STEM Learning and Research (STELAR) Center @ Education Development Center

How to Address Workforce/Career Education in your ITEST Project

Thursday September 24th, 2015

stelar
STEM Learning and Research Center

NSF

EDC Learning transforms lives.

Who We Are

- STEM Learning & Research Center (STELAR)
- Education Development Center
- Supporting the program and its grantees since 2003
- Available to assist considering submitting an ITEST proposal
- http//:stelar.edc.org

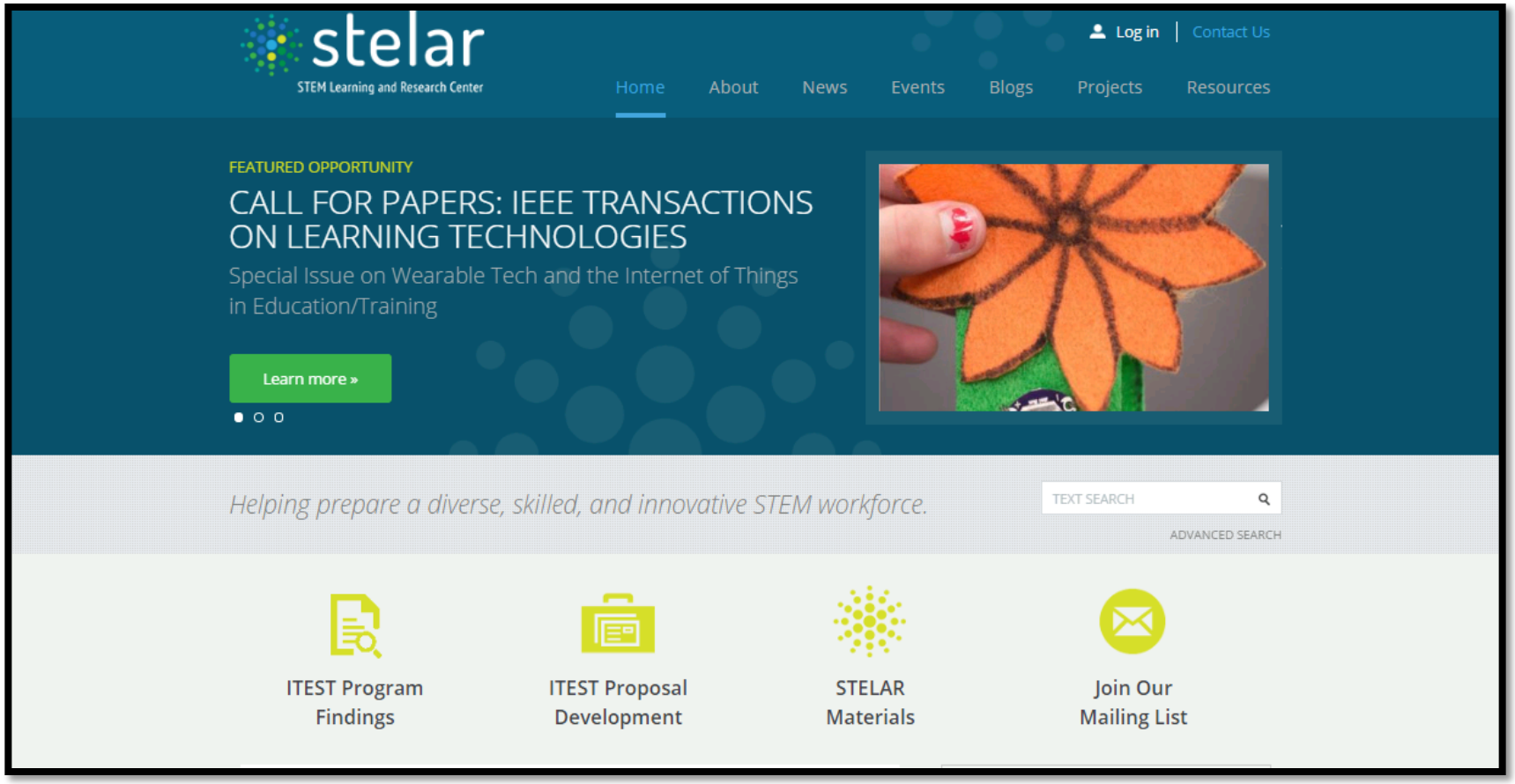
What We Do

- 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

Some of Our Activities

- **Webinars:** Effective Dissemination, Designing Research for ITEST Projects, Mentoring Models
- **Monthly Newsletter:** Information to stay updated on all things STEM and ITEST
- **Project Liaisons:** A STELAR staffer who works directly with each project to provide resources and make connections
- **Regional and Thematic Meetings:** A way for current projects to network with each other
- **Management Information System (MIS):** Annual collection of project information about what projects do, who they work with, what they have achieved

