

ITEST Research and Evaluation

Tuesday, June 8, 2015

Hosted by:

STEM Learning & Research Center
(STELAR)

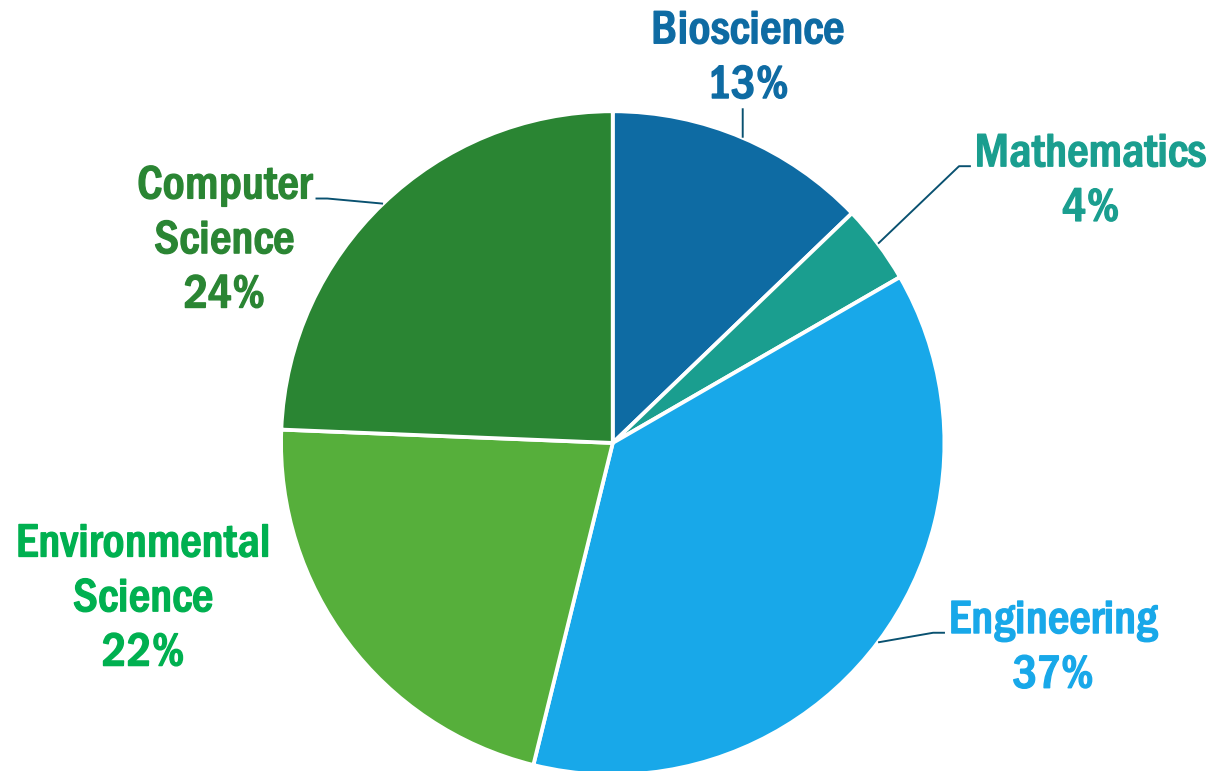
Educational Development Center, Inc.



NSF's Innovative Technology Experiences for Students and Teachers (ITEST) Program

- Projects build understandings of best practices, factors, contexts and processes contributing to K-12 students' motivation and participation in STEM
- Projects help students to be aware of STEM careers, and to pursue formal school-based and informal out-of-school educational experiences to prepare for such careers
- Includes **297** current and past projects across **46** states and the District of Columbia
- Projects have served **304,900 youth, 10,500 educators, 4100 parents and caregivers**

ITEST Portfolio Active Projects 2015



ITEST Portfolio Primary Disciplines



- **Computer Science:** gaming & simulations, multimedia, programming, web development



- **Bioscience:** bioinformatics, biomedicine, biotechnology, DNA sequencing, neuroscience



- **Environmental Science:** climate modeling, geospatial technology



- **Engineering:** aerospace, astronomy, design, robotics, nanotechnology
- **Mathematics:** scientific algebra, geometry

2014 ITEST Solicitation

Research is
part of *all*
ITEST
projects



*The ITEST program through **research** and model-building activities seeks to build understandings of best practice factors, contexts and processes contributing to K-12 students' motivation and participation.....*

*The ITEST program funds **foundational and applied research projects** addressing the development, implementation, and dissemination of innovative strategies, tools, and models for engaging students.....*

What does research look like in ITEST projects?

