

THE NEW FACE OF RESEARCH AND EVALUATION IN ITEST PROJECTS

HOSTED BY: STEM LEARNING AND RESEARCH CENTER (STELAR)
EDUCATION DEVELOPMENT CENTER, INC.

Agenda

- STELAR Overview
- Presenters:
 - Carrie Parker
STELAR Center
 - Kirk Knestis
Digital East St. Louis: An Urban Place-Based Learning Model to Promote Information Technology and Computer Science Career Interests of Minority Youth
 - Bradley Barker, Gwen Nugent, Neal Grandgenett
Nebraska Wearable Technologies (WearTec)



STELAR Overview

- STELAR Partners:
 - EDC, Inc.
 - EdLab Group
 - Goodman Research Group, Inc.

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

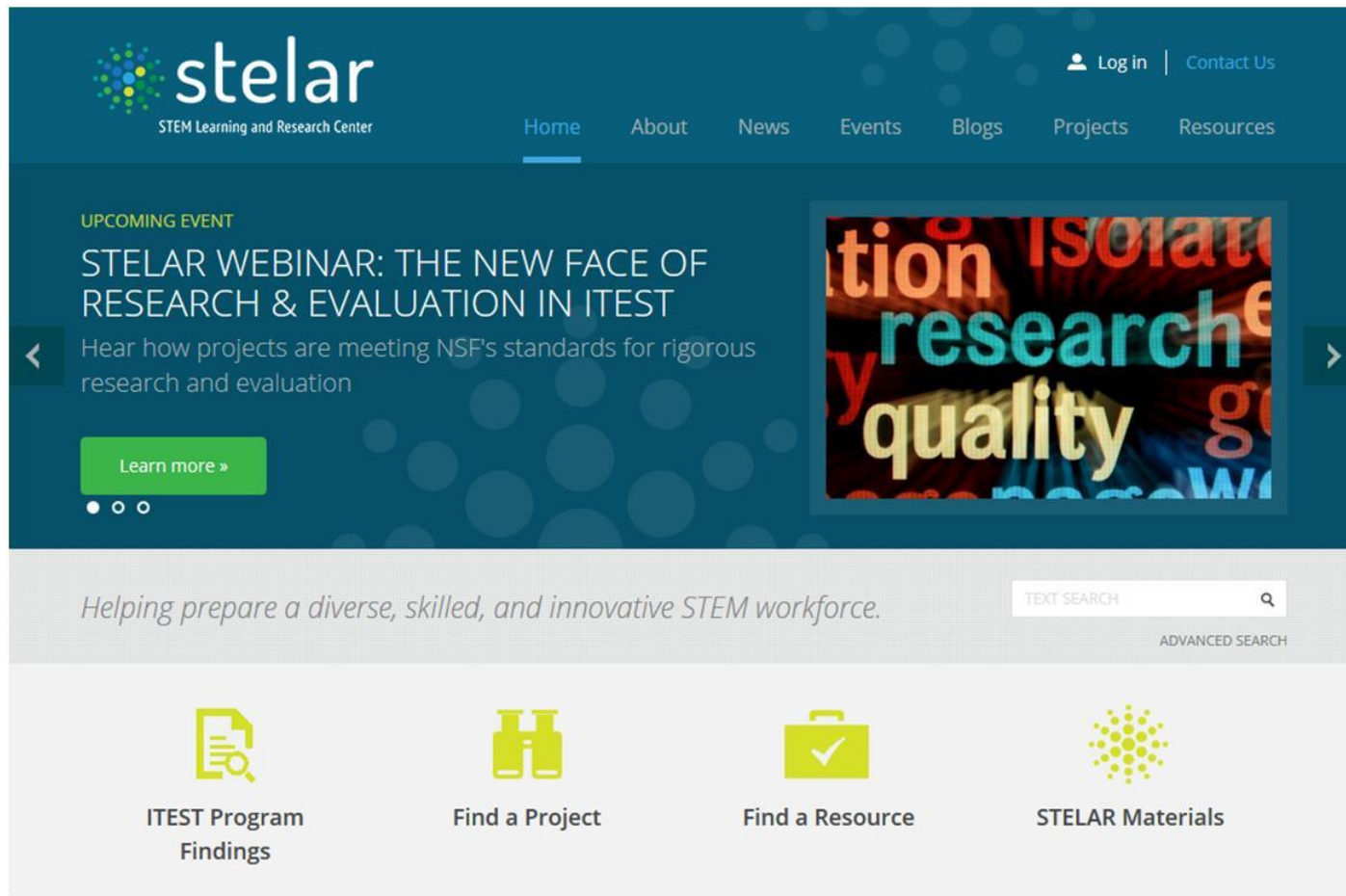
- To build understandings of best practice factors, contexts and processes contributing to K-12 students' motivation and participation in STEM
- Helps students to be aware of STEM careers, and to pursue formal school-based and informal out-of-school educational experiences to prepare for such careers
- **288** current and past projects across **44** states have served **247,700 students, 9600 educators, 3000 parents and caregivers**