Find Resources on STELAR Website



Get Ideas for Designing your Proposal

ITEST Proposal Development

Share / Save

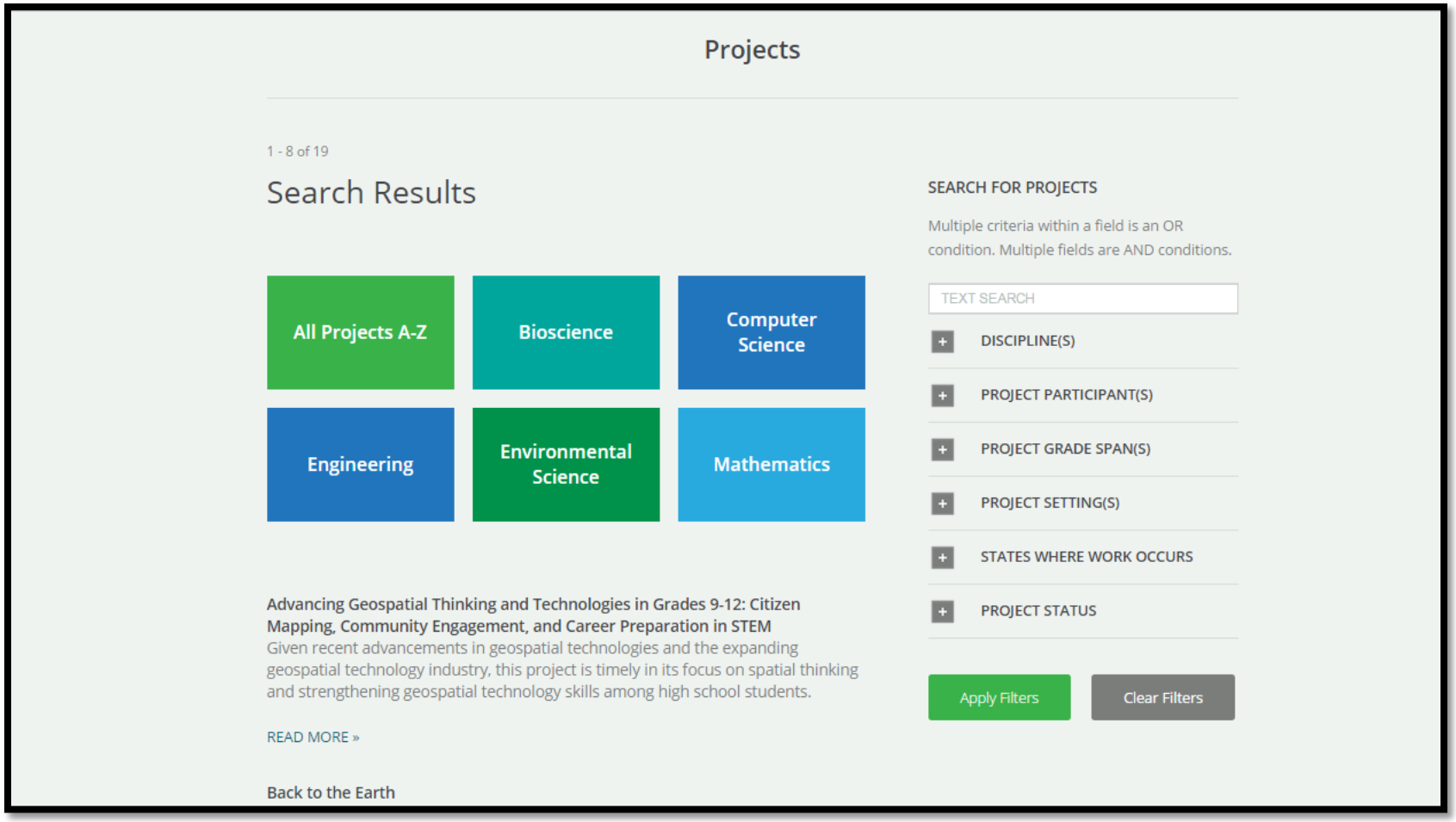
Are you considering submitting a proposal to ITEST? You have come to the right place!
The resources under each heading below provide valuable information to help you develop a competitive proposal:

- The ITEST solicitation webinars provide an overview of the ITEST program as well as details on what to include, and what not to include, in your proposal.
- STELAR themed webinars demonstrate how previous ITEST projects have tackled topics that are of interest to the ITEST program.
- Data and Info Briefs are publications that summarize the activities of the ITEST projects in a given year. Knowing what has been done previously may help you develop an innovative proposal.
- Other publications provide background information on topics that are of interest to the ITEST program.

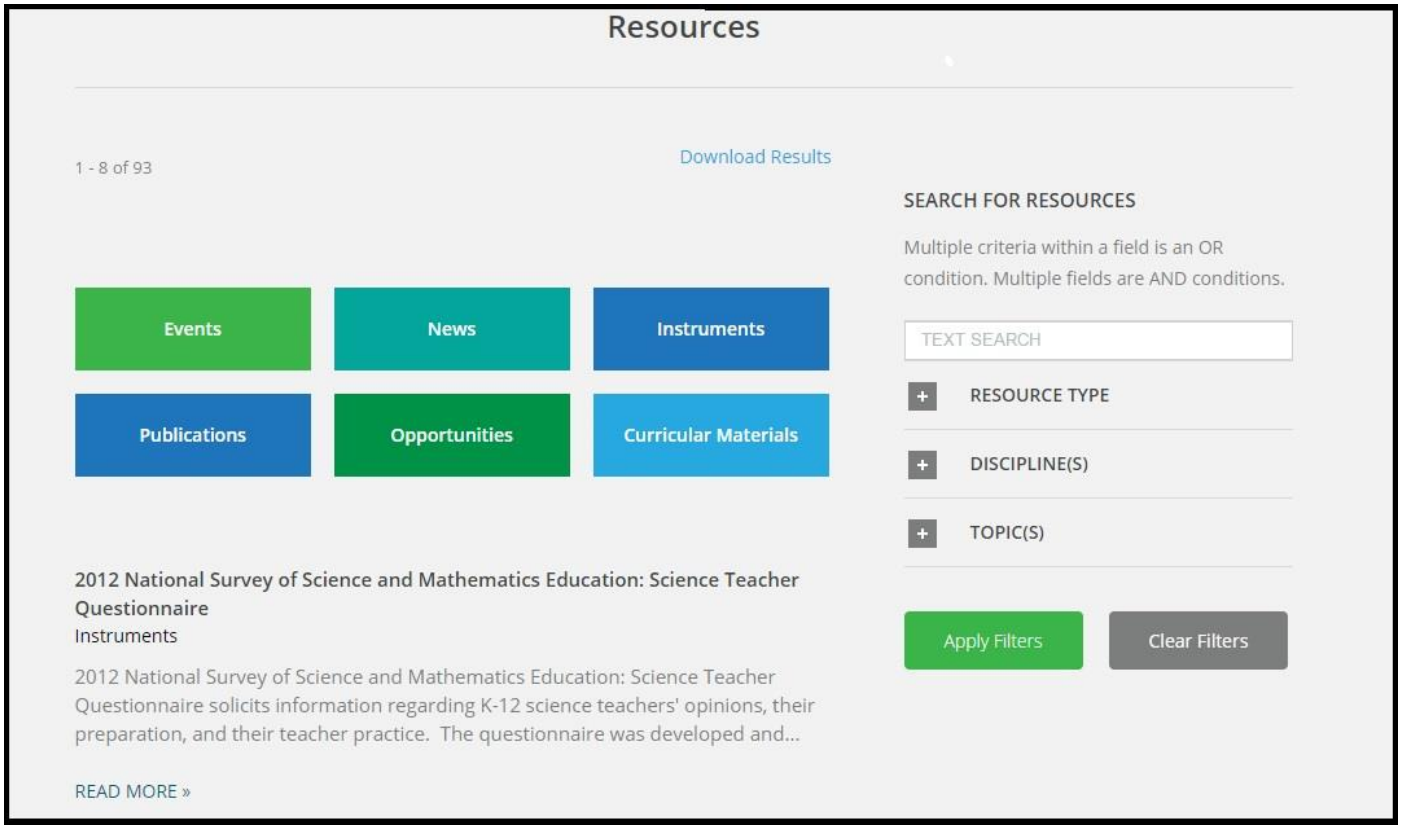
In addition, we suggest you also peruse the other areas of the STELAR website to learn more about your specific area of interest. We encourage you to browse the project profiles to see what projects have already been funded; read ITEST Program Findings to discover what the previously funded ITEST projects have learned from their research and implementation efforts; and search within resources to find *instruments* and *curricular materials* used and developed by ITEST projects.

- GET TO KNOW ITEST
- PREPARE YOUR PROPOSAL FOR SUBMISSION
- DEVELOP A ROBUST RESEARCH DESIGN
- CREATE AN EFFECTIVE EVALUATION STRATEGY
- CONNECT WITH PARTNERS
- REACH UNDERSERVED POPULATIONS
- DEVELOP THE WORKFORCE OF THE FUTURE

Find Project Profiles



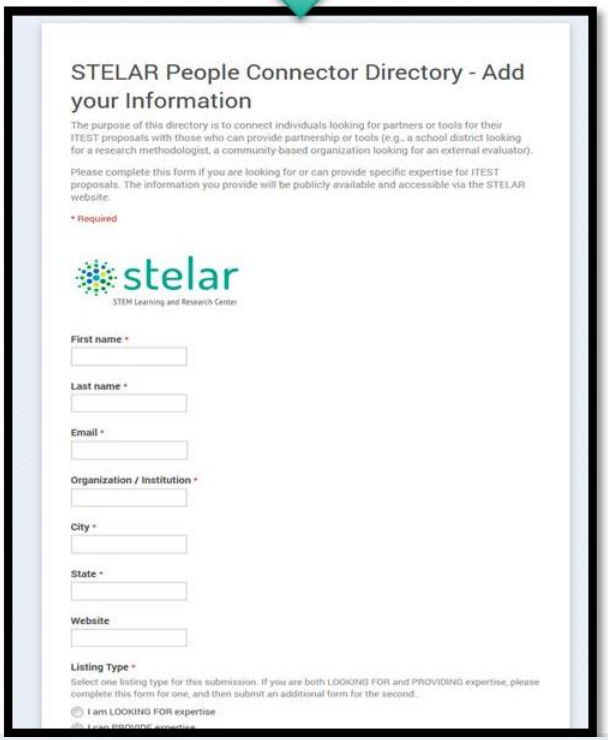
Resource Library – Curricula & Instruments



