Using the DIO Framework to Improve Professional Development for Science and Mathematics Educators, K-16

Sheila Jones and Judy Monsaas

February 6, 2007

PRISM Goals

Raise expectations and achievement in Science and Mathematics in K-12 schools, while closing achievement gaps among demographic groups by

- Requiring all students to complete challenging courses/curricula in SM
- Increasing and sustaining the number, quality and diversity of K-12 teachers who teach SM
- Increasing the responsiveness of higher education to the needs of K-12 schools

Population Served

- **Regional**
  - 170,000 K-12 students
  - 10,000 K-12 teachers
  - In 275+ urban & rural public schools
  - 44% of teachers prepared in University System of Georgia

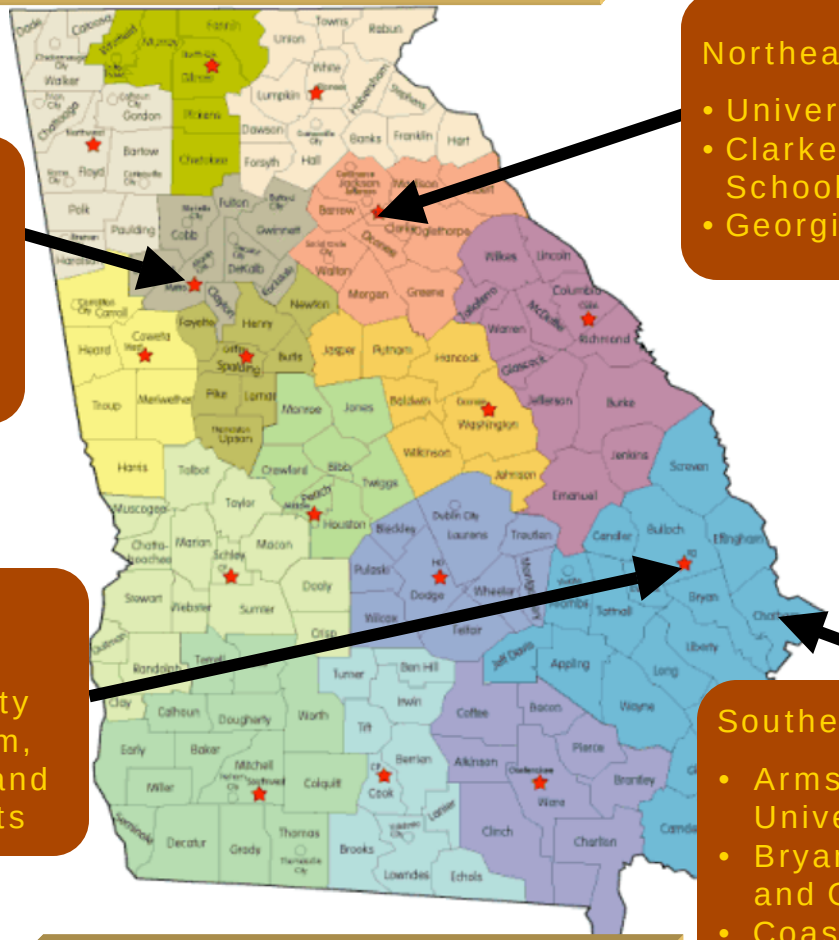
- **State**
  - 1.4 million K-12 students
  - 100,000+ K-12 teachers
  - 100% USG teacher preparation programs in science and mathematics

GPS training with K-12 Teachers

Mathematics Awareness class
SE Region 5th & 9th Graders

Regional and State Partnerships

University System of Georgia



Northeast Region

- University of Georgia
- Clarke, Jackson, and Oconee School Districts
- Georgia Perimeter College

Metro Atlanta Region

- Georgia State University
- Atlanta Public Schools
- CEISMC—Georgia Institute of Technology

East Central Region

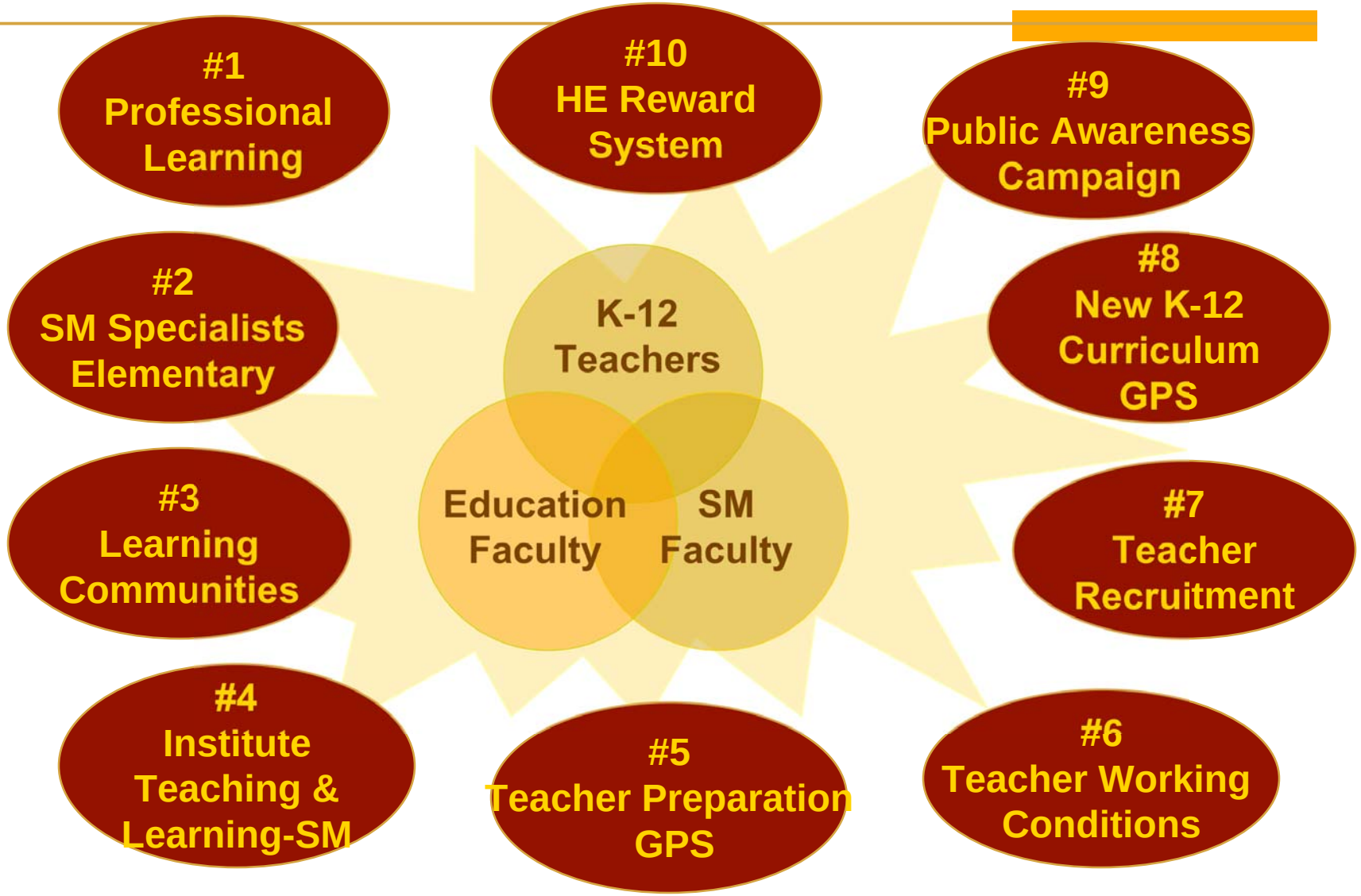
- Georgia Southern University
- Bulloch, Candler, Effingham, Evans, Screven, Toombs, and Vidalia City School Districts

Southeast Region

- Armstrong Atlantic State University
- Bryan, Camden, Chatham, and Glynn School Districts
- Coastal Georgia Community College