STEM Learning and Research Center (STELAR) Goals

- Facilitate projects' success through **technical support** with a focus on synthesis of findings
- Inform and influence the field of STEM stakeholders by **disseminating** project findings nationally
- Deepen the impact and reach of the ITEST program by **broadening participation** in the ITEST portfolio



STELAR Website – <http://stelar.edc.org>



The screenshot shows the homepage of the STELAR website. The header features the STELAR logo (a colorful cluster of dots) and the text "stelar STEM Learning and Research Center". Navigation links include "Home" (underlined), "About", "News", "Events", "Blogs", "Projects", and "Resources". There are also "Log in" and "Contact Us" links. The main content area has a dark blue background with a large banner for an "UPCOMING EVENT" titled "STELAR WEBINAR: THE NEW FACE OF RESEARCH & EVALUATION IN ITEST". The banner text says "Hear how projects are meeting NSF's standards for rigorous research and evaluation" and includes a "Learn more »" button. To the right of the text is a graphic with the words "research" and "quality" in large, colorful letters. Below the banner is a light gray section with the tagline "Helping prepare a diverse, skilled, and innovative STEM workforce." and a search bar with "TEXT SEARCH" and "ADVANCED SEARCH" options. At the bottom of this section are four icons with corresponding text: a magnifying glass over a document for "ITEST Program Findings", binoculars for "Find a Project", a briefcase with a checkmark for "Find a Resource", and a cluster of dots for "STELAR Materials".

stelar
STEM Learning and Research Center

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UPCOMING EVENT

STELAR WEBINAR: THE NEW FACE OF RESEARCH & EVALUATION IN ITEST

Hear how projects are meeting NSF's standards for rigorous research and evaluation

Learn more »

Helping prepare a diverse, skilled, and innovative STEM workforce.

TEXT SEARCH

ADVANCED SEARCH

ITEST Program Findings

Find a Project

Find a Resource

STELAR Materials

STELAR People Connector

<http://stelar.edc.org/opportunities/people-connector-directory>


People Connector Form

STELAR People Connector Directory - Add your Information

The purpose of this directory is to connect individuals looking for partners or tools for their ITEST proposals with those who can provide partnership or tools (e.g., a school district looking for a research methodologist, a community-based organization looking for an external evaluator).

Please complete this form if you are looking for or can provide specific expertise for ITEST proposals. The information you provide will be publicly available and accessible via the STELAR website.

* Required

 **stelar**
STEM Learning and Research Center

First name *

Last name *

Email *

Organization / Institution *

City *

State *

Website

Listing Type *

Select one listing type for this submission. If you are both LOOKING FOR and PROVIDING expertise, please complete this form for one, and then submit an additional form for the second.

☐ I am LOOKING FOR expertise

☐ I can PROVIDE expertise

People Connector Directory

STELAR People Connector Directory

File Edit View Insert Format Data Tools Form Add-ons Help All changes saved in Drive

Comments Share

The purpose of the People Connector Directory is to connect individuals looking for partners or tools for their ITEST proposals with those who can provide partnership or tools (e.g., a school district looking for a research methodologist, a community-based organization looking for an external evaluator). The information provided is publicly available and accessible via the STELAR website. You can get notified of additions to the Directory by clicking on 'Tools' and 'Notification Opportunities' above (you must sign in to a google account in order to access the Tools).

Note: STELAR and NSF do not endorse the credibility or expertise of any specific individuals on the compiled list.

