ITEST Management Information System 2012: Final Report Describing Active ITEST Projects

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Education Development Center, Inc.

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Originally implemented in 2009, the Management Information System (MIS) is designed to collect information from ITEST projects shortly after their award is granted from NSF (to provide baseline data) and annually thereafter at the end of each project year, ending with a final completion. Each question has been designed to provide information that will inform the state of ITEST: who participates, how often, in what kinds of activities, with what objectives and targeted outcomes. Based on community feedback from the 2011 questionnaire, we have made several revisions to streamline and shorten the MIS completion process, including dividing the questionnaire into individual sections that can be completed individually, and removing some of the questions. The ITEST Learning Resource Center (LRC) at EDC has collected information from active ITEST projects for the last four years; MIS reports from past years are available at: http://itestlrc.edc.org/publications/program-wide-summary-itest-mis-reports .

This document provides a summary of the descriptive results of the 2012 Management Information System collection of information from currently active ITEST projects. The questions cover the following areas:

- Partners and dissemination
- Characteristics of ITEST project participants
- Evaluation and research practices

In addition, the MIS had a number of open response items: project description and objectives for all new projects; research and evaluation questions for all projects; and the names of externally developed and validated instruments used by projects. The responses to these items are included at the end of this report.

Unlike previous years, the 2012 report does not provide any analysis or interpretation of the data, nor does it compare the results to previous years.

MIS Completion Rates 2012-2013

Cohort	Number solicited	Number completed	Percent completed
C5	2	2	100
C6	30	24	80.0
C7	25	16	64.0
C8	28	20	71.4
C9	6	5	83.3
Total	91	67	73.6

PARTNERS AND DISSEMINATION

Project Partners (n=67)

Partners	Baseline (n=5)	Annual (n=41)	Final (n=21)	Total (n=67)
Business/Industry	3	23	17	43
Government laboratory	1	10	2	13
College/University	3	35	21	59
K-12 schools	3	38	19	60
Community-based organization	3	19	13	35
Informal science education organization	3	18	9	30
Not-for-profit organization	4	21	12	37
Historically Black Colleges and Universities	0	5	4	9
Hispanic serving institutions	1	9	2	12
Other minority serving institutions	1	7	3	11
Researchers, Research institutions	3	24	15	42

In the following table, PIs who completed the baseline version are asked to identify which conferences they plan to present ITEST findings; PIs who completed the annual are asked to identify which conferences they presented at in the previous project year; and PIs who completed the final version are asked which conferences they presented at during the life of their project.

Conferences at which ITEST findings were presented (n=67)

	Baseline (n=5)	Annual (n=41)	Final (n=21)	Total (n=67)
ACM Special Interest Group on Computer Science Education (SIGCSE)	2	0	1	3
American Evaluation Association (AEA)	1	2	4	7
American Educational Research Association (AERA)	3	14	9	26
American Society for Engineering Education (ASEE)	1	4	4	9
Association for Science Teacher Education (ASTE)	2	5	3	10
Association of Science-Technology Centers (ASTC)	2	3	1	6
International Conference on Computer-Supported Collaborative Learning (CSCL)	1	0	2	3
International Council of the Learning Sciences (ICLS)	0	2	0	2
International Society for Technology in Education (ISTE)	2	8	8	18
International Technology and Engineering Educators Association (ITEEA)	1	3	3	7
National Afterschool Association (NAA)	2	1	2	5
National Association for Research in Teaching (NARST)	1	7	6	14
National Education Association (NEA)	1	0	0	1
National Science Teachers Association (NSTA)	3	14	11	28
Serious Games	0	0	0	0
Society for Information Technology and Teacher Education (SITE)	2	5	8	15
League for Innovation Science, Technology, Engineering and Math (STEMtech)	0	3	2	5

*PIs identified an additional 23 conferences where ITEST findings were presented.