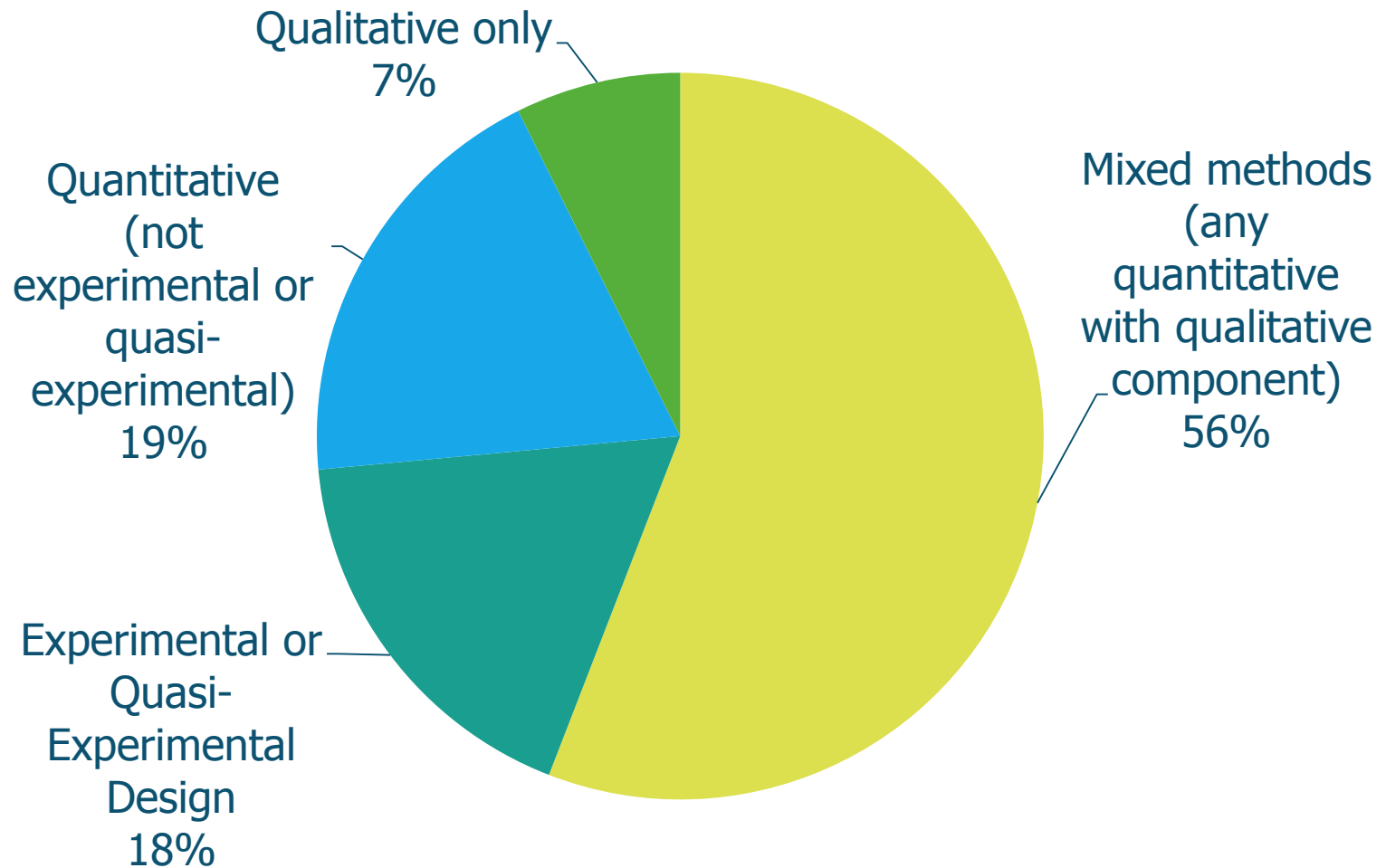


- Project Design
- Logic Models and ITEST Guiding Questions
- External Evaluation
- Common Guidelines