	Timestamp	First name	Last name	Email	Organization / Institution	City	State	Website	Listing Type	Type of Expertise	Expertise Details
14	9/8/2014 16:42:48	Anita	Krishnamurthi	akrishnamurthi@alterssch	Alterschool Alliant	Washington	DC	http://www.alterssch.org	I can PROVIDE expertise	Researcher, Informal education	Please reach out if you're looking for...
15	9/9/2014 9:07:53	Bonnie	Swan	bonnie.swan@ucf.edu	University of Central Florida	Orlando	Florida	http://education.ucf.edu	I can PROVIDE expertise	Evaluator, Researcher	Program Evaluation and Education...
16	9/9/2014 9:19:45	Cynthia	Tanakis	tanakis@pitt.edu	University of Pittsburgh	Pittsburgh	PA	http://www.ceac.pitt.edu	I can PROVIDE expertise	Evaluator, Researcher	Cynthia A. Tanakis, Ed.D., founder...
17	9/9/2014 12:09:42	Amy	Grack Nelson	agnelson@smm.org	Science Museum	St Paul	MINN		I can PROVIDE expertise	Evaluator, Evaluation instrument	Expertise in the development and...
18	9/9/2014 17:00:08	Troy	Sadler	sadler@missouri.edu	University of Missouri	Columbia	MO	http://education.missouri.edu	I can PROVIDE expertise	Evaluator	The ReSTEM Institute: Reimagining...
19	9/10/2014 18:56:16	Vega	Vanessa	vanessa@rockman.com	Rockman et al.	San Francisco	CA	www.rockman.com	I can PROVIDE expertise	Evaluator, Researcher	Can provide expertise on: evaluation...
20	9/16/2014 10:00:21	Kevin	Glass	glass@educationconnect	Center for Research	Litchfield	CT	www.educationconnect.org	I can PROVIDE expertise	Evaluator	We can provide both internal and external...
21	9/16/2014 13:14:04	Juan	Concepcion	rubricsolution@gmail.com	Concepcion-Cards	Manati	Puerto Rico	www.rubricsolution.com	I am LOOKING FOR expertise	Evaluator, Informal education	Proven educational STEM practice...
22	9/17/2014 15:21:28	Kristin	Bass	kristin@rockman.com	Rockman et al.	San Francisco	CA	www.rockman.com	I can PROVIDE expertise	Evaluator, Evaluation instrument	Rockman et al is an independent...
23	9/17/2014 10:39:14	Karen	Yanowitz	kyanowitz@astate.edu	Arkansas State U	Jonesboro	AR		I can PROVIDE expertise	Evaluator, Researcher	I have two ITEST grants and am ve...
24	9/18/2014 16:41:00	Jared	Ozga	jozga@wcs.org	Wildlife Conservancy	New York	NY	www.wcs.org	I am LOOKING FOR expertise	Informal education site	Looking to forge partnerships with...
25	9/22/2014 15:26:32	Robinson	Robinson	ronrobinson@lewislatimer	Lewis H. Latimer	Chelsea	Mass	www.lewislatimer.org	I can PROVIDE expertise	Informal education site	I can provide information on how to...
26	10/22/2014 16:12:12	Teresa	Reagan	treagan@ncat.edu	NC A&T State Uni	Greensboro	NC		I am LOOKING FOR expertise	Evaluator	We are searching for an external e...
27	11/12/2014 21:47:15	Aaron	Parker	Aaron.Ti.Parker@gmail.com	University of Guam	ASAN	Guam		I am LOOKING FOR expertise	Evaluator, Formal education	Looking for help putting together a...
28	2/17/2015 12:30:42	Jana	Craig-Hare	janach@ku.edu	University of Kansas	Lawrence	KS	www.altec.org	I can PROVIDE expertise	Evaluator, Researcher	Evaluation instrument
29	2/17/2015 16:23:36	Jaclyn	Ocuppaugh	joc2424@tc.columbia.edu	Teachers College	New York	New York		I can PROVIDE expertise	Evaluator, Researcher	Evaluation instrument

Monthly Highlights



STELAR

Monthly Highlight

Research in ITEST

[read more »](#)



Recent News

ITEST Conference Presentations for 2015

December 11, 2014 | [READ MORE »](#)

Program stitches together STEM, fashion design

October 9, 2014 | [READ MORE »](#)

Seen in NY: Bridging the Gap at the Central Park Zoo

March 12, 2014 | [READ MORE »](#)

The science of learning

July 22, 2014 | [READ MORE »](#)

New program aims to bring fitness, fun into the classroom

July 7, 2014 | [READ MORE »](#)

[VIEW ALL NEWS »](#)