Georgia Department of Education

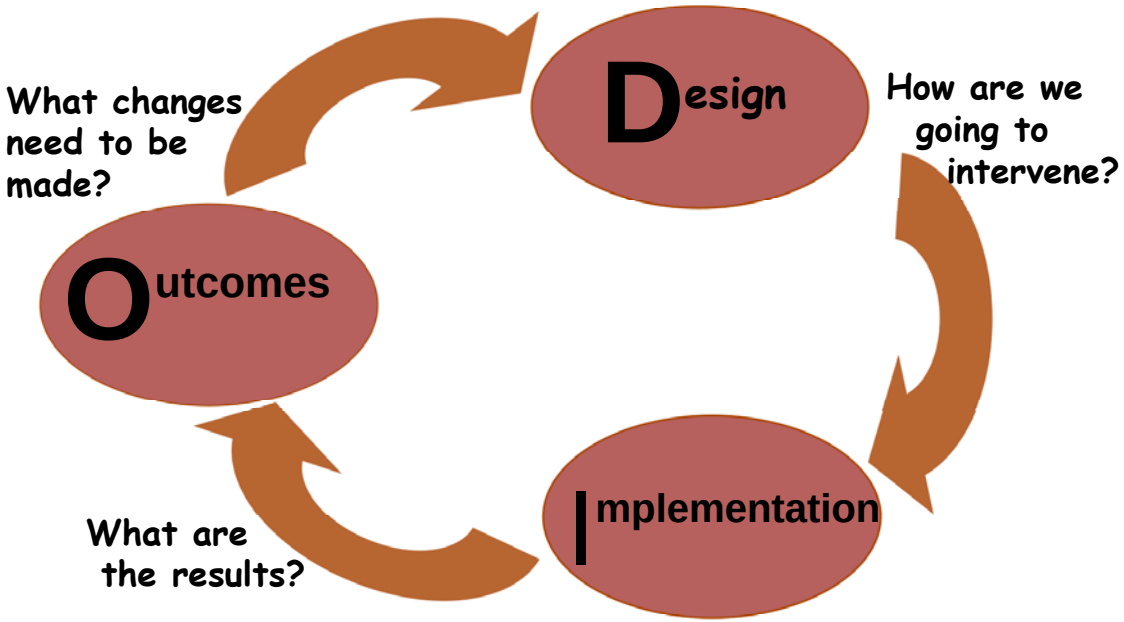
PRISM Design



Focus Today

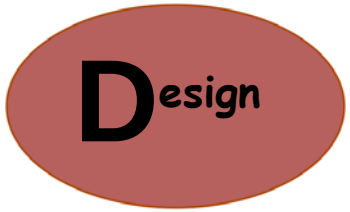
#3
Learning Communities

DIO Framework



How We Went About It

- Learning Community Retreat for the PRISM Leadership Team
- P-16 Learning Community Definition Document
- P-16 Learning Community Rubric
- Professional Learning for Lead Teachers
- Regions held Learning Community Workshops/Conferences



What is a P-16 Learning Community?

P-16 Learning Communities provide opportunities for P-16 educators to share what they know, consult with peers about problems of teaching and learning, observe others at work, and explore and test new ideas, methods and materials.

P-16 Learning Communities Promote:

- Shared vision
- Collaboration between P-12 and college faculty
- Shared leadership – faculty led
- Trying, testing, and replicating effective teaching practices
- Publicizing the work
- Work that leads to improved student achievement
- Participation in collaborative inquiry

Foci of PRISM Learning Communities in 2005-06

- Preparation to implement the new Georgia Performance Standards in mathematics and science
- Content and pedagogy in mathematics and science
- Using data for school improvement
- Action research
- Inquiry-based teaching and learning strategies