Project Design

- Project development, research and evaluation activities are coherent and contribute to the whole project
 - Research methods fit the stage of project development and the question to be answered
 - PI/institution implementing the project can do the research or can have an external research partner
- All projects have a research plan. Research questions focus on:
 - improving the innovation
 - impact of the projects on participants

ITEST Project Research Designs (n=68)*



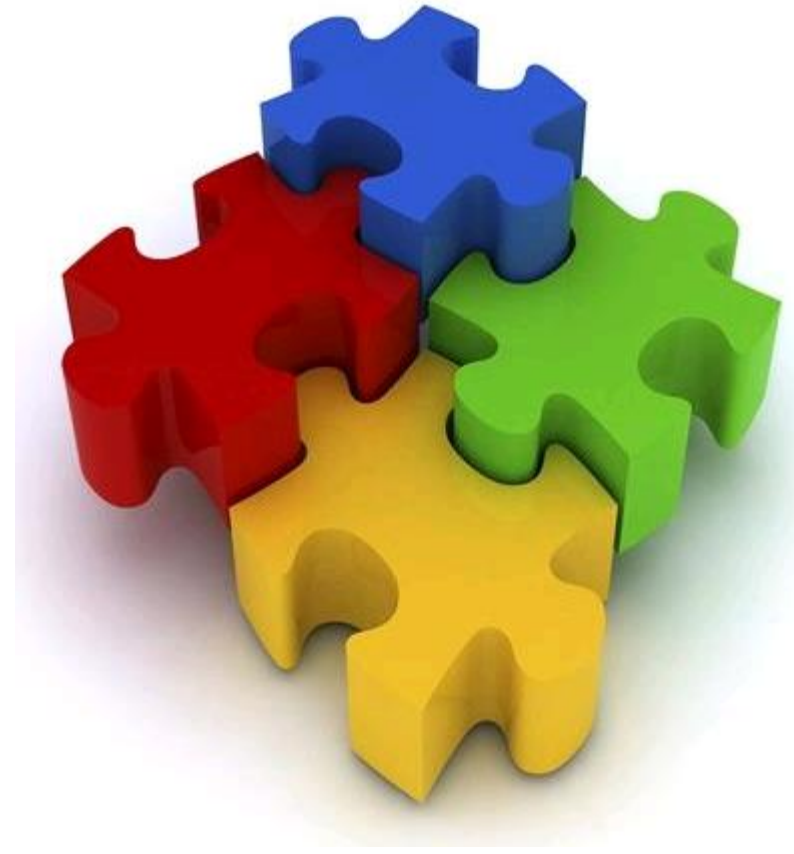
*Active projects Fall 2014

ITEST Guiding Questions: STEM Workforce Development

- What coherent sets of experiences effectively and efficiently support **student competency (e.g. knowledge, skills), motivation and persistence** for productive participation in the **STEM and STEM cognate workforce** of today or in the future?
- What **instructional and curricular models** can effectively engage teachers to utilize and integrate technologies so as to enhance student understanding of STEM and STEM cognate careers?
- What roles might **business and industry workforce** member's play in motivating students to become aware of, interested in and prepared for careers in the STEM and STEM cognate workforce?
- What roles might business and industry play in preparing teachers to support student awareness of the workplace?
- What strategies might **parents, mentors and caregivers** adopt in the modern digital and computer age that develop student understandings of and appreciation for the scientific, technical, mathematical, and engineering basis of technological developments?
- What strategies effectively engage **principals, guidance counselors, and other school system administrative leaders** to promote students' and teachers' adoption and effective use of technologies that support STEM and STEM cognate learning and career awareness?
- Given the shifting demographics reflected in our current classrooms and in our country, what are effective and productive ways to ensure broadening participation by **engaging diverse underrepresented populations in STEM** programs and careers?