**26 PIs said that at least one of their conference presentations was done in coordination with other ITEST PIs.

Dissemination Formats

	Baseline (n=5)	Annual (n=41)	Final (n=21)	Total (n=67)
Peer-reviewed journal articles	3	19	12	34
Website	5	35	20	60
Book chapters	2	7	8	17
Books	2	3	4	9
Invited presentations	4	28	19	51
Media (newspaper, TV, video, radio)	3	22	18	43
Meetings/topical convenings	5	25	18	48
Blogs	1	8	5	14
Social networking	3	19	10	32
Workshop	5	23	19	47
Newsletter	4	16	12	32

Dissemination Products

	Baseline (n=5)	Annual (n=41)	Final (n=21)	Total (n=67)
Software	1	10	6	17
Curriculum/instructional materials	5	37	21	63
Games	1	6	7	14
Professional development materials/teacher training, etc.	4	32	18	54
Instruments (e.g. to assess interest, engagement, persistence, motivation, skills, knowledge or dispositions)	5	31	16	52
Implementation models	5	17	16	38
Theoretical constructs	3	10	8	21
Textbooks	1	1	0	2
Videos	2	16	12	30
Research findings	5	32	16	53
Technology designs	2	7	7	16
Virtual environments	1	8	4	13
Evaluation strategies	5	19	14	38
Program models	5	19	14	38

PROJECT TARGET POPULATIONS

Number of projects working with populations

	Baseline (n=5)	Annual (n=41)	Final (n=21)
Youth out of school (in either summer or after school settings)	2	25	16
Youth in school (direct project work in classroom settings)	1	17	8
Youth in school (indirect project work, youth who are taught by participating teachers)	2	22	14
Teachers	4	35	19

Number of Youth and Teachers Served in ITEST Projects

version		Number of projects	Range	Mean	Std. Deviation
Baseline (number planning to serve)	Number of youth served out of school	3	48-100	82.7	30.0
	Number of youth served in school directly	2	50-224	137.0	123.0
	Number of youth served in school indirectly	2	100-300	200.0	141.4
	Number of teachers served	4	8-50	24.0	20.2
Annual (number served in previous year)	Number of youth served out of school	25	15-3300	377.4	845.5
	Number of youth served in school directly	17	15-18000	1630.1	4344.2
	Number of youth served in school indirectly	22	40-6300	1137.0	1620.3
	Number of teachers served	35	1-450	59.1	100.9
Final (number served over life of project)	Number of youth served out of school	16	20-540	245.3	178.3
	Number of youth served in school directly	10	16-6050	822.5	1843.2
	Number of youth served in school indirectly	14	25-17875	4195.7	4874.5
	Number of teachers served	19	4-433	92.7	108.6

*Note: in some cases there are duplicated counts of youth; in some cases PIs included youth in more than one category for a particular year, and in the case of those completing the final version, if youth participated in more than one year they could be double-counted.

Number of projects planning to work with student populations (Baseline survey n=5)

	Not targeted	One to 25 participants	26 to 50 participants	More than 50 participants	We target this group but do not collect data
Students with disabilities	4	1	0	0	0
English language learners	3	0	0	2	0
Students participating in gifted/talented programs	4	0	0	1	0
Students qualifying for free/reduced price lunch	0	0	1	3	1
Girls	2	0	0	3	0
Boys	3	0	0	1	1
African Americans	0	1	0	3	1
Hispanics	0	1	0	3	1
American Indians	1	3	0	1	0
Alaska Natives	1	2	0	1	1
Native Hawaiians	1	2	0	1	1
Pacific Islanders	1	2	0	1	1

Number of projects working with student populations in last project year (Annual survey n=36)

	Not targeted	One to 25 participants	26 to 50 participants	More than 50 participants	We target this group but do not collect data
Students with disabilities	29	5	0	1	1
English language learners	20	7	1	5	3
Students participating in gifted/talented programs	21	7	1	4	3
Students qualifying for free/reduced price lunch	10	3	4	16	3
Girls	2	5	5	20	4
Boys	5	4	5	18	4
African Americans	6	5	11	11	3
Hispanics	6	10	5	12	3
American Indians	20	13	0	0	3
Alaska Natives	28	4	0	1	3
Native Hawaiians	28	3	2	0	3
Pacific Islanders	25	6	2	0	3

Number of projects working with student populations over life of project (Final survey n=20)

	Not targeted	One to 25 participants	26 to 50 participants	More than 50 participants	We target this group but do not collect data
Students with disabilities	14	3	0	2	1
English language learners	8	4	0	6	2
Students participating in gifted/talented programs	15	2	0	2	1
Students qualifying for free/reduced price lunch	1	3	0	15	1
Girls	0	2	2	16	0
Boys	4	1	2	13	0
African Americans	1	4	1	14	0
Hispanics	1	4	5	10	0
American Indians	11	6	2	1	0
Alaska Natives	15	4	0	1	0
Native Hawaiians	14	6	0	0	0
Pacific Islanders	14	6	0	0	0