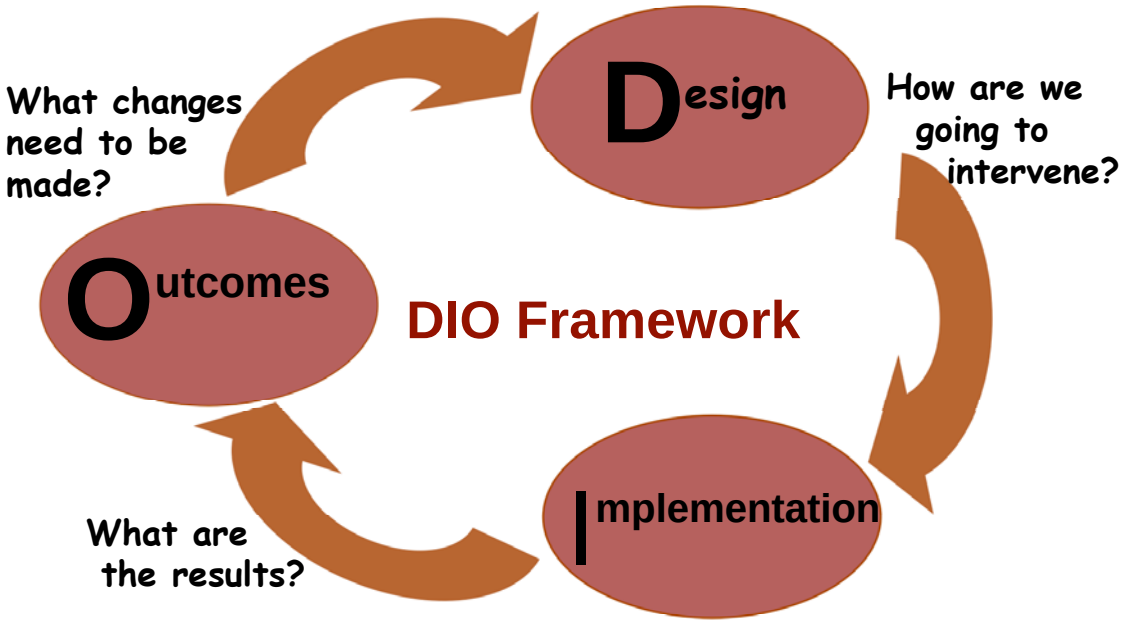
Variation in PRISM Learning Communities

- Can be grade, school, district or region level
- Focus varies based on needs identified by participants through a formal or informal needs assessments (customized professional development)
- Some learning communities have and do not have IHE involvement
- IHE faculty members have varied roles in PRISM LCs:
  - Participating member
  - Facilitator
  - Resource

PRISM Learning Communities by Region: 2005-06

Region	Number of PRISM LCs	Number of LCs with IHE participants
Metro	14	11
East Central	40	7
Northeast	28	5
Southeast	121	36

Evidence-Based Design and Outcomes



PRISM Evaluation Design

Evaluation Question	Data Collection Method
Who participated in LCs? To what extent?	Participant Information Attendance rosters Higher Education faculty participation
What was the nature of the LC?	Document collection: agendas, syllabi, reading logs, etc. Observations of the LCs Interviews Surveys
Did the participants acquire the intended knowledge and skills?	Inventory of Teaching and Learning Practices (ITAL) Open-ended survey Interviews
Did the participant use the acquired knowledge and skills in the classroom?	Classroom observation (Reformed Teacher Observation Protocol) Inventory of Teaching and Learning Practices (ITAL) Open-ended survey Interviews
Did student achievement improve?	State tests (Georgia Criterion-Referenced Competency Tests, End-of Course Tests, Georgia High School Graduation Tests)

PRISM Evaluation of LCs: Quasi-Experimental Methods

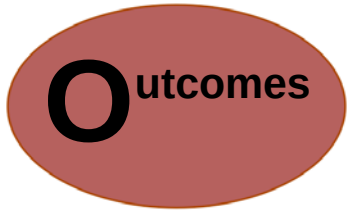
	Spring 03	Spring 04	Spring 05	Spring 06	Spring 07	Spring 08
	Ach. Tests	Ach. Tests ITAL	Ach. Tests ITAL	Ach. Tests ITAL	Ach. Tests ITAL	Ach. Tests ITAL
Year 1 Schools	Control	PRISM	PRISM	PRISM	PRISM	PRISM
Year 2 Schools	Control	Control	PRISM	PRISM	PRISM	PRISM
Year 3 Schools	Control	Control	Control	PRISM	PRISM	PRISM
Year 4 Schools	Control	Control	Control	Control	PRISM	PRISM
Year 5 Schools	Control	Control	Control	Control	Control	PRISM

Qualitative Design-Triangulation

- Data Sources
  - PRISM Leaders (State and Regional)
  - Administrators (K-12 & IHE)
  - Faculty (K-12 and IHE)
  - External Professional Learning Facilitators
- Sites
  - Four regions
  - State Leadership Team Meetings

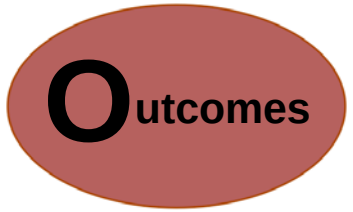
Qualitative Findings: Common Positive Outcomes

- Collaboration
  - Within K-12
  - Within IHE
  - Across K-12 and IHE
- Formal sharing of cultures
- Data-driven decision making
- Multiple communication strategies
- Customized professional learning



Qualitative Findings: Difficulties Encountered

- Initial lack of clarity
  - Structure and organization of LCs
  - PRISM
- Time
  - Conflicting responsibilities
  - IHE – no rewards
- Scheduling
  - Conflicts within K-12
  - IHE conflicts with K-12 school-based meetings



Quantitative Instrument

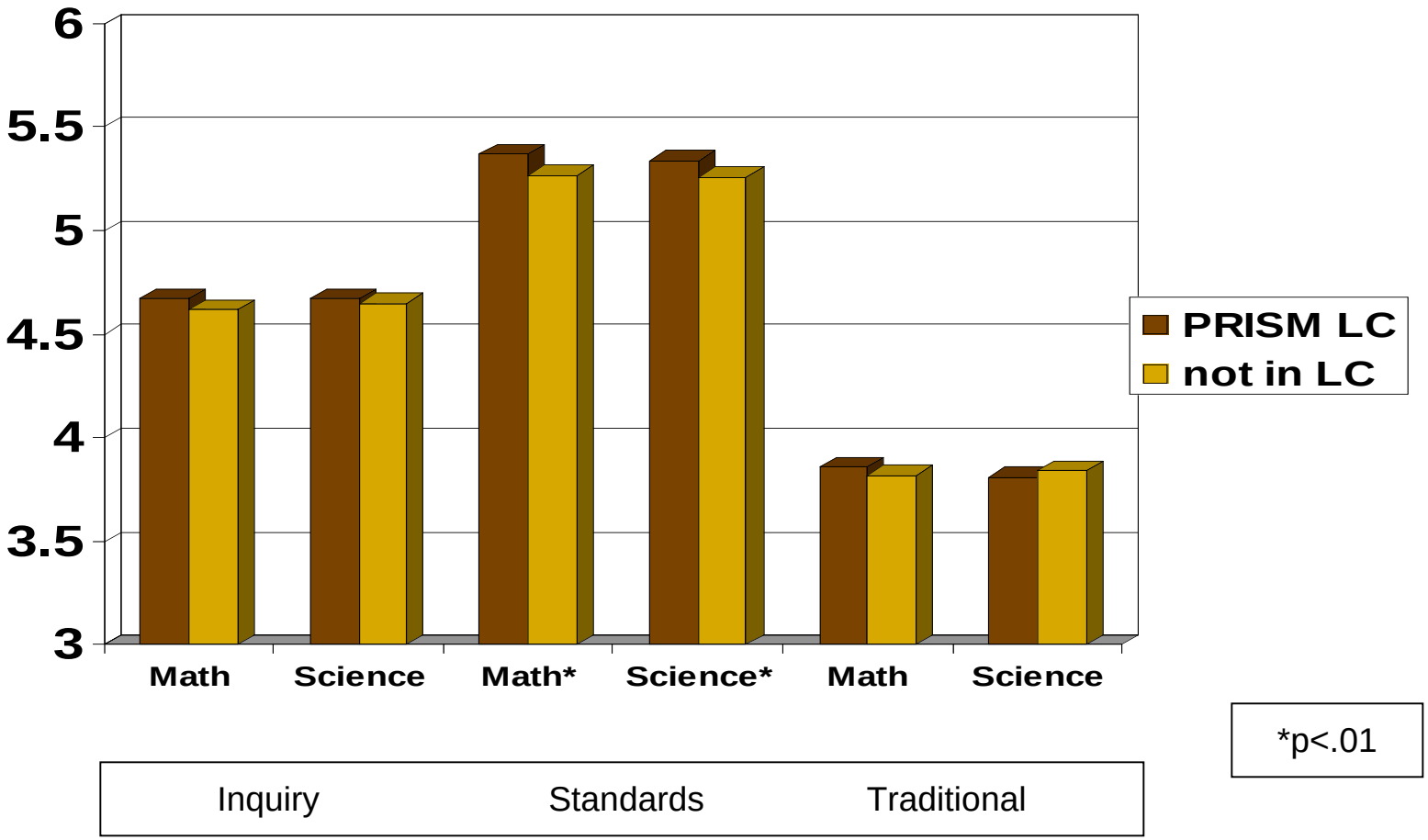
Inventory of Teaching and Learning (ITAL)