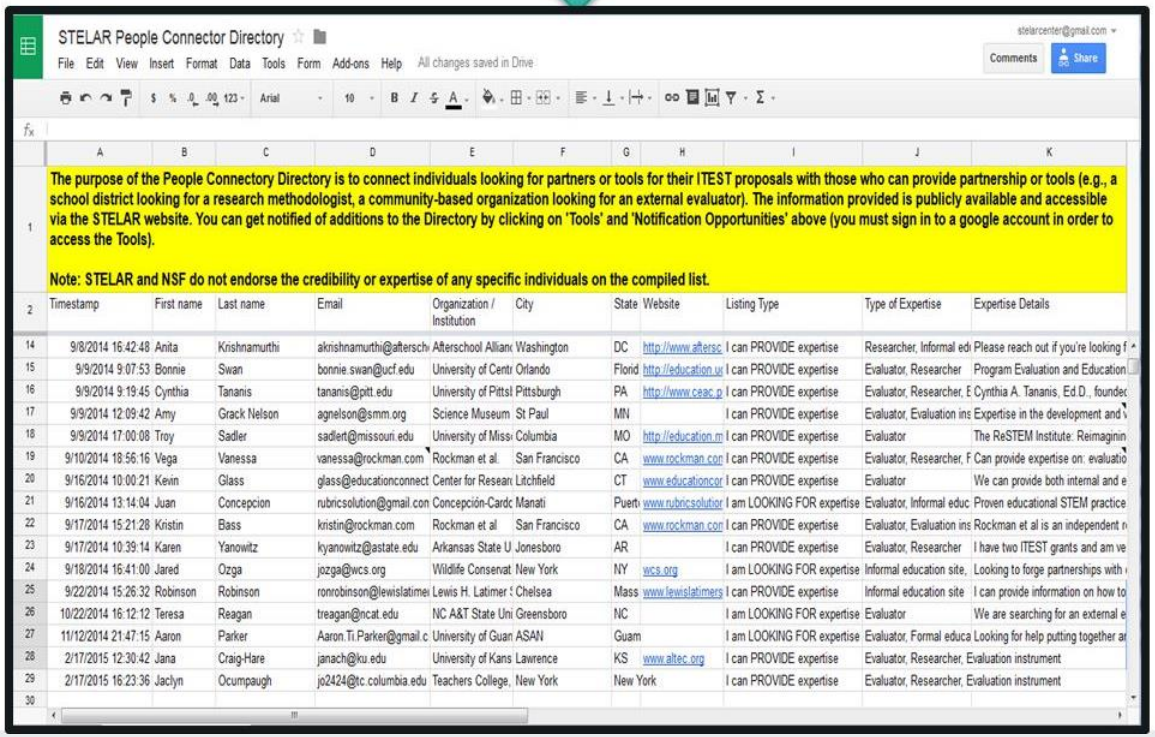
Connect with others via the People Connector

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

People Connector Form



People Connector Directory



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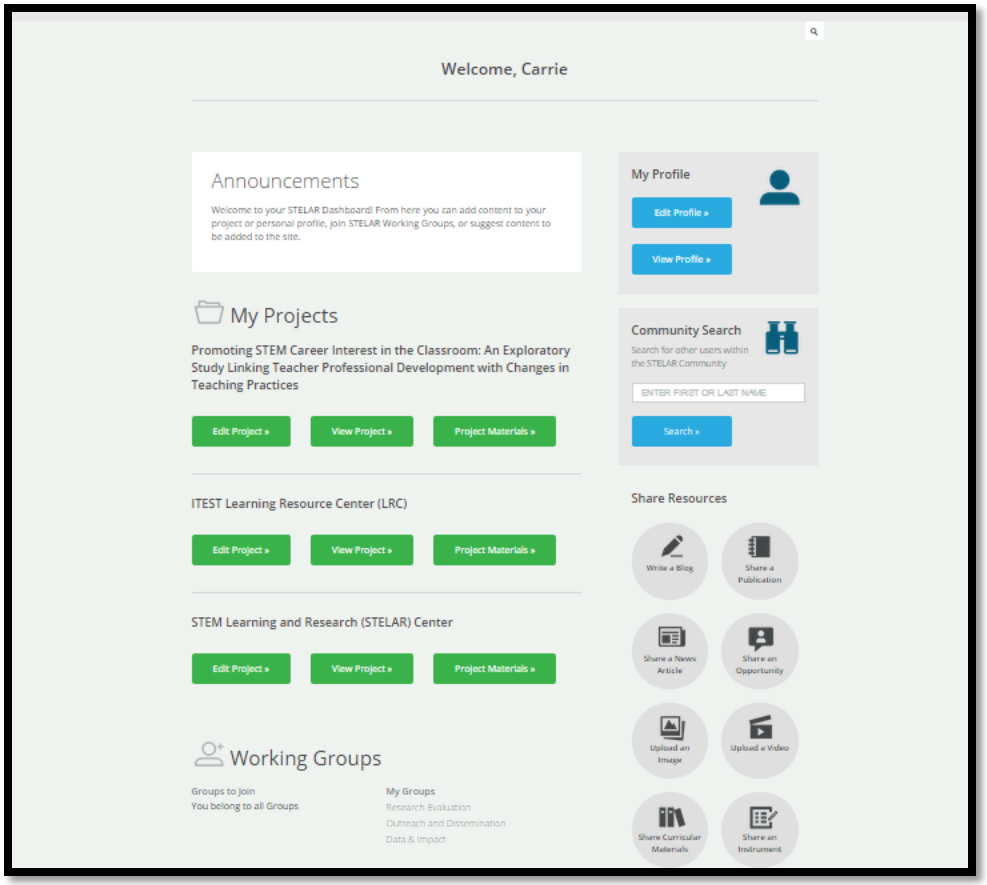
Join our Community of Practice



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And lots more!

