The Arizona Board of Regents

2012- 13 IMPROVING TEACHER QUALITY (ITQ)
STATE GRANTS

Logic Model and Evaluation Plan for:

Intel Math Project for Northern Arizona (IMPNAZ)
Southern Arizona Mathematics Initiative (SAZMI)
West Central Arizona Intel Math Initiative (WCAIMI)

The Arizona Board of Regents (ABOR) is committed to serious execution of its statutory responsibility to "support projects that will have the greatest impact on helping Local Education Agencies (LEAs) – and particularly high-need LEAs – ensure that all teachers are highly qualified and have the knowledge and teaching skills they need to help all students achieve to high standards" (Item F-8, "Improving Teacher Quality State Grants – Non-Regulatory Guidance, U.S. Department of education).

As part of its continuing commitment to provide Arizona families with a quality education for their children, knowledgeable teachers in the classrooms, and instructional leaders in school administration, the Arizona Board of Regents requires that each funded *Improving Teacher Quality* (ITQ) project undergo evaluation by an external reviewer charged with the responsibility of determining whether individual programs are conducted in accordance with the Federal regulatory authority of the No Child Left Behind Act of 2001 (P.L. 107-110, NCLB) and reporting those findings to ABOR. Specifically, *Improving Teacher Quality* grant programs, which are funded under NCLB legislation (Title II, Part A), are designed to encourage *scientifically-based professional development as a means for improving student academic performance*. All ITQ-funded programs are to conduct professional development activities that will directly impact the quality of teaching in the classroom and improve student learning. As directed by these broad federal guidelines, the ITQ 2012-13 external evaluation team has assumed responsibility for individual and collective evaluation of the three projects funded: Intel Math Project for Northern Arizona (IMPNAZ), Southern Arizona Mathematics Initiative (SAZMI), and West Central Arizona Intel Math Initiative (WCAIMI). to assess each project's success at impacting the quality and effectiveness of teachers and the academic performance of their students.

Program evaluation begins with and is guided by a logic model, or structural framework that embodies program developers' theory of how best to address a problem. It depicts the connections between the resources invested in a program, the activities that are planned to address the problem using the available resources, and the anticipated outcomes of investing those resources and conducting those activities. The model helps determine what to evaluate and when to evaluate it, so that evaluation resources are used effectively and efficiently. The resulting evaluation activities and measures test and verify the reality of the program theory – and how well it works in implementation and achieves the predicted outcomes.

2011-12 Intel Math ITQ Projects

Problem Statement

The SAZMI project organized through the University of Arizona will service teachers from eight high-need LEAs in southern Arizona. These LEAs are often in remote areas, serving high-high poverty students with a disproportionately high number of non-highly qualified teachers or teachers with provisional or temporary teaching credentials. Partner LEAs have demonstrated low-levels of student achievement in mathematics as measured by the Arizona Instrument to Measure Standards (AIMS). Their students are consistently below state averages in the middle and secondary school levels with as few as 11% of students meeting the standards. Partnering districts report high need for teacher support in math content, pedagogy, vocabulary and communication with English language learners, differentiated instruction and basic problem-solving skills.

Problem Statement

The IMPNAZ project organized by Northern Arizona University has been designed to service teachers from Kingman Unified School District and Coconino County in northern Arizona. Of the 14 schools represented by these LEAs, eight qualify as high-poverty. Twelve (12) teachers are not highly qualified. Moreover, in eight of the 14 schools less than 50% of the students met state standards on the Instrument to Measure Standards (AIMS) math assessment. In addition to math content and pedagogy learning needs, teachers in the program need additional support in investigating common misconceptions in math and student understanding of the curriculum.

Problem Statement

The WCAIMI project has been organized through Prescott College and designed to service schools in Yavapai and Mohave Counties in west central Arizona. Invited teachers represent predominately rural schools with high poverty and nearly 100% non-highly qualified math teachers. In 2008, less than 75% of the their students passed the math portion of the Instrument to Measure Standards (AIMS) state assessment. In 2011, passing rates increased to 45% overall, although some schools still reported less than 75% passing. In addition to their high need for content knowledge and support in aligning lessons to the state and common core standards, participating teachers need support in connecting to other teachers. Their largely rural environments have resulted in a high degree of isolation for individual teachers, and have prohibited many professional development efforts.

Priorities

- Elementary and middle school students in high-need LEAs need quality mathematics education in their classrooms.
- Their teachers in grades K-8 need math content knowledge, research-based tools, strategies, and support to teach mathematics in their classrooms.
- As individual teachers improve their content knowledge and teaching skills, they need the support of other teachers in math learning communities to build mathematics education capacity statewide.

ASSUMPTIONS

Assumptions:

Teacher participation in the Intel Math Program can improve teachers' math content knowledge.