Upcoming Events

 Feb 26 2015 - 3:00pm to 4:00pm

STELAR Webinar: The New Face of Research and Evaluation in ITEST Projects

[READ MORE »](#)

[VIEW ALL EVENTS »](#)

Career Choice from Computational Indicators of Student Engagement within Middle School Mathematics Classes

STELAR recently had the opportunity to interview Ryan Baker about his ITEST Project, Predicting

[READ FULL POST »](#)

December 8, 2014

Project Spotlight: GUTS: Growing Up Thinking Scientifically

STELAR recently caught up with Irene Lee about her work on Project GUTS: Growing Up Thinking

[READ FULL POST »](#)

[VIEW ALL BLOGS »](#)

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Keep up-to-date on STELAR news and activities, and receive ITEST program updates.

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Today's STELAR webinar

The New Face of Research and Evaluation in ITEST Projects



2007 ITEST Solicitation

Little or no mention of research as part of project work



ITEST is designed to increase the opportunities for students and teachers to learn about, experience, and use information technologies within the context of STEM.... It is in direct response to the concern about shortages of information technology workers in the United States.

2008 ITEST Solicitation

One goal includes producing research



*.....meet the demand for qualified STEM, including information technology workers; to diversify the workforce since women and minorities are underrepresented in ... ICT and other STEM fields; **and to produce research addressing STEM workforce issues.***

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.....*

OK – now we know that all ITEST projects are research projects

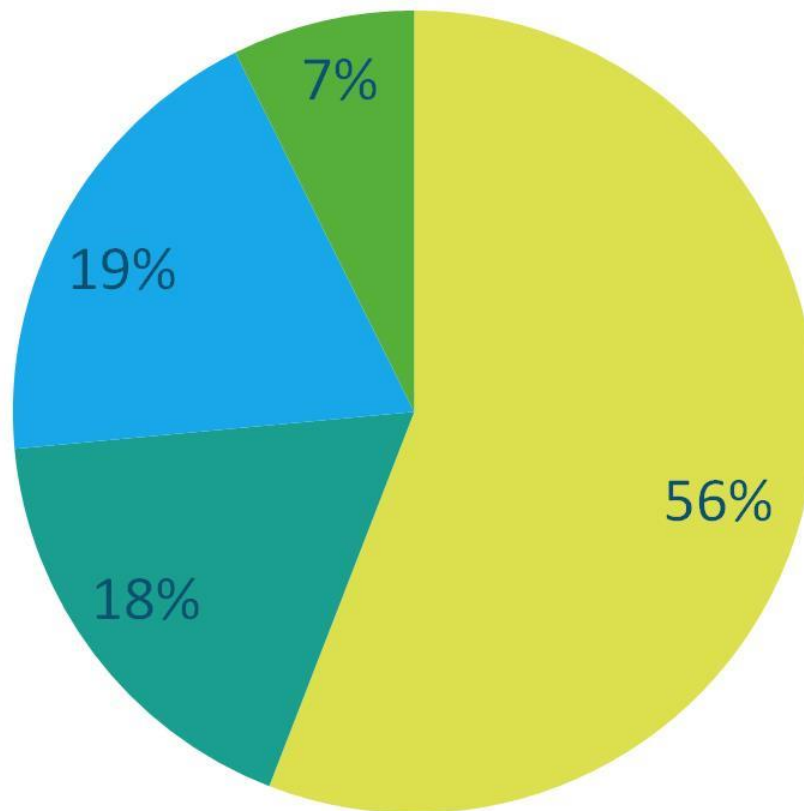


- What does this mean in practice?
 - Project Design
 - Logic Models and ITEST Guiding Questions
 - External Evaluation
 - Common Guidelines

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)*



- Mixed methods (any quantitative with qualitative component)
- Experimental or Quasi-Experimental Design
- Quantitative (not experimental or quasi-experimental)
- Qualitative only