Resources

1 - 8 of 473

Events | News | Instruments | Publications | Opportunities | Curricular Materials

$1.1 million grant will fund 3 years of scientific research
News

ITEST project WNY Genetics in Research Partnership has secured funding to enable teachers and high school students from 13 counties in Western and Central New York to conduct scientific research in bioinformatics during the next three years....

SEARCH FOR RESOURCES

Multiple criteria within a field condition. Multiple fields are

TEXT SEARCH

RESOURCE TYPE

DISCIPLINE(S)

TOPIC(S)

Apply Filters

STELAR Materials

Share / Save

The ITEST LRC (2003-2012) and the STELAR Center have produced reports, webinars, and other events as resources to all those working to broaden participation in the STEM workforce to traditionally underrepresented populations. Browse the resources, and let us know what else you would like to see by emailing stelar@edc.org.

- MANAGEMENT INFORMATION SYSTEM (MIS) REPORTS
- NEWSLETTER ARCHIVE
- THEMATIC HIGHLIGHTS ARCHIVE
- WEBINAR ARCHIVE
- CONVENINGS

Dissemination Strategies

Apr | 2015

Dissemination Strategies

Highly effective dissemination strategies are crucial to a a project's impact but projects often struggle with how best to synthesize and share findings and to identify which venues to pursue to best reach their target audiences. The resources compiled here share considerations and program strategies related to dissemination, tools and technologies that can be employed, examples of new dissemination venues or modalities such as social media, online journals, and other lessons learned, successes and challenges to effectively disseminating project findings.

RESOURCES

STELAR Webinar: Effective Dissemination Plans – Success Strategies for Projects and Proposals
(EVENT) Attendees learned how to develop highly effective dissemination plans from seasoned PIs in ITEST and other NSF programs. Presenters shared strategies, lessons learned, ways to leverage technology, and helped to identify non-traditional dissemination venues that are often overlooked.
READ MORE »

ITEST Conference Symposia for 2015
(NEWS) STELAR collaborated with ITEST projects on a number of conference symposium proposals during 2014 for the 2015 conference year.
READ MORE »

Project Spotlight: Fueling the Ocean STEM Workforce Pipeline
(BLOG) STELAR recently had the opportunity to interview Jill Zande from the MATE ROV

Recent Highlights

Mar | 2015
Cyberlearning
Feb | 2015
Research in ITEST
Jan | 2015
Mentoring in ITEST
Dec | 2014
Computer Science Education
Oct | 2014
Working with Diverse

Upcoming Opportunities

Call for Papers: IEEE TLT Special Issue on Wearable Tech and the Internet of Things in Education/Training
Due by Monday, June 15, 2015 | READ MORE »

Journal of Science Education and Technology - ITEST Special Issue Call for Papers
Due by Monday, June 15, 2015 | READ MORE »

U.S. News STEM Solutions National Leadership Conference
Due by Monday, June 29, 2015 | READ MORE »

The Saint Paul Foundation - Advancing Racial Equity Grant Opportunity
Due by Tuesday, June 30, 2015 | READ MORE »

People Connector Directory for ITEST Proposals
READ MORE »

STELAR
Monthly Highlight
Dissemination Strategies
read more »

STELAR Newsletter

News from ITEST, current events, and more.

Current Newsletter »
Newsletter Archives »

Blog

May 27, 2015
Project Spotlight: Barcoding Life's Matrix
STELAR had the opportunity to speak with Ralph Imondi (Coastal Marine Biolabs Integrative

READ FULL POST »

May 7, 2015
Fostering and Maintaining Students' Interest in Engineering

STELAR is on Social Media – Stay in Touch!

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Watch us: https://www.youtube.com/user/stelarcenter

Find resources: http://stelar.edc.org/

Today's presenters

David Blustein, Professor at Boston College

Kirk Knestis, CEO at Hezel Associates, LLC

David Reider, Principal Partner at Education Design, Inc.

Essentials of Career Development

David Blustein, PhD

Professor

Counseling, Developmental, and Educational Psychology Department

Lynch School of Education

Boston College

Career Development and STEM

- The STEM education work that we are working on occurs in a broader context of career development.
- Throughout our lives, we are consistently faced with the need to find our way in the world of work.
- In my presentation, I focus on this broad context—career development.

Career Development and STEM

- Many of the ITEST programs are directed toward enhancing students' skills and interest in STEM.
- Our efforts occur simultaneously while students are considering their options in the world.
- The best ITEST programs, in our view, are those that integrate STEM skills development with career development education.
- By applying some of the core principles of career development theory and research, we believe that STEM education efforts can be enhanced considerably.

Brief Overview of Career Development

- People strive to find a good fit for themselves.
- We are looking for a job/career that will allow us to express ourselves and find meaning and satisfaction in the social and economic world.
- Two major paradigms in the field include:
  - Person-environment Fit Theory
  - Life-Span Developmental Perspectives

Person-Environment Fit

- We are seeking good fit between ourselves and the world of work.
- Knowledge of the self and knowledge of the world of work are central in making good choices.
- We all seek out a good fit in life.
  - In short, birds of a feather flock together.
- A central intervention from Person-Environment Fit theory is exploration of the self and the world of work.
- In many ways, an ITEST program offers a systematic and intentional means of fostering this sort of exploration.

Career Exploration

- Self-exploration - appraisal of one's internal psychological attributes
  - Values, personality characteristics, interests, and abilities
- Environmental exploration - consideration of information from one's environment
  - Options and constraints from relevant educational, vocational, and relational contexts
- Social activity bound by relational, cultural, and economic factors
  - Social elements: family and relational support for exploration
  - Cultural elements: how adaptive exploration is defined within a given culture

Developmental Perspectives

- Another perspective examines our work lives from the life-span developmental ideas.
- From a developmental perspective, we are prompted to resolve various tasks that help to launch young people into the world of work.
  - For example, consider the following:
    - The need to decide what to do after high school.
    - The need to decide what courses to take in high school.

Developmental Tasks of Late Adolescence

- Growth: (ages 0-14): developing a coherent self-concept; self-confidence; adaptive skills in academics and social interactions.
- Exploration: (14-25): crystallize, specify, and implement career plans.
- Establishment: (26-midlife):

The Developmental Task: Using Stages as a Heuristic

- Growth (Ages 4-13)
- Involves forming a vocational self concept
  - Concern about the future
  - Control over decision making
  - Conviction to achieve
  - Competence in work habits and attitudes

  - One of the key developmental tasks is to acquire a future orientation, which leads to planfulness.

Stages (cont)

- Exploration (Ages 14-24)
- Involves fitting oneself into society in a way that unifies one's inner and outer worlds.
  - Crystallization
  - Specification
  - Actualization
  - Successful completion of the exploration stage yields:
    - Planfulness
    - Curiosity to explore work roles
    - Knowledge about career decision making and the world of work

Stages (Cont.)

- Establishment (Ages 25-44)
- Effect a cohesion between one's inner and outer worlds.
  - Stabilizing
  - Consolidating
  - Advancement
- Stable self-concepts and career patterns result from successful movement through establishment
- Work devoid of meaning requires that people find meaning in other life roles

Exploring STEM Careers

- To what extent can we shape interest formation?
  - Answer is neither yes or no
- Students may be considering STEM options; we can enhance their exploration by...
  - Improving competence in STEM skills
  - Enhancing relevance
  - Providing viable exploration options
  - Reducing the impact of gender and race-based socialization

Take-Aways

- ✓ ITEST programs, and the STEM movement in general, can be understood as an intentional form of career development education.
- ✓ Students are seeking out a good fit in the world of work.
- ✓ We are seeking to enrich our students' exploration of STEM careers by providing them with exciting new skills and opportunities to develop their interests.

Workforce Education Outcomes

Kirk Knestis, PhD
CEO
Hezel Associates
Syracuse, NY

From NSF ITEST Solicitation 15-599

"…ITEST supports the development, implementation, and selective spread of innovative strategies for engaging students in experiences that: (1) increase student awareness of STEM and ICT careers; (2) motivate students to pursue the education necessary to participate in those careers; and/or (3) provide students with technology-rich experiences that develop their knowledge of related content and skills (including critical thinking skills) needed for entering the STEM workforce."