Professional development on mathematical pedagogical-content knowledge can improve teachers' confidence and ability to teach mathematics in their classrooms.

Demonstration, modeling and experiencing effective mathematics teaching in workshops can result in adoption of similar strategies in the classroom by participants.

Implementing quality mathematics teaching in the classroom will improve student learning of mathematics.

EXTERNAL VARIABLES

External Variables that may help or hinder program implementation. (Pre-existing and/or Intervening}:

School and work schedules can interfer with teachers' full participation.

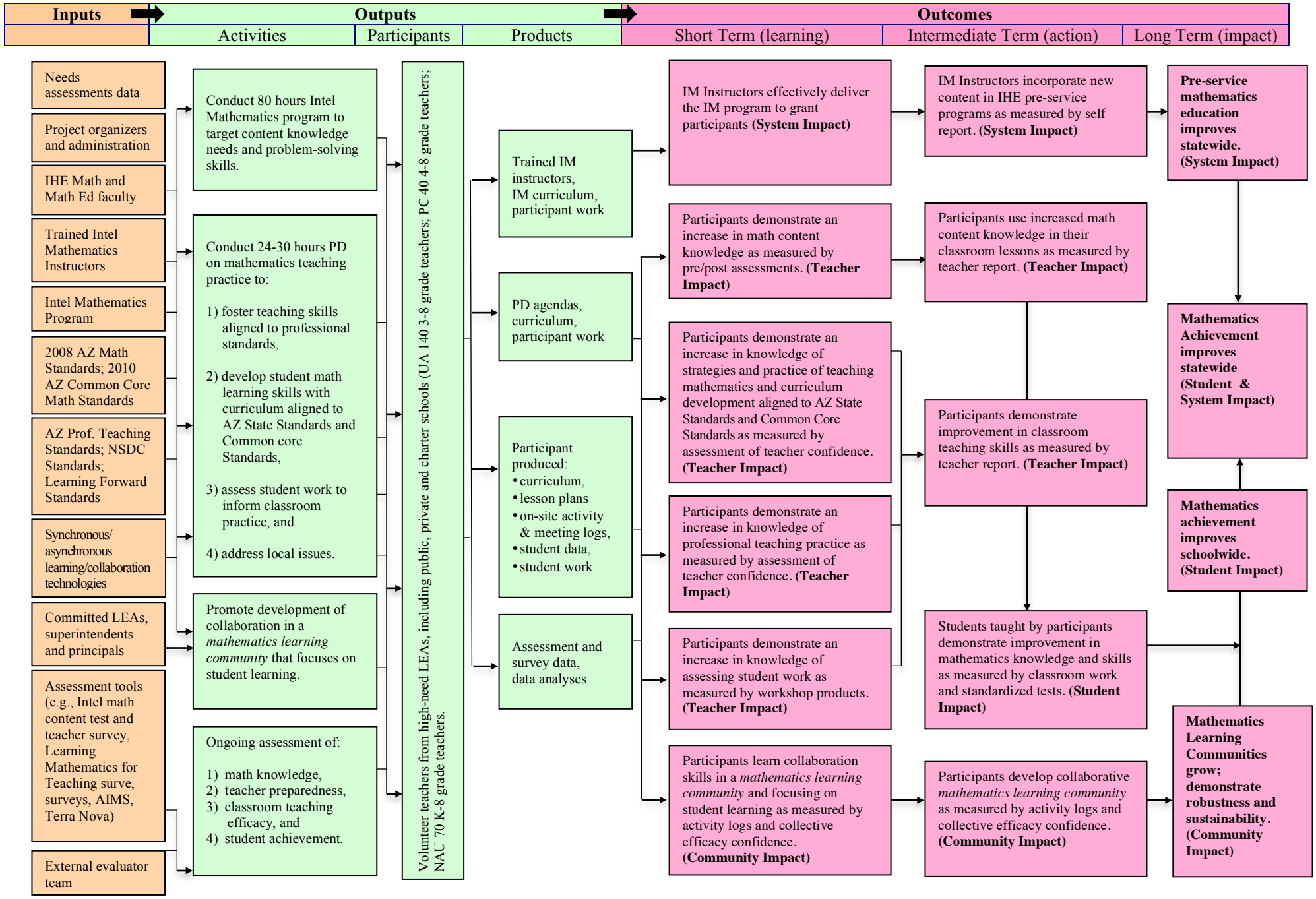
Criteria for selecting project participants and their commitment to active participation.

Attrition of participants during program implementation.

Technology availability, reliability and utilization.

Changes in state, district or school priorities.

Non-program activities and events could affect student performance on measures of learning.