*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



STEM Learning and Research Center (STELAR) Logic Model

Inputs

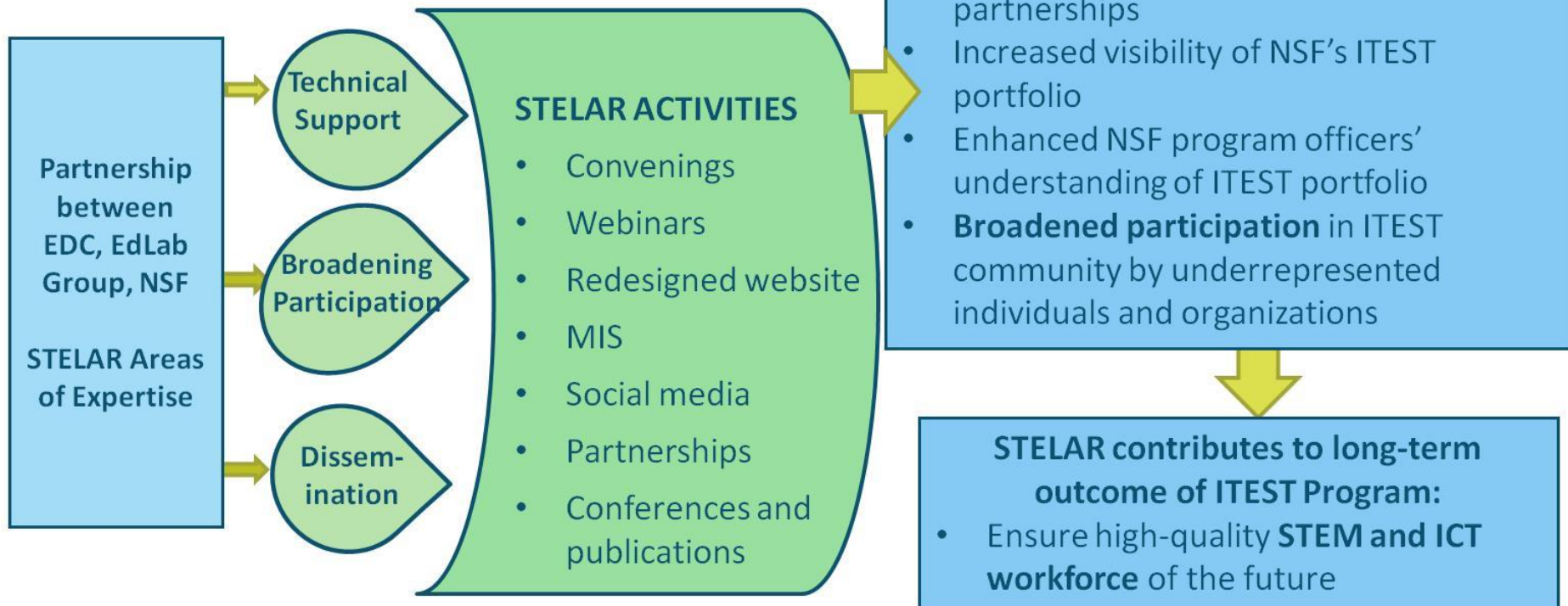
Activities

Outputs

Outcomes

Impact

EDC and EdLab Group will leverage our deep knowledge of the ITEST program and the vibrant ITEST Community of Practice to expand ITEST in new directions, develop new partnerships, and broaden outreach to targeted stakeholders.



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





Digital East St. Louis

Integrated R&D and Program Evaluation
in an NSF ITEST Project

Kirk Knestis, PhD – Hezel Associates

Hezel Associates (Syracuse, NY)

Evaluation, Research, and Planning Contractor

- Staff of 11 researchers
- Currently partner on 12 NSF projects in nine programs, three in ITEST
- Working with SIUE on their ITEST Strategies project – *Digital East St. Louis*
- *Unusual because we are both **Research Partner** and **External Evaluator** for this work*

Digital East St. Louis

Southern Illinois University Edwardsville (SIUE)

- 2014 ITEST Strategies project award
- *An Urban Place-Based Learning Model to Promote Information Technology and Computer Career Interests of Minority Youth*
- Outcomes relate to **IT and computing skills** and **awareness of STEM-related careers**
- The **innovation** is an “urban place-based learning model”

Digital East St. Louis

Developing and Researching the DESL Model

- All ITEST projects are research projects, to...
- Conceive, improve, and adopt a model to achieve lasting education outcomes for stakeholders (**Broader Impacts**)
- Advance broader understandings about teaching and learning (**Intellectual Merit**)
- ITEST requires an external evaluation of every project

Research vs. Evaluation

Research

Evaluation

Research vs. Evaluation

Research & Development

Framed as **Research and Development** (R&D)

*Study of the DESL
innovation in terms of its
promise of effectiveness*

*Internal to the project,
working with developers*

Program Evaluation

Framed as **Program Evaluation**

*Study of implementation
and impact of the
project's R&D activities*

*External to the project,
third-party perspective*

Research vs. Evaluation

Research & Development

- **Design & Development Research** (Common Guidelines for Ed R&D)
- Mixed-method design
- Comparison pilot study analysis of outcomes
- Questionnaires, student artifact review, interviews, observations

Program Evaluation

- Assessment of **R&D activities** and impact in terms of **broader impact** and **intellectual merit**
- Theory-based mixed method design
- Interviews, document review, and peer review of research

Data do not overlap!