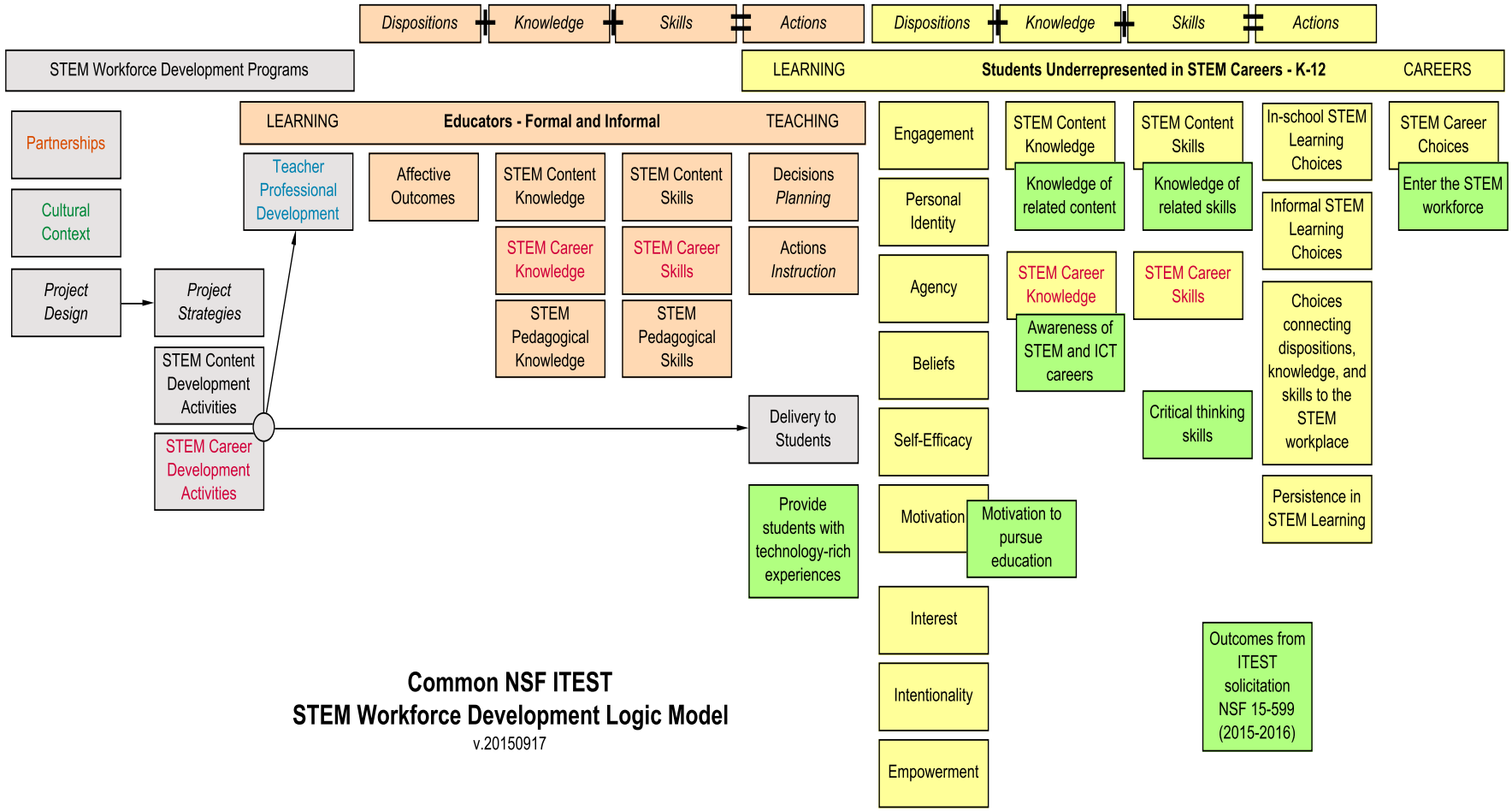
From NSF ITEST Solicitation 15-599

"...ITEST supports the development, implementation, and selective spread of innovative strategies for engaging students in experiences that: (1) increase student awareness of STEM and ICT careers; (2) motivate students to pursue the education necessary to participate in those careers; and/or (3) provide students with technology-rich experiences that develop their knowledge of related content and skills (including critical thinking skills) needed for entering the STEM workforce."

From NSF ITEST Solicitation 15-599

1. Awareness of STEM and ICT careers
2. Motivation to pursue the education necessary to participate in STEM careers
3. Knowledge of related content and skills
4. Knowledge of critical thinking skills

STEM Workforce Development Logic Model



ITEST Outcomes

Dispositions + Knowledge + Skills = Actions

- ✓ Dispositions – *What they feel or believe*
- ✓ Knowledge – *What they understand*
- ✓ Skills – *What they can do*
- ✓ Actions – *Substantial steps they take toward careers*

STEM Outcomes Matrix

	Dispositions	Knowledge	Skills	Actions
STEM Content				
STEM Careers				

STEM Outcomes Matrix – From ITEST

	Dispositions	Knowledge	Skills	Actions
STEM Content		3. Knowledge of related content	3. Related skills	
STEM Careers	2. Motivation to pursue education	1. Awareness of STEM and ICT careers	4. Critical thinking skills	

STEM Outcomes Matrix - Examples

	Dispositions	Knowledge	Skills	Actions
STEM Content	Interest in biology	Understanding of the nitrogen cycle	Ability to use a graduated cylinder	Taking an elective math course
STEM Careers	Belief that one can be a scientist	Familiarity with engineering disciplines	Ability to think critically about research results	Participating in technology internships

Additional Considerations

- ✓Each ITEST project must have well defined outcomes
- ✓ ITEST outcomes focus on students but outcomes may be defined for educators as well
- ✓Specific **Actions** outcomes are not stipulated by NSF but are (a) crucial to making real differences in workforce, and (b) hard to achieve and measure
- ✓ Different types of outcomes call for different assessment methods

Key Takeaways

- ✓ Outcomes can be categorized, making them easier to define, describe, and measure for NSF ITEST projects
- ✓ STEM Career outcomes (versus STEM content outcomes) are crucial to the ITEST program
- ✓ Dispositions, knowledge, and skills must theoretically lead to actions by learners, in order to make a real difference in their lives and the US workforce

Workforce Development – Developing an Analysis

David Reider
Principal Partner
Education Design, Inc
Boston, MA

Summary

ITEST projects commonly measure content, participation, teacher and student response, and dispositions toward STEM learning.

Workforce Development projects need to examine impact on workforce development issues.

Rethinking and reframing what we measure will have a direct impact on project design.

Context

STEM Workforce constitutes one of the three primary categories that form the strategic framework for the NSF directorate Education and Human Resources (EHR), in which the ITEST program is located.