Inputs
Outputs
Outcomes
Activities
Participants
Products
Short Term (learning)
Intermediate Term (action)
Long Term (impact)
Needs assessments data
Project organizers and administration
IHE Math and Math Ed faculty
Trained Intel Mathematics Instructors
Intel Mathematics Program
2008 AZ Math Standards; 2010 AZ Common Core Math Standards
AZ Prof. Teaching Standards; NSDC Standards; Learning Forward Standards
Synchronous/ asynchronous learning/collaboration technologies
Committed LEAs, superintendents and principals
Assessment tools (e.g., Intel math content test and teacher survey, Learning Mathematics for Teaching surve, surveys, AIMS, Terra Nova)
External evaluator team
Conduct 80 hours Intel Mathematics program to target content knowledge needs and problem-solving skills.
Conduct 24-30 hours PD on mathematics teaching practice to:
1) foster teaching skills aligned to professional standards,
2) develop student math learning skills with curriculum aligned to AZ State Standards and Common core Standards,
3) assess student work to inform classroom practice, and
4) address local issues.
Promote development of collaboration in a mathematics learning community that focuses on student learning.
Ongoing assessment of:
1) math knowledge,
2) teacher preparedness,
3) classroom teaching efficacy, and
4) student achievement.
Volunteer teachers from high-need LEAs, including public, private and charter schools (UA 140 3-8 grade teachers; PC 40 4-8 grade teachers; NAU 70 K-8 grade teachers.
Trained IM instructors, IM curriculum, participant work
PD agendas, curriculum, participant work
Participant produced:
• curriculum,
• lesson plans
• on-site activity & meeting logs,
• student data,
• student work
Assessment and survey data, data analyses
IM Instructors effectively deliver the IM program to grant participants (System Impact)
Participants demonstrate an increase in math content knowledge as measured by pre/post assessments. (Teacher Impact)
Participants demonstrate an increase in knowledge of strategies and practice of teaching mathematics and curriculum development aligned to AZ State Standards and Common Core Standards as measured by assessment of teacher confidence. (Teacher Impact)
Participants demonstrate an increase in knowledge of professional teaching practice as measured by assessment of teacher confidence. (Teacher Impact)
Participants demonstrate an increase in knowledge of assessing student work as measured by workshop products. (Teacher Impact)
Participants learn collaboration skills in a mathematics learning community and focusing on student learning as measured by activity logs and collective efficacy confidence. (Community Impact)
IM Instructors incorporate new content in IHE pre-service programs as measured by self report. (System Impact)
Participants use increased math content knowledge in their classroom lessons as measured by teacher report. (Teacher Impact)
Participants demonstrate improvement in classroom teaching skills as measured by teacher report. (Teacher Impact)
Students taught by participants demonstrate improvement in mathematics knowledge and skills as measured by classroom work and standardized tests. (Student Impact)
Participants develop collaborative mathematics learning community as measured by activity logs and collective efficacy confidence. (Community Impact)
Pre-service mathematics education improves statewide. (System Impact)
Mathematics Achievement improves statewide (Student & System Impact)
Mathematics achievement improves schoolwide. (Student Impact)
Mathematics Learning Communities grow; demonstrate robustness and sustainability. (Community Impact)

Evaluation Questions
Process (Inputs/Outputs) What did the programs as implemented actually consist of? When were they delivered and under what conditions? What resources, strategies and tools were used (e.g., faculty, *Intel Math, Learning Forward Standards, additional resources for PD, etc*)? Whom did the program reach as compared to those targeted at the outset? Who participated in what activities and who didn't? What worked? For whom did it work? Were participants satisfied? **Short-term Learning Outcomes** Did IM trained instructors deliver program with fidelity? Did participants learn IM math content? Did participants learn about math learning process skills and how to implement them in their classrooms? Did participants learn how to align lessons to Arizona math standards (2008) and Common Core Standards (2010)? Did participants learn how to contribute to a mathematics learning community? Did SAZMI participants learn how to teach mathematical vocabulary and English language learners, differentiate instruction and implement basic problem-solving skills for students? Did IMPNAZ participants learn how to investigate common misconceptions in math and student understanding of the curriculum? Did WCAIMI participants learn how to connect to other teachers using technologies of IITV and Moodle? **Intermediate-term Learning Outcomes** Did IM trained instructors incorporate IM content and workshop strategies in their college courses for pre-service teachers? Did participants incorporate IM math content in their classroom lessons? Did participants implement math pedagogy skills in their classrooms? Did participants align lessons to Arizona math standards (2008) and Common Core Standards (2010)? To what extent did participants contribute to their mathematics learning communities? Did SAZMI participants implement new skills to help English language learners increase mathematical vocabulary and communication and basic problem-solving skills for students? Did IMPNAZ participants investigate and correct common misconceptions in math and student understanding of math concepts? Did WCAIMI participants learn connect to other teachers using technologies of IITV and Moodle and reduce their sense of isolation? Did students of participating teachers show an increase in mathematical content knowledge and problem-solving skills? Did the participants attempt/complete certification or "highly qualified" status; how many?