Research, by Phase

Hezel Associates

SIUE Partners

1. Collect data onsite, analyze, summary to PI
2. Analyze data from SIUE, summary to PI
3. Shift to “critical friend” perspective, focus on external evaluation

1. Grow internal capacity for data collection
2. Collect data, grow capacity for analysis
3. Collect data, analyze, report to external audiences

Building SIUE and partner research capacity

Program Evaluation, by Phase

Hezel Associates

1. Collect & analyze data, mid- and year-end formative summaries
2. Collect & analyze data, mid- and year-end formative summaries
3. Mid-year summary, final report, peer review of PI's findings

SIUE Partners

1. Provide access for data collection, use formative summaries
2. Provide access for data collection, use formative summaries
3. Provide access for data collection, use report for NSF reporting

Kirk Knestis PhD
Chief Executive Officer
Hezel Associates, LLC
731 James Street #410
Syracuse, NY 13203
kirk@hezel.com
www.hezel.com

WearTec Research

BRADLEY BARKER, PI

GWEN NUGENT, COPI RESEARCH

NEAL GRANDGENETT, COPI EVALUATION

WearTec Project

A strategies project to design and test an instructional model using wearable technologies to enhance student interests and capabilities to pursue STEM careers.



Questions From Solicitation

What coherent set of experiences effectively and efficiently support student competency...?

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?

Given the shifting demographics what are effective ways to broaden participation...?

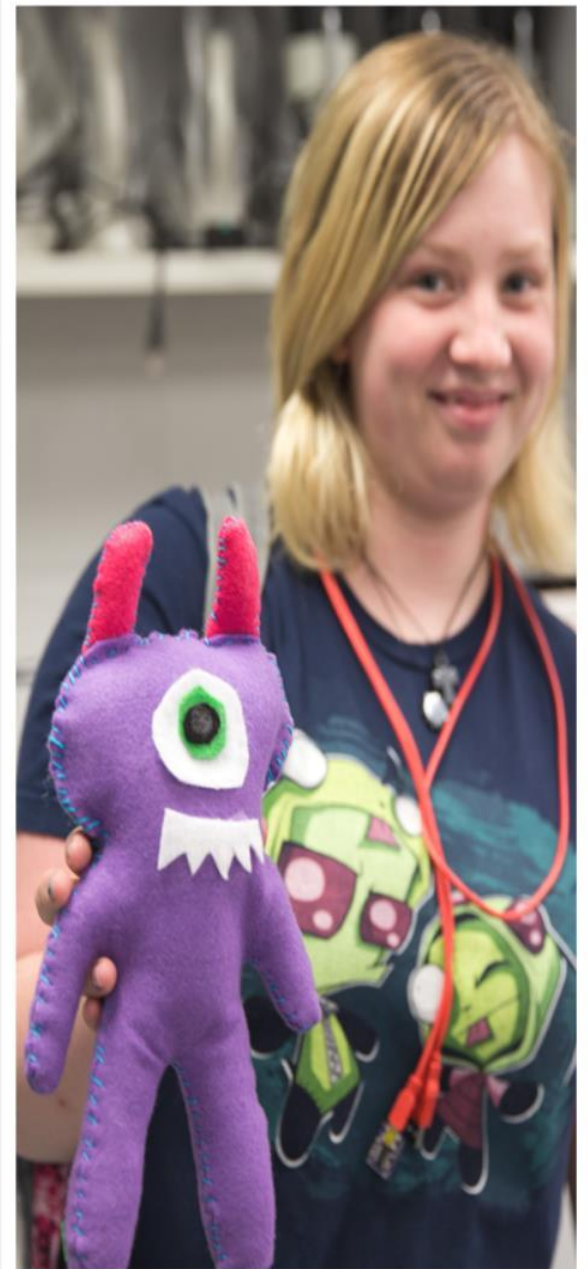


Research Questions and Design

Primary Research Question:

To what extent do the wearable technology experiences promote student a) engineering design knowledge and skills; b) electricity and circuitry knowledge; c) computer programming skills; and d) positive attitudes and motivation toward STEM and STEM careers?