Querying the ITEST Population

- ITEST PIs & Evaluators w/workforce components
- Personal connections and STELAR project database
- Limited to projects that engaged HS students w/STEM professionals
- Of 250 total ITEST inventoried projects/32 returned/6 responded
- Total of n=11 (+ 5 eDez projects)

Cursory findings

- Most claimed to engage in some kind of workforce education
- Most did not connect PD or classroom activities with actual workforce experiences

Strong passive results

- e.g. 92% some kind of workforce element
- 63% providing info on STEM careers
- 45% provide actual workplace experiences

	none	some extent	fair extent	large extent	Total
Engage students in understanding the STEM workforce	0.00% 0	27.27% 3	36.36% 4	36.36% 4	11
Provide information about STEM careers	0.00% 0	27.27% 3	9.09% 1	63.64% 7	11
Provide actual workplace experiences (i.e. shadowing, internships)	45.45% 5	0.00% 0	9.09% 1	45.45% 5	11
Provide meetings or presentations by STEM professionals	9.09% 1	18.18% 2	9.09% 1	63.64% 7	11
Connect the ITEST project work to STEM careers	0.00% 0	18.18% 2	27.27% 3	54.55% 6	11
Provide visits to STEM workplace sites	36.36% 4	9.09% 1	9.09% 1	45.45% 5	11

Less strong active engagement

- 75% overall visits to workplace
- … but 36% for inclusion of workforce partners as central to team
- Site visits are typically show-and-tell

Answer Choices	Responses	
guest speakers at events or workshops	63.64%	7
contributed to project design	45.45%	5
field trips to workplace or site	72.73%	8
webinar or other online event	18.18%	2
guest instructor	9.09%	1
part of core project team	36.36%	4
no interaction with STEM professionals	9.09%	1
internship activities	36.36%	4

ITEST STEM Workforce Education Helix

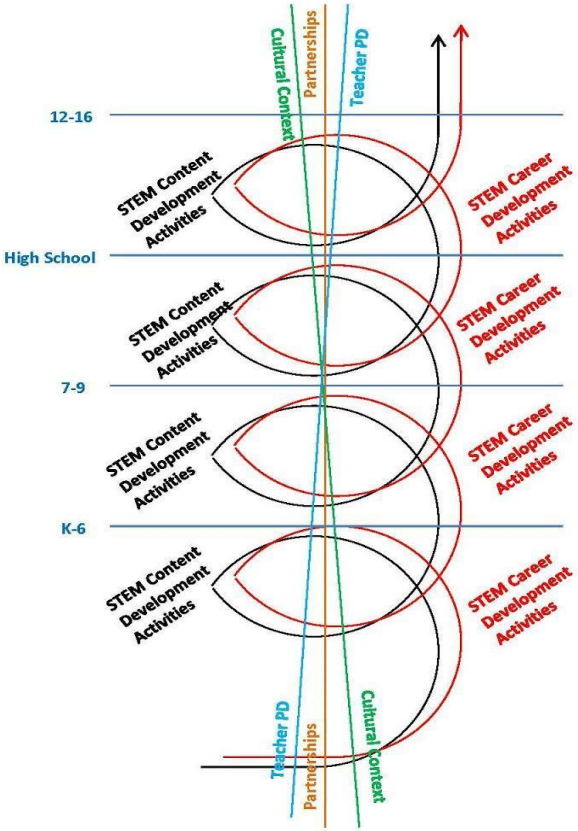
ITEST Projects should ideally include both:

A. **STEM Content Activities**
B. **STEM Career Development Activities**

Three Learning and Support Dimensions:

1. **Professional Development**
2. **Partnerships**
3. **Cultural Context (schools and workplace)**

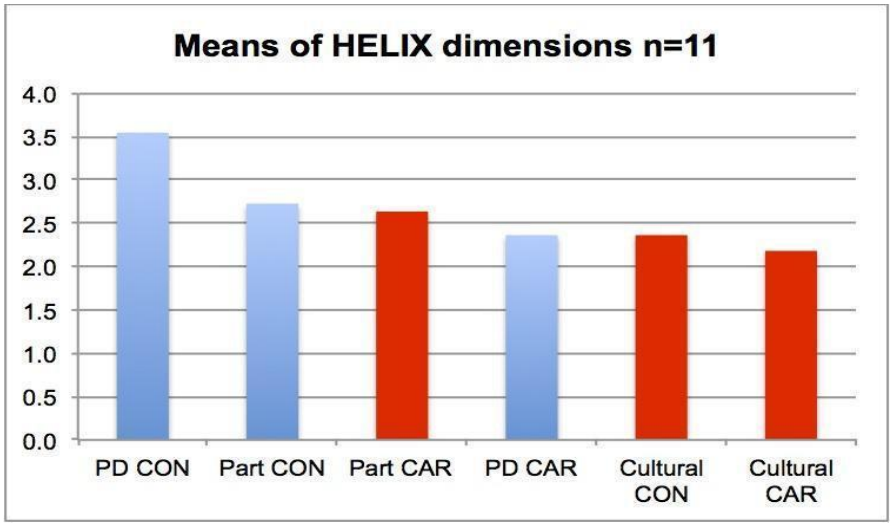
ITEST STEM Workforce Education Helix



STEM Content Development Activities
STEM Career Development Activities
Teacher Professional Development
Partnerships
Cultural Context

Dimensions of Content & Career

Content dimensions typically rate higher



Takeaway

- ✓ Workforce Development projects need to examine impact on workforce development issues.
- ✓ Rethinking and reframing what we measure will have a direct impact on project design.

Q & A

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