Long-term Impact
Did mathematics teaching effectiveness in the classroom improve?
Did student learning of mathematics improve relative to AZ math standards and Common Core standards?
Did pre-service training of math teachers improve at the state colleges and universities?

EVALUATION PLAN and ASSESSMENTS

Inputs and Outputs			
Target	**What**	**When**	**Who and How**
Documentation of program implementation, including: • Training of IM instructors • Meetings • Workshops • Participants	Demographics of participants (including school, grade level, teaching experience, math courses, HQ status, etc.) Attendance Records at all workshops 80 Hours IM + PD workshops and meetings Meeting agendas Participant evaluations	Ongoing	Records kept by IM instructors Attendance data with teacher Intel ID codes sent to External Evaluators External Evaluators may utilize as co-factor in analysis
Short-term Outcomes			
Target	**What**	**When**	**Who and How**
Fidelity of IM program	Observations using the same observation protocol	Ongoing during 80+ hours	External Evaluators will observe workshops and compare daily agendas based on IM recommendations External Evaluators analyze
Teacher math knowledge	IM Assessment	Pre and Post 80 hours of Intel Math Workshops	Administered and graded by IM Instructors; teacher scores identified by Intel ID code Results and each teacher's scores in Excel file sent to External Evaluation Team with teacher codes, no names External Evaluators analyze, summarize and report
Teacher pedagogical content knowledge	LMT Assessment	Pre and Post 80 hours of Intel Math Workshops	Administered and graded by IM Instructors; teacher scores identified by Intel ID code. Results and each teacher's scores in Excel file sent to External Evaluation Team External Evaluators analyze, summarize and report
Teacher efficacy/confidence for teaching math	Teacher Survey	Pre and Post	Survey put online by external evaluators Link sent to teachers by PIs Teacher Intel ID codes sent to External Evaluation Team PIs and External Evaluation coordinate for 100-percent rate-of-return External Evaluators analyze
Intermediate-term Outcomes			

Target	What	When	Who and How
Changes in classrooms due to increased content knowledge	Teacher Survey of teaching content and methods Teacher interviews	Mid Fall Semester 2012 Mid Spring Semester 2013	Survey put online by external evaluators Link sent to teachers by PIs Teacher Intel ID codes sent to External Evaluation Team PIs and External Evaluation coordinate for 100-percent rate-of-return External Evaluators analyzeExternal Evaluators conduct individual interviews with sample of teachers from each program
Changes in classroom due to improved pedagogy	Teacher Survey of teaching content and methods	Mid Fall Semester 2012 Mid Spring Semester 2013	Self report template created by External Evaluators with input from PIs Template sent to teachers by PIs. PIs receive completed templates and send to External Evaluators. External Evaluators analyze.
Implementation of math learning communities	Teacher logs identifying participants and dates of interactions with school sites identified	Ongoing Fall and Spring 2012	Logs collected from electronic discussion boards or other sources Logs sent to PIs and External Evaluators External Evaluators analysis includes one or more of the following: time, frequency, length of discussions, intra-school and inter-school
Increased student achievement	Students' AIM scores by Classroom	Pre and Post workshops	PIs collect data from participants (coded by teacher Intel ID) and send to External Evaluators External Evaluators analyze
Effects of math learning communities on teachers perceptions of school wide efficacy	Collective Efficacy and teachers comments about TLC meetings	Pre and Post	Survey put online by external evaluators Link sent to teachers by PIs External Evaluators analyze
Completion of all evaluation measures by instructors and participants	PIs record submission of data by participants and instructors. PIs send follow-up requests for participants and instructors to complete and/or submit data.	PI forwards data from participants and instructors within two weeks after receipt.	PI withholds compensations until all items are completed
Assessment of teaching mathematical vocabulary and communication to English language learners, differentiated instruction and basic problem-solving skills for all students through self-report.	Retrospective survey of teaching strategies implemented completed online.	Spring 2013	Survey put online by external evaluators Link sent to teachers by PIs External Evaluators analyze

Assessment of investigating and correcting common misconceptions in math and student understanding of the curriculum by IMPNAZ participants?	Retrospective survey of teaching strategies implemented completed online.	Spring 2013	Survey put online by external evaluators Link sent to teachers by PIs External Evaluators analyze
Assessment of increased use of technologies of IITV and Moodle to connect to other teachers by WCAIMI participants.	Retrospective survey of teaching strategies implemented completed online.	Spring 2013	Survey put online by external evaluators Link sent to teachers by PIs External Evaluators analyze