V. (2004). The Science Management Observation Protocol: Using structured observations to improve teachers' management of inquiry-based classrooms. *Science Teacher, 71*(10), 30-33.

White, B.Y., & Sellers, P. (1997). Deepening the analysis: Longitudinal assessment of a problem-centered mathematics program. *Journal for Research in Mathematics Education, 28,* 163-186.

## BIBLIOGRAPHY


Aleven, V., & Koedinger, K. (2002). An effective metacognitive strategy—Learning by doing and explaining with a computer-based cognitive tutor. *Cognitive Science, 26,* 147-179.

Bransford, J.D., & Schwartz, D.L. (1999). Rethinking transfer: A simple proposal with multiple implications. *Review of Research in Education, 24*(40), 61-100.

Brewer, J., & Hunter, A. (1989). *Multimethod research: A synthesis of styles*. Newbury Park: Sage.

Brown, A.L. (1975). The development of memory: Knowing about knowing and knowing how to know. In H.W. Reese (Ed.), *Advances in child development and behavior* (p. 10). New York: Academic Press.

Brown, A.L., Bransford, J.D., Ferrara, R.A., & Campione, J.C. (1983). Learning, remembering, and understanding. In J.H. Flavell & E.M. Markman (Eds.), *Handbook of child psychology: Cognitive development volume 3* (pp. 78-166). New York: Wiley.

Bruner, J. (1960). *The process of education.* Cambridge, MA: Harvard University Press.

Chappuis, S., & Stiggins, R.J. (September, 2002). Classroom assessment for learning. *Educational Leadership,* 40-43.

Chase, W.G., & Simon, H.A. (1973). Perception in chess. *Cognitive Psychology, 4*(1), 55-81.

diSessa, A. (1982). Unlearning Aristotelian physics: A study of knowledge-based learning. *Cognitive Science, 6*(2), 37-75.

DuFour, R., DuFour, R., Eaker, R. & Many, T. (2007). *Learning by doing: A handbook for professional learning communities at work.* Bloomington, IN: Solution Tree.

Flavell, J.H. (1973). Metacognitive aspects of problem-solving. In L.B. Resnick (Ed.), *The nature of intelligence.* Mahwah, NJ: Lawrence Erlbaum Associates.

Gejda, L. M., & LaRocco, D. J. (2006, October). *Inquiry-based instruction in secondary science classrooms: A survey of teacher practice.* Paper presented at the annual meeting of the Northeast Educational Research Association, Kerhonkson, NY.

Holland, H. (2005). Teaching teachers: Professional development to improve student achievement. *Research Points, 3*(1), 1-4. Retrieved from http://www.aera.net/uploadedFiles/Journals_and_Publications/Research_Points/RPSummer05.pdf

Hunt, E., & Minstrell, J. (1994). A cognitive approach to the teaching of physics. In K. McGilly (Ed.), *Classroom lessons: Integrating cognitive theory and classroom practice* (pp. 51-74). Cambridge, MA: MIT Press.

Joint Committee on Standards for Educational Evaluation. (1994). *The program evaluation standards* (2nd ed.). Thousand Oaks, CA: Sage.

National Research Council. (1999). *How people learn: Brain, mind, experience, and school.* Committee on Developments in the Science of Learning. J.D. Bransford, A.L. Brown, & R.R. Cocking (Eds.). Commission on Behavioral and Social Sciences and Education. Washington, DC: National Academy Press.

Needham, A., & Baillargeon, R. (1993). Intuitions about support in 4½- month-old infants. *Cognition, 47*(2), 121-148.

Piburn, M., Sawada, D., Falconer, K., Turley, J. Benford, R., Bloom, I. (2000). Reformed Teaching Observation Protocol (RTOP). Retrieved from http://physicsed.buffalostate.edu/AZTEC/RTOP/RTOP_full/

Roberts, J. K., & Henson, R. K. (2000, November). *Self-efficacy teaching and knowledge instrument for science teachers (SETAKIST): A proposal for a new efficacy instrument.* Paper presented at the annual meeting of the Mid-South Educational Research Association, Bowling Green, KY.

Rossi, P. H., Lipsey, M. W., & Freeman, H. E. (2004). *Evaluation: A systematic approach* (7th ed.). Thousand Oaks, CA: Sage.

Sampson, V. (2004). The Science Management Observation Protocol: Using structured observations to improve teachers' management of inquiry-based classrooms. *Science Teacher, 71*(10), 30-33.

White, B.Y., & Sellers, P. (1997). Deepening the analysis: Longitudinal assessment of a problem-centered mathematics program. *Journal for Research in Mathematics Education, 28,* 163-186.