Logic Models as a way to pull it all together

- Theoretical framework
- Alignment with guiding questions
- Making research design, implementation, and evaluation coherent



Inputs

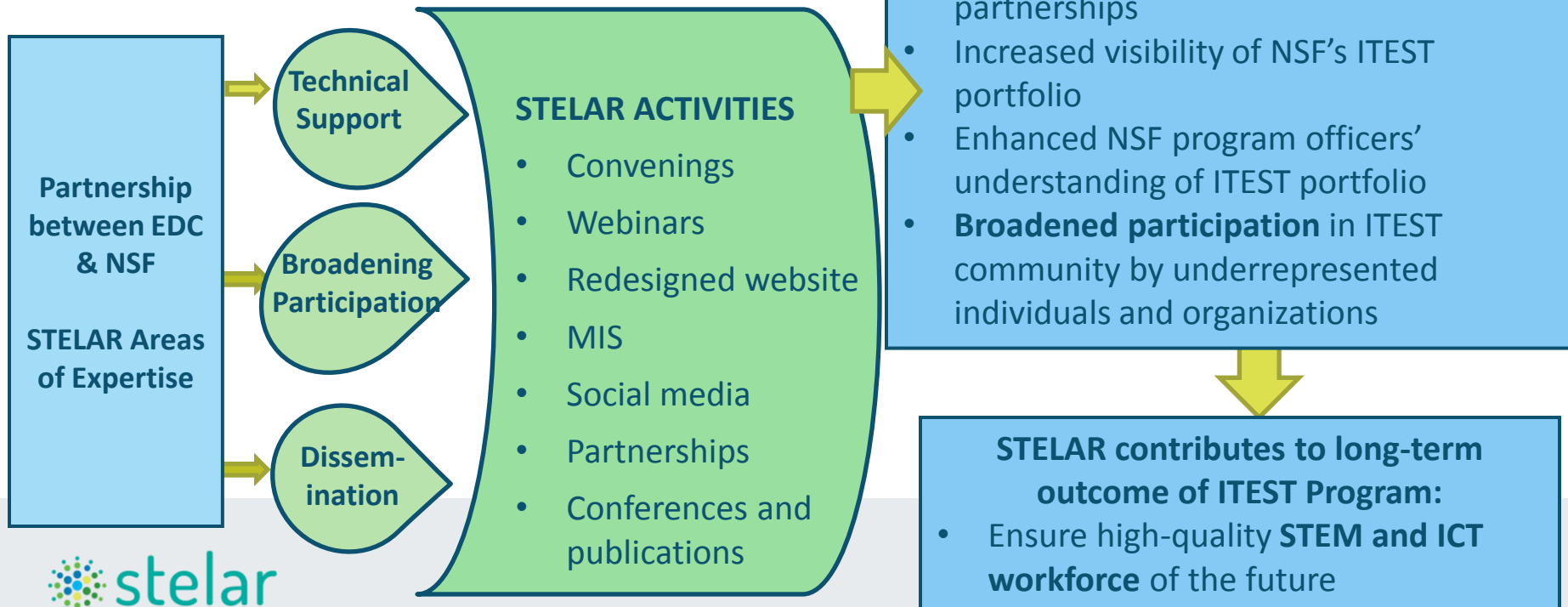
Activities

Outputs

Outcomes

Impact

EDC will leverage deep knowledge of the ITEST program and the vibrant ITEST Community of Practice to expand ITEST in new directions, develop new partnerships, and broaden participation.



OUTCOMES

- Active community of practice engaged in developing and disseminating **STEM learning environments**
- New stakeholders engaged in ITEST community.
- ITEST dissemination network built on emerging technologies and new partnerships
- Increased visibility of NSF's ITEST portfolio
- Enhanced NSF program officers' understanding of ITEST portfolio
- **Broadened participation** in ITEST community by underrepresented individuals and organizations

STELAR contributes to long-term outcome of ITEST Program:

- Ensure high-quality **STEM and ICT workforce** of the future

External Evaluation in the 2014 Solicitation

Conducted by someone external to the project, with a focus on two overarching questions:

- **Did you do what you said you would do?**
- **How well did you do it?**

*All DRL projects are subject to a series of **external, critical reviews** of their designs and activities (including their theoretical frameworks, any data collection plans, analysis plans, and reporting plans). A proposal must describe appropriate project-specific external review and feedback processes. These might include an external review panel or advisory board proposed by the project or a third-party evaluator.*

Common Guidelines for Education Research and Development

- **Foundational:** Tests, develops or refines theories of teaching or learning
- **Early Stage or Exploratory:** Examines relationships among important constructs in education and learning (usually correlational rather than causal)
- **Design and Development:** Draws on existing theory & evidence to design and iteratively develop interventions or strategies
- **Impact:** Generates reliable estimates of the ability of a fully-developed intervention or strategy to achieve its intended outcomes (efficacy, effectiveness, scale-up)