- Designed to measure K-16 teachers use of inquiry and standards based teaching and learning practices.
- Inquiry items written to parallel indicators in the RTOP.
- Principle components analysis revealed three dimensions.
  - I. Inquiry-based teaching and learning practices (30 items)
  - II. Standards-based teaching and learning practices (10 items)
  - III. Traditional teaching and learning practices (12 items)

Quantitative Procedures: ITAL

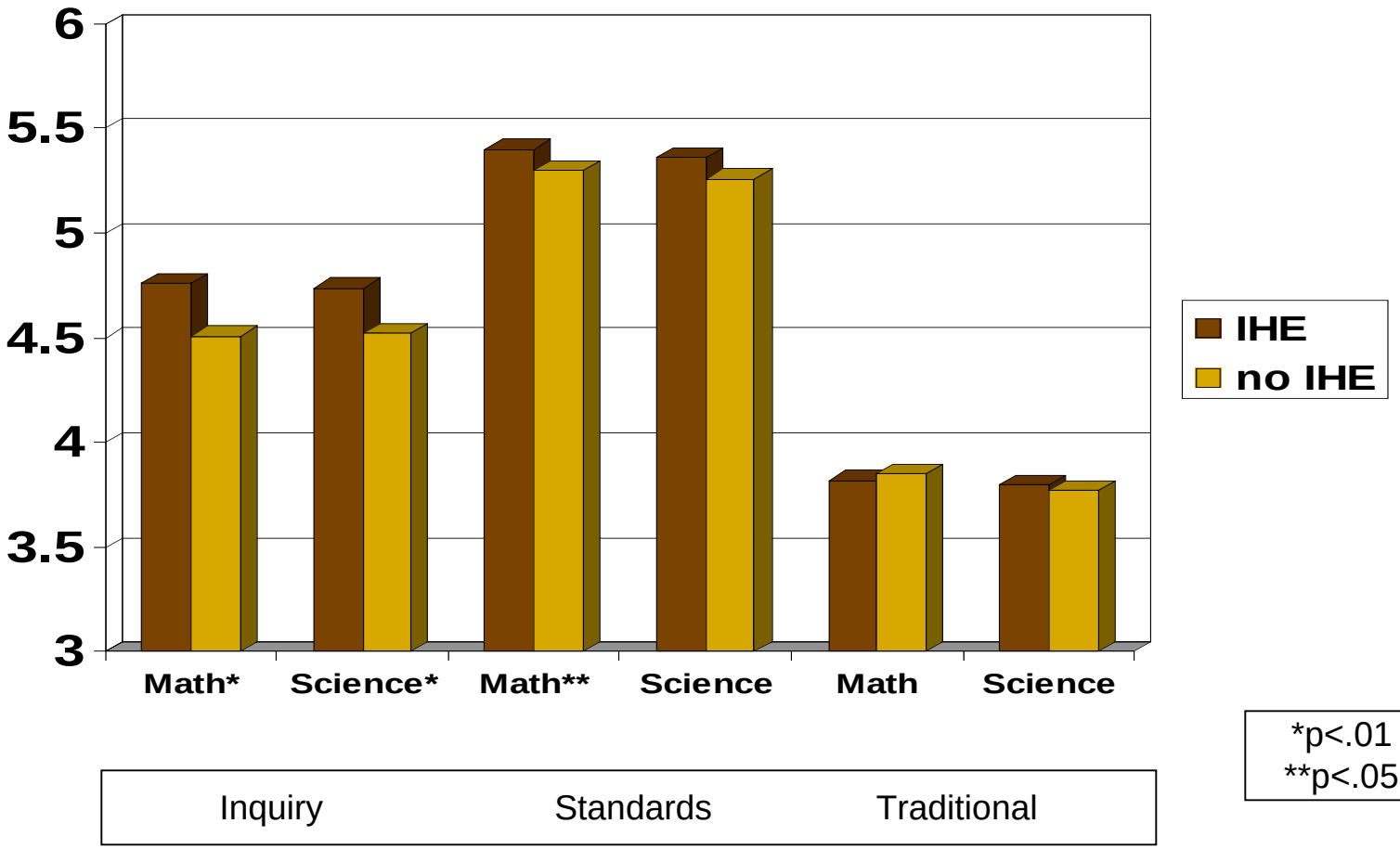
- ITAL administered to all K-12 teachers who teach science and mathematics via email.
- Additional questions about LC participation and IHE involvement included.
- Response rates varied from 24% (problems with email addresses) to 93% for districts. Median response rate = 72%.