Design: Quasi-experimental examining differences between the WearTec intervention group and a control group participating in an after-school STEM club at the same school (n = 45 informal/formal teaching teams and 900 students) .



Research Questions and Design

Secondary Research Questions

1. To what extent does the use of the wearable technologies curriculum broaden the participation of underrepresented groups in STEM programs and careers?

Design: Descriptive with statistical analyses examining any differential effects across subgroups

2. To what extent does this wearable technologies project effectively engage teachers and out-of-school educators to utilize and integrate STEM into the classroom and out-of-school learning to promote student learning and interest in STEM?

Design: Mixed methods with interviews and fidelity of implementation analysis

Evaluation Process

Working collaboratively with the research team, we will follow the:

- Evolving feasibility and usability of the curriculum

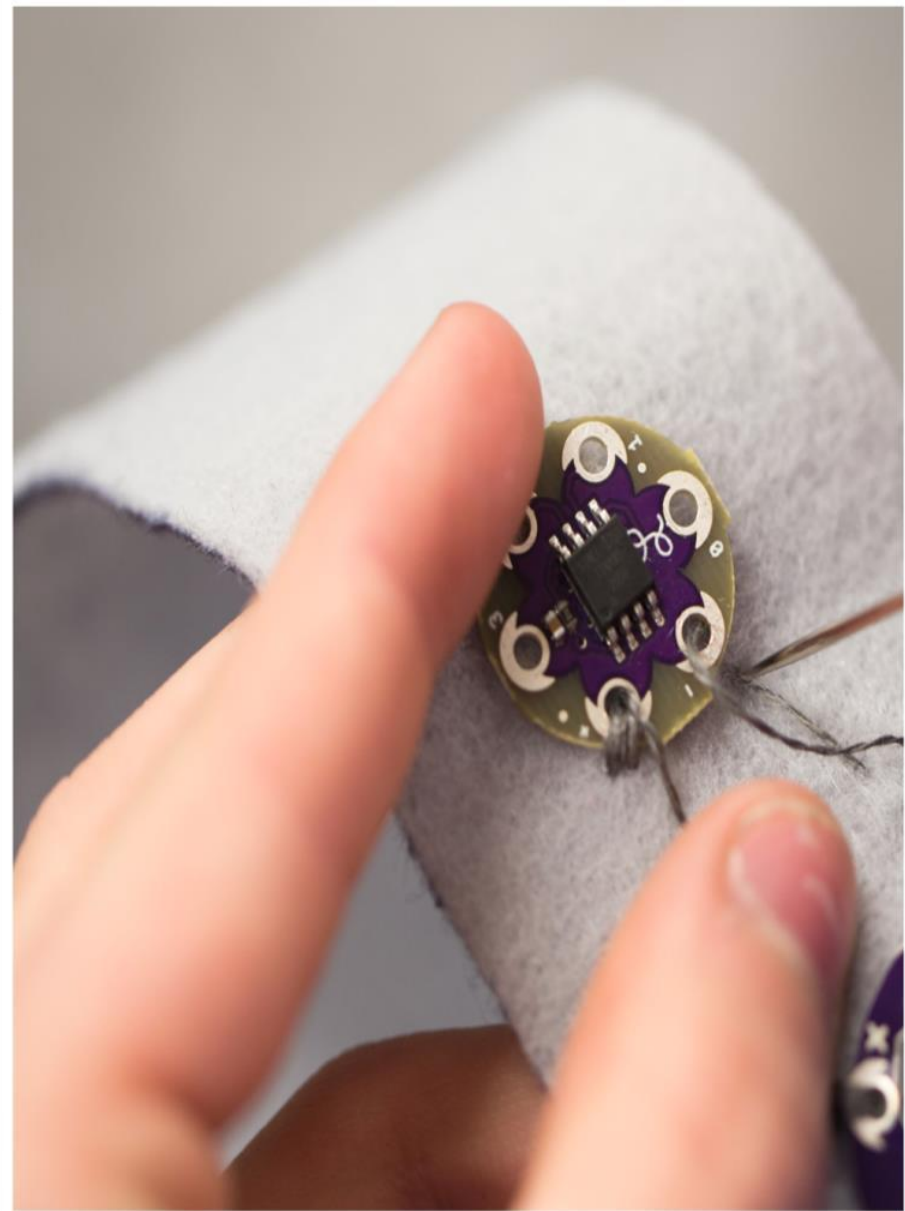
(Advisory Panel reviews by from content and curriculum specialists)

- Perceived effectiveness (teachers, informal educators, students)

(Focus groups / surveys / interviews / embedded assessments)

- Use of the curriculum in instruction and classroom implementation

(Rubric-based observation data based from classroom videos)



NSF Common Guidelines

Our team has aligned our research closely with NSF's *Common Guidelines for Education Research and Development* and in particular, with the document's category of Research Type #3 (Design and Development Research). This type of research “develops solutions to achieve a goal related to education or learning, such as improving student engagement or mastery of a set of skills”. We are essentially developing, testing, and refining a “wearable technologies curriculum solution” that has the promise of effectively teaching engineering design and building student interest and motivation in STEM

Student Oriented Questions

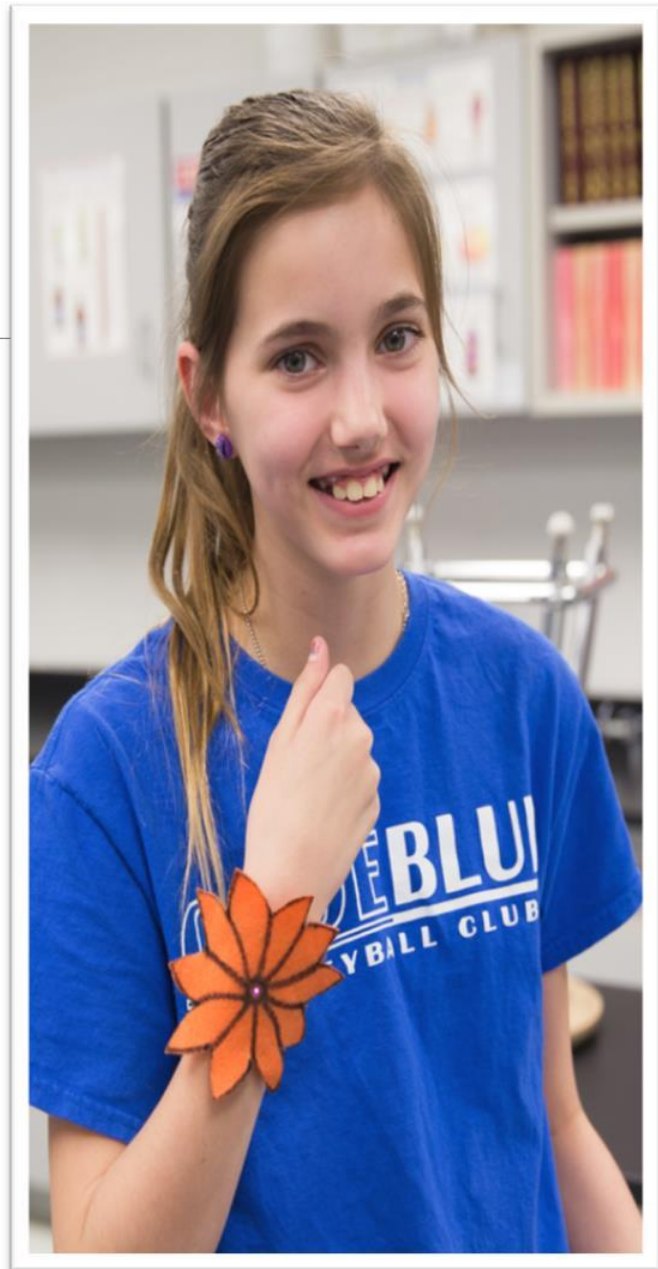
- *Are the youth able to successfully complete activities?*
- *Are they engaged in activities?*
- *Are there additional changes needed to promote student-desired outcomes?*

(Observation data, Short Feedback Surveys, Embedded Assessments)

Teacher Oriented Questions

- *Are teachers able to successfully implement activities in their classroom?*
- *Are there barriers?*
- *How much support do teachers need and what type and from whom?*
- *How do teachers perceive the curriculum and activities - what was helpful, what does not work, what changes are needed?*

(Surveys, Observation Data, Focus Groups)



Questions?



Stay Connected

STELAR Contact Information

stelar@edc.org

<https://www.facebook.com/stelarctr>

https://twitter.com/STELAR_CTR