Useful Links

- Common Guidelines for Education Research and Development:
http://www.nsf.gov/pubs/2013/nsf13126/nsf13126.pdf?WT.mc_id=USNSF_124
- NSF FAQs for Common Guidelines
http://www.nsf.gov/pubs/2013/nsf131_27/nsf13127.pdf

Conclusion – or a few more ideas

- Formative evaluation
- Rigor vs. design-based research and innovation
- Cultural competence? When research design doesn't fit project implementation
- Multiple ways to meet research and evaluation goals



SOME ITEST PROJECT CHARACTERISTICS

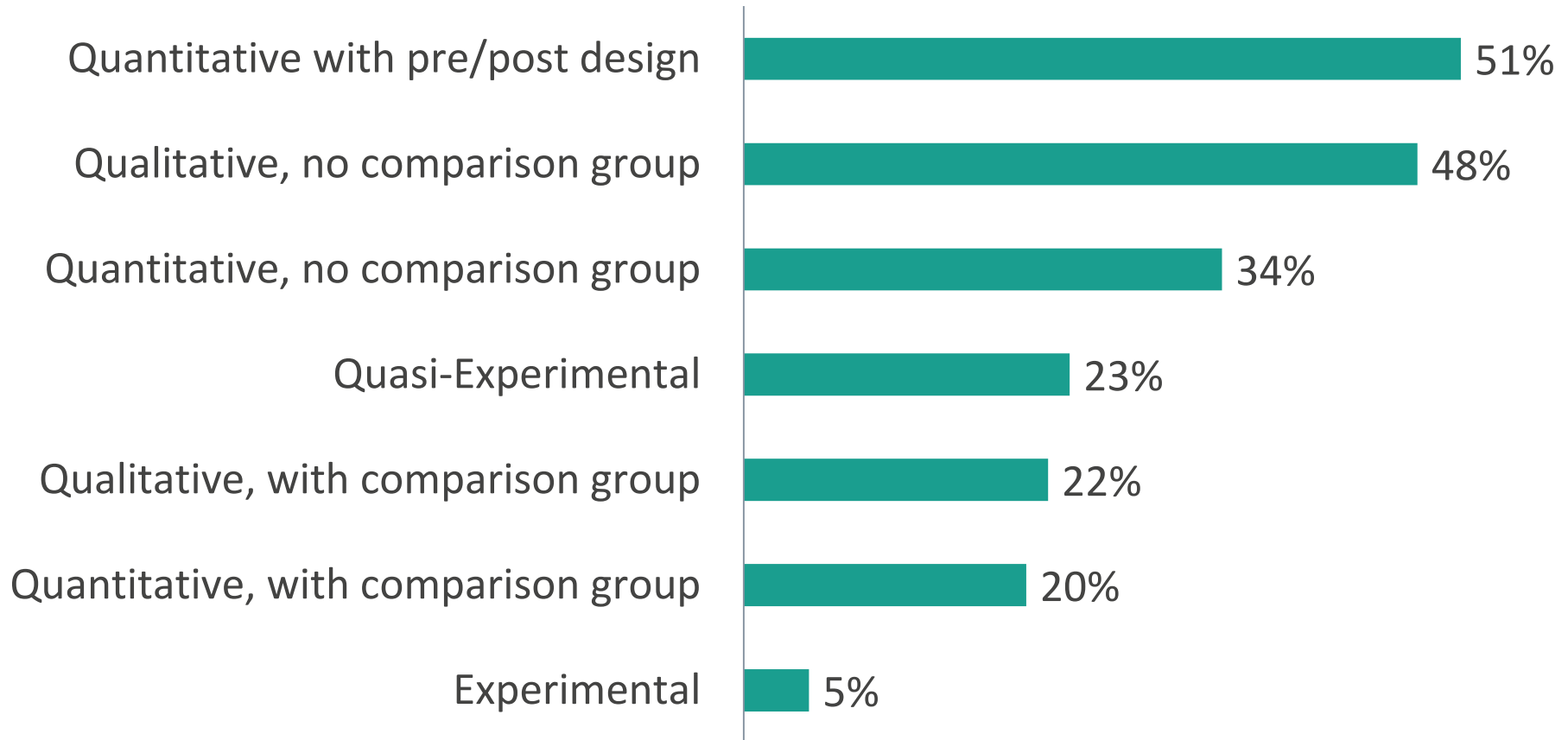
Project Design: Activities (n=65)

Most common project activities:

- Hands-on activities using technologies common in the STEM workplace (75%)
- Curriculum development (68%)
- Problem-based learning (65%)
- Career skills development (62%)
- Participation of visiting scientists or STEM professionals (60%)



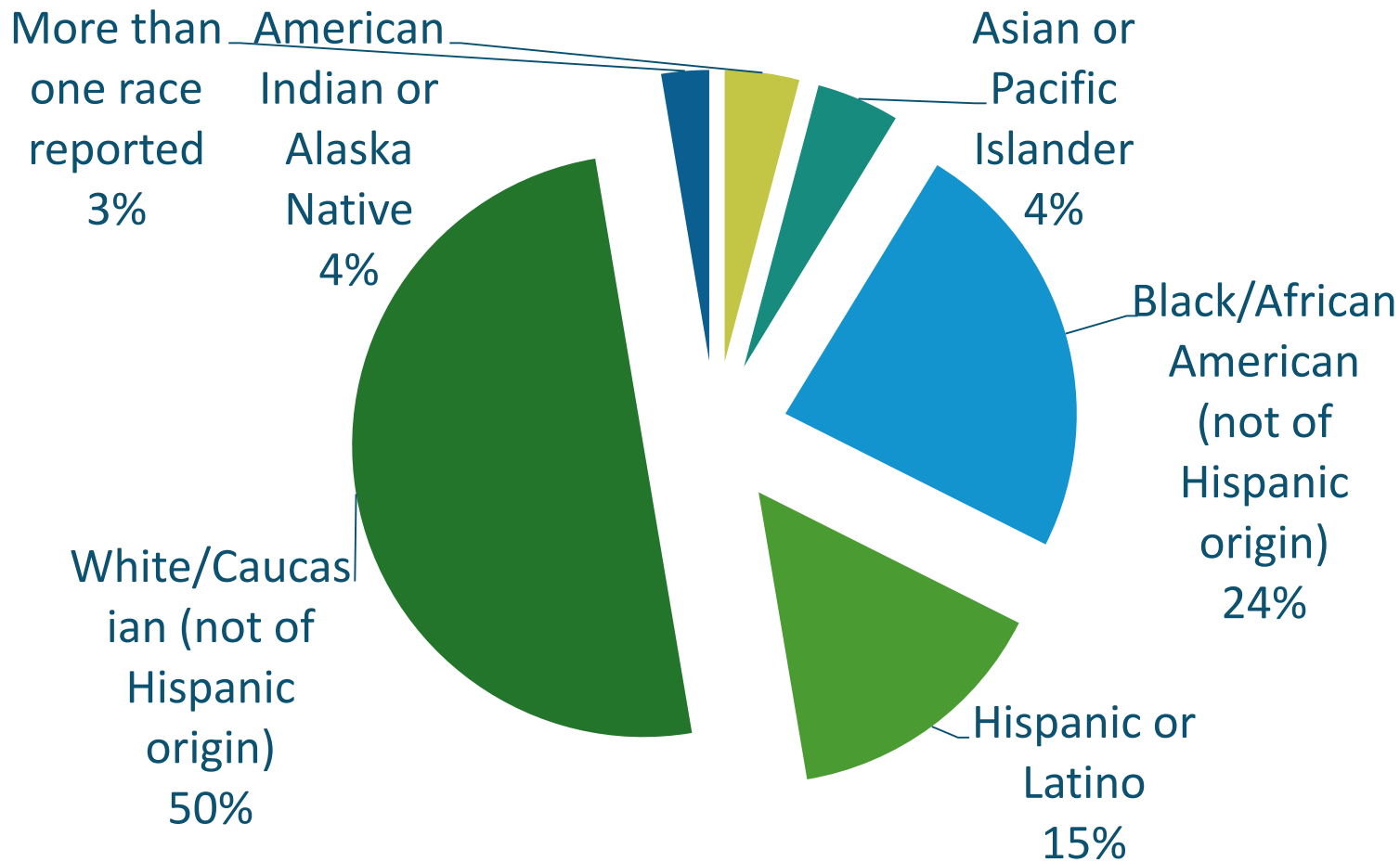
Research/Evaluation Design (n=65)



Research Design (n=65)

	Projects with Youth (n=56)	Projects with Educators (n=54)
Outcomes	<ul style="list-style-type: none">• Changes in interest in STEM (57%)• Changes in interest in STEM careers (54%)• Changes in STEM content knowledge (42%)	<ul style="list-style-type: none">• Changes in self-efficacy in teaching STEM content (50%)• Changes in practice/pedagogy (44%)• Changes in knowledge for using technology tools in STEM teaching (41%)
Data collection methods	<ul style="list-style-type: none">• Pre- and/or post-assessments (88%)• ITEST project observations (50%)• Youth interviews (50%)	<ul style="list-style-type: none">• Pre- and/or post-assessments (59%)• Educator interviews (54%)
Instruments	48% use externally developed and validated instruments	24% use externally developed and validated instruments

Diversity of Youth Served Out of School



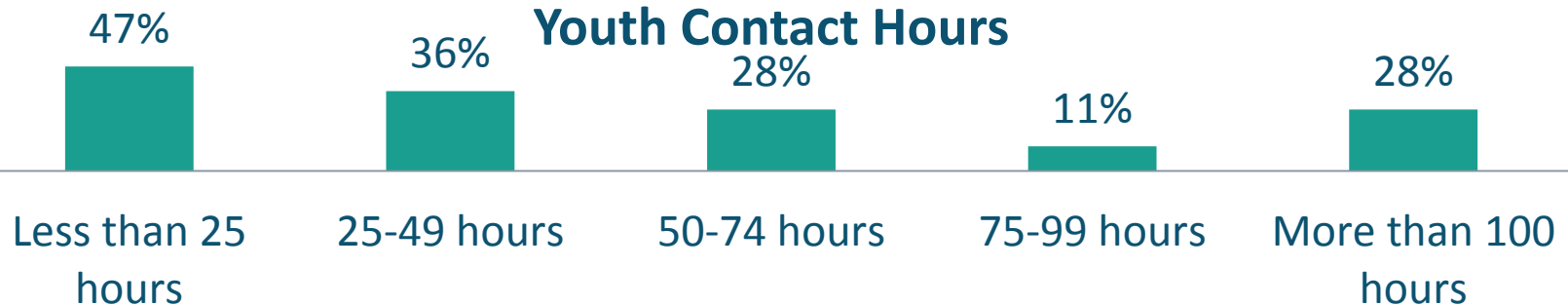
Active Projects with Youth

- 36 of 44 active projects (82%) worked directly with youth
- 22,000 youth served in 2012-2013

Top Formats with Youth



Youth Contact Hours



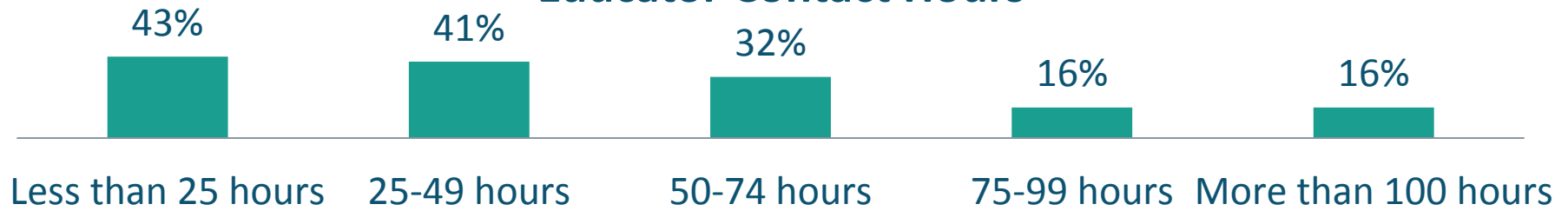
Active Projects with Educators

- 37 of 44 active projects (84%) worked with educators
- 1,700 educators served in 2012-2013
- 22,700 youth taught, in 21 projects

Top Formats with Educators



Educator Contact Hours



Questions? Contact us!

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- Bernie Sibuma
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