Mean Scores on ITAL for K-12 Mathematics and Science Teachers Who Did and Did Not Participate in a PRISM Learning Community



*p<.01

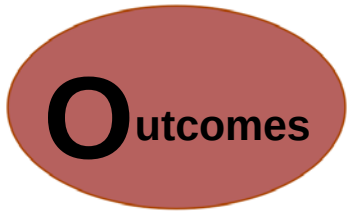
Mean Scores on ITAL for K-12 Mathematics and Science Teachers With or Without a IHE Faculty Member in the PRISM LC



*p<.01
**p<.05

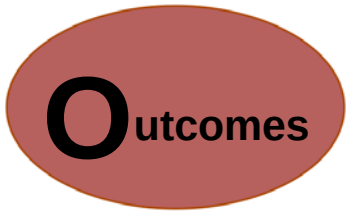
Key Findings -- ITAL

- Teachers who participated in PRISM LCs reported greater emphasis on standards-based teaching and learning practices than those who did not
- Teachers who participated in PRISM LCs that had a IHE faculty member involved reported greater emphasis on inquiry-based teaching and learning than participants in a PRISM LC that did not have IHE involvement



Additional Findings - ITAL

- K-12 teachers reported greater emphasis on standards-based teaching and learning practices than on either inquiry or traditional practices
- K-12 teachers reported least emphasis on traditional teaching and learning practices



HOW DIO Has Influenced PRISM Learning Communities

- Feedback from the qualitative evaluation has led to LCs by
  - Calling attention to learning communities that are effective and not effective
  - Providing feedback within and across regions to regional leaders who are improving learning communities
- Feedback from the quantitative evaluation (i.e., the ITAL and RTOP) has led to increased focus on inquiry in LCs

Further Studies Planned

- Linking the focus of the LC with teaching practices
- Linking participation in a LC with standardized achievement test scores
- Investigating the type of IHE involvement in LCs with teaching practices
- Investigating the effect of IHE participation in K-16 LCs on **IHE faculty** teaching practices

General Conclusions

- Learning communities viewed as successful by participants
- Time and schedule conflicts appear to be a continual challenge
- Regular feedback from regional evaluators has had some influence on the design of PRISM LCs and influenced the implementation of PRISM LCs
- Learning community participation does appear to have a small positive effect on teachers' emphasis on standards-based teaching and learning in the classroom
- Higher Education faculty involvement appears to have a small positive effect on K-12 teachers' emphasis on teachers reported emphasis on inquiry in the classroom

www.gaprism.org

www.mathsciencesuccess.org

sheila.jones@usg.edu

judith.monsaas@usg.edu