Number of projects by gradespan and location

	Baseline (n=5)	Annual (n=39)	Final (n=21)	Total (n=65)
K-2	0	2	0	2
3-5	1	12	2	15
6-8	2	23	13	38
9-12	4	26	16	46
Urban	5	29	21	55
Suburban	1	27	16	44
Rural	2	25	15	42

Number of projects by teacher content area

	Baseline (n=4)	Annual (n=34)	Final (n=19)	Total (n=57)
Science	3	31	18	52
Technology	3	23	16	42
Engineering	3	12	10	25
Mathematics	4	22	15	41
Humanities	1	8	6	15
Social Studies	1	9	5	15

Formats of working with teachers

	Baseline (n=4)	Annual (n=34)	Final (n=19)	Total (n=57)
Academic year program - After School	4	18	12	34
Academic year program - Weekends	2	7	9	18
Summer program	3	21	17	41
Summer institute with youth participants	1	12	11	24
Distance learning	0	12	7	19
Online social networking	1	14	8	23
Academic year program – during school hours	3	15	8	26
Professional development day(s) during the academic year	3	16	9	28

Formats of working with youth

	Baseline (n=5)	Annual (n=36)	Final (n=20)	Total (n=61)
Summer program: 1-2 week sessions	1	13	12	26
Summer program: more than 2 weeks per session	2	8	6	16
In-school program	3	19	11	33
After school program	5	16	12	33
Weekend program	3	12	5	20
Youth employment/internship component	2	3	4	9
Distance learning	0	5	7	12
Online/social networking	1	11	6	18

EVALUATION AND RESEARCH PRACTICES

What research methods do you use?

	Baseline (n=5)	Annual (n=41)	Final (n=21)	Total (n=67)
Experimental research	1	2	2	5
Quasi-experimental research	1	17	7	25
Quantitative with comparison group	2	22	13	37
Quantitative with no comparison group	1	7	5	13
Qualitative with no comparison group	2	20	15	37
Qualitative with comparison group	1	6	2	9
Other research methods	0	5	2	7

22 projects use externally validated instruments with teachers; 21 projects use externally validated instruments with youth.

Number of projects using outcome measures for teachers

	Baseline (n=4)	Annual (n=34)	Final (n=19)	Total (n=57)
Changes in teacher implementation of ITEST materials	2	25	13	40
Changes in teacher knowledge of how to use cyberinfrastructure/ technology tools in the context of STEM teaching	1	17	10	28
Changes in teacher use of cyberinfrastructure/technology tools	2	19	9	30
Changes in teacher STEM content knowledge	3	17	12	32
Changes in teacher practice/pedagogy	4	23	11	38
Changes in teacher knowledge of STEM career information and/or workplace demands	3	15	10	28
Changes in teacher perception of STEM	3	18	6	27
Changes in self-efficacy in teaching STEM content	4	18	7	29

Number of projects using instruments to measure teacher change

	Baseline (n=4)	Annual (n=34)	Final (n=19)	Total (n=57)
Pre-assessment of teacher technology skills (written survey)	1	12	10	23
Post-assessment of teacher technology skills (written survey)	2	12	11	25
Pre-assessment of teacher technology skills (other than written survey)	2	5	7	14
Post-assessment of teacher technology skills (other than written survey)	3	7	9	19
Pre-assessment of teacher content (written survey)	2	11	6	19
Post-assessment of teacher content (written survey)	3	12	7	22
Pre-assessment of teacher content (other than written survey)	3	5	5	13
Post-assessment of teacher content (other than written survey)	4	8	7	19
Pre-assessment of teacher attitudes (written survey)	2	16	14	32
Post-assessment of teacher attitudes (written survey)	3	22	15	40
Pre-assessment of teacher attitudes (other than written survey)	3	6	9	18
Post-assessment of teacher attitudes (other than written survey)	4	11	12	27
ITEST project observations (summer institutes, youth activities)	2	22	15	39
Teacher focus groups	3	16	11	30
Classroom observations	4	19	12	35
Teacher self-reports (journals)	3	16	11	30
Teacher web-based data (blogging, emails, posts)	0	14	7	21
Teacher interviews	3	24	15	42
Embedded assessments	2	9	11	22
Examples of teacher class plans	2	9	8	19
Videos of students and/or teachers	1	11	4	16
Teacher survey of implementation practices	4	16	7	27
Are any of the instruments you use with teachers externally developed and validated?	2	13	7	22

Number of projects using outcome measures for youth

	Baseline (n=5)	Annual (n=36)	Final (n=20)	Total (n=61)
Changes in youth self-efficacy in STEM	4	25	19	48
Changes in youth participation in STEM-related activities	4	21	13	38
Changes in youth interest in STEM	5	30	20	55
Changes in youth engagement in STEM	5	23	17	45
Changes in youth STEM content knowledge	4	29	16	49
Changes in youth skills using technology tools	3	19	16	38
Changes in youth skills applying STEM concepts	4	22	14	40
Changes in youth ways of thinking and problem solving	4	18	14	36
Changes in youth knowledge of STEM careers, preparation and/or workplace demands	5	28	13	46
Changes in youth interest in STEM careers	5	29	19	53
Changes in youth preparation for STEM careers (technical/scientific training related to a specific career)	3	18	5	26
Youth entry into STEM career paths	3	9	6	18

Number of projects using instruments to measure youth change*

	Baseline (n=5)	Annual (n=35)	Total (n=40)
Pre-assessment of youth technology skills (written survey)	2	11	13
Post-assessment of youth technology skills (written survey)	2	12	14
Pre-assessment of youth technology skills (other than written survey)	3	6	9
Post-assessment of youth technology skills (other than written survey)	3	8	11
Pre-assessment of youth content (written survey)	3	17	20
Post-assessment of youth content (written survey)	3	19	22
Pre-assessment of youth content (other than written survey)	5	7	12
Post-assessment of youth content (other than written survey)	5	11	16
Pre-assessment of youth attitudes (written survey)	3	27	30
Post-assessment of youth attitudes (written survey)	3	29	32
Pre-assessment of youth attitudes (other than written survey)	5	9	14
Post-assessment of youth attitudes (other than written survey)	5	13	18
Youth focus groups	0	18	18
ITEST project observations (summer institutes, youth activities)	0	21	21
Youth self-reports (journals)	0	8	8
Performance-based assessments	0	17	17
Embedded assessments	0	11	11
Student/youth interviews	0	18	18
Youth web-based data (blogging, emails, posts)	0	5	5

*This question was not asked in the final version of the survey.

OTHER ITEMS

Status of projects completing final version of survey

	Yes	No
Our project work is complete and this MIS report contains all information on the completed project.	12	9
We are still carrying out project activities with participants.	7	14
Our project activities have ended, but our project is still active and we are compiling and/or analyzing results.	12	9
Whether or not our project work is complete, we have important results, outcomes, or other information about the project that we were not able to share in this format.	11	10

Submitted reports through MIS portal

	Annual MIS version	Final MIS version
Evaluation Report	16	5
Annual Report	25	0
Final Report	0	5

Average interaction between PI and evaluator

	Number of projects
Once a week	9
A few times a month	25
Once a month	24
Once a quarter	6
Once a year	3
Total	67

<u>Baseline projects only (n=5)</u>

All C9 projects submitted an IRB applications. Three received exempt status, and two expedited status.

2012-13 MIS Open-Ended Responses

Project Description (Cohort 9 only)
The Bridging the Gap will reach 150 New York City high school students from minority and underserved schools by providing (1) after-school and weekend programming during which they will learn about and engage in hand-on activities relating to the wildlife sciences, and (2) follow-up programming during which the students will be tracked and get ongoing, long-term support and mentoring, enabling them to effectively pursue wildlife science or related STEM careers.
Sixty staff, 450 children (grades 3-5 from minority underserved urban communities across 5 sites in Philadelphia), and 450 families will engage in year-round science learning and exposure to careers in science, technology, engineering, and mathematics (STEM) through the multiple access points of afterschool, home, and community.
Over three years, GreenTECH will reach approximately 610 students in grades 10 and 11 and 30 teachers in 4 schools to engage students in green technologies and careers at the high school level in creating sustainable school buildings, developing solutions and recommendations to sustainability issues, increasing STEM (Science, Technology, Engineering, and Math) knowledge and skills, and pursuing green careers.
One hundred sixty 8-12th grade girls from minority and undeserved schools will participate in a year long technology program leading to the development of a techo-social identity and increased interest in pursuing careers in Science, Technology, Engineering, and Math (S.T.E.M) fields.
Twenty two STEM teachers and 1,000 students from greater Sacramento region will participate in a study on how to use co-robot systems and math-oriented RoboPlay Competitions with modular robots to enhance student engagement, increase students' motivation in learning Algebra and subsequent STEM subjects, and interest in pursuing STEM related careers and post-secondary study

Project Objectives (Cohort 9 only)
1. A science career program for minority high school students that provides wildlife science content, hands-on experiences in science learning and research, career-building services, mentoring, and long-term tracking and support. 2. The successful recruitment of 150 minority students who participate and complete the program (and who, through sheer numbers alone, stand to have a far reaching impact on the zoo and wildlife science fields). 3. Objective 3: An extensive research study that will closely analyze the project, measure its short- and longer-term outcomes, suggest needed modifications, inform the science education field of outcomes and lessons learned, and expand the research base on the use of informal science resources in STEM career preparation for minority students.
1. Embed project-based science learning into the program offerings of five afterschool sites serving children grades 3-5, with approximately 50 children at each site; 2. Develop home-based science activities that continue children's science learning initiated in the afterschool setting into the home setting with families; 3. Establish family programs that support engagement with science and accessing scientists and their careers in relevant and meaningful ways, across the contexts of afterschool, home, and community;
1. The GreenTECH project will develop a high quality/effective curriculum and place-based model of environmental action that provides access to the knowledge and technology integral to sustainability education and a high performance school building. 2. The project will provide professional development and TA that prepares school staff to understand

Project Objectives (Cohort 9 only)
and teach the GreenTECH curriculum and MOUSE Specialist Badge curriculum and program-related content effectively. 3. The project will develop students' self-efficacy in awareness, attitudes, increased knowledge and technology skills in STEM content related to energy and school building performance, environmentally responsible behaviors, and perceptions of themselves as stewards of the environment. 4. The project will build the capacity of students to serve as specialists in the technologies essential to renewable energy, and will create leadership roles for students to use those technologies for environmentally responsible advocacy and behaviors at the school site and in the community and to impact the school's carbon footprint. The project will contribute to increasing students' interest and motivation to pursue STEM education and careers in green technology, environmental sciences, renewable energy and sustainable design.
1. Reach a total of 300 program participants overall through combined sites. 2. Streamline the program and curriculum so that participants can successfully complete the program and graduate within a year (12 months) from start to finish. 3. Produce relevant and engaging research articles, journals, and books on the impact of cultural pedagogy, mentoring, and technology on the social and cognitive development of adolescent minority girls from underrepresented backgrounds.
1. The long-term and far-reaching goal of this co-robot project is to institute transformative changes in math and science education by integrating co-robots into the current K-12 school curriculum, with a focus on Algebra. 2. Develop effective teaching materials with modular robotics technology that integrate computing and co-robot based math labs to enhance STEM subjects, with a focus on engaging students in low-performing public schools. 3. Study how curriculum-targeted RoboPlay Competitions can help students not only learn the Algebra, but also foster their broader interest in STEM subjects.

Research Questions (All Cohorts)
In what ways and to what extent can a successful school-to-career program model be adapted to help minority students achieve the affective, cognitive, and behavioral outcomes necessary to effectively pursue zoo science careers?
1. To what extent do participating adults and children demonstrate increased engagement with hands-on, inquiry-based science activities throughout the project? Do participants begin to seek out STEM experiences and resources beyond those that are immediately available through project activities? 2. To what extent do participants develop new understandings of the role of science and other STEM disciplines in their own lives and for others within their families and communities? How does participation in Integrating Science impact participant's self-identity as a science learner, or as a potential STEM professional? 3. To what extent does each dimension support science exploration and increase knowledge about STEM careers and resources among adults and children? What are the limitations of each of the dimensions of the model? 4. Overall, in what ways can the 3-D approach bridge the longstanding social and cultural barriers between the rich human resources of Philadelphia's minority communities and the region's vibrant science and technology sectors?
1. Does the project's place-based community strategy have an impact on students' understanding and

Research Questions (All Cohorts)
knowledge of STEM content/concepts related to environmental issues, school building performance, and renewable energy; ability to use green technology to address environmental issues; participation in environmentally responsible behaviors; decisions about pursuing future STEM education and careers? 2. Do students' roles as experts in green technology and leaders in efforts to achieve sustainable energy in the school lead to an increase in self-efficacy; understanding of environmental issues, school building performance, and renewable energy; participation in environmentally responsible behaviors; and decisions about future STEM education and careers? 3. Does students' capacity to have an impact on the school's carbon footprint increase students' interest and motivation in pursuing future STEM education and careers?
How does CompuGirls compare to similar technology based programs for minority girls? Are there differences in participant enrollment/retention?
1. 1. To what extent is the program successful in attracting a diverse group of Robotics fellows? 2. To what extent does the project increase Fellows' computing knowledge, and integration of computing and robotics activities into their teaching subjects? 3. To what extent does the program impact teaching Algebra I with computing and robotics activities? 4. To what extent do teachers modify their instructional practice to include more student group work? 5. To what extent do Fellows' students exhibit (a) increased interest in STEM coursework and careers, and (b) increased knowledge of computing and robotics? 6. How do Fellows' students compare to similar students in non-participating teachers' classes in indicators of academic achievement and engagement? 7. How does students' participation in RoboPlay Competitions contribute to their interest in pursuing computing and STEM careers and coursework? 8. To what extent do afterschool programs integrate the curriculum developed by this project?
Do students who participate in the DAS Academy program identify interest in years 2–3 and then choose, in year 4, STEM/ICT career pathways more often than students who do not participate in the DAS Academy program?
1. RQ1. How well can automated measures of student disengagement in middle school mathematics class predict a student's later choice of STEM college majors and STEM careers? 2. RQ2. How does student disengagement drive and interact with the psychological and motivational phenomena and processes which lead to student career choice?
1. How does the sequence and pacing of the design activities and use of technology in the studio enhance (or detract) from engaging participants in the STEM-related content? (This question will be investigated using the Spring 2012 data from the whole class video recordings.) 2. How does small group dialogue among the students and the volunteer facilitators enhance the learning of science concepts of energy, heat transfer, forces, and motion? 3. How does small group dialogue with volunteer facilitators influence students' interest and self-identification with STEM content? 4. The purpose of this study is to identify instructional factors that affect middle school students' engagement in science in an informal learning environment. 5. To what extent do the Studio STEM activities (e.g., sequence and pacing, group dialogue, scaffolding, ICTs,): (a) engage participants in the content, (b) change participants' attitudes towards STEM, (c) promote identification with STEM-related content, (d) lead to participants increased interest in STEM-related careers?
Does participation improve teachers' STEM content knowledge and science self-efficacy?
1. Research Q 1: What is the effectiveness of the model for the leadership level? (Specifically for the

Research Questions (All Cohorts)
leadership level, What are the organizational barriers that create a problem for reform? How do these districts respond to the ILA intervention as a part of the STEM Career Awareness project?) 2. Research Q 2: What is the influence of professional development on teachers' attitudes, dispositions, and classroom enactment? 3. Research Q 3: What is the effect of the Strategic Teaming Model on teacher and leadership retention and adoption of innovation? 4. Research Q 4: What is the impact on students' STEM learning and interest in STEM careers?
1. Research on student outcomes with an emphasis on gender, race/ethnicity, socio-economic status, and location of school (i.e., urban or rural) will determine whether students in the GCE-infused math and science courses (compared to students in the same schools that did not receive the GCE-infused content): (1) report higher levels of STEM career interests, (2) report higher math and science self-efficacy and outcomes expectations, (3) engage in more exploration of STEM careers and post-secondary STEM education options, (4) endorse higher utility of math and science to the tasks of everyday life, and (5) differ in the importance of 4 work values (i.e., money, power, family, altruism). 2. Research on teacher outcomes examines the impact of involvement in the project on teachers and counselors (relative to teachers and counselors in other schools who do not participate in the summer institutes and GCE-infused curriculum) including: (1) math and science teaching and counseling practices, (2) STEM teaching self-efficacy and outcomes expectations among teachers for teaching of engineering content, and (3) self-efficacy and outcomes expectations among counselors for STEM post-secondary education counseling.
1. Does an after school program, which focuses on science learning experiences, skills development (including language and social skills needed for middle school science) and career awareness related to STEM fields, enhance fifth grade students' science content knowledge and attitudes towards science? 2. Does participation in the fifth-grade after school program improve students' performance in middle school (grade 6) science classes?
1. RQ1: To what extent and in what ways do students integrate and apply technology use with workforce readiness skills? 2. RQ2: To what extent does participating in SCI-TALKS change elementary students' interest in, attitudes about, and proficiency in the targeted science fields? 3. RQ 3: As compared to the non-participating group, to what extent and in what ways do pre-service teachers' participation in SCI-TALKS increase likelihood of their utilization of reform-based science teaching strategies and formative assessment in their formal classrooms? 4. RQ 4: To what extent and in what ways do participating universities consider integration of an elementary science methods practicum in their university programs?
1. does our combination of game development, social relevance, and mentoring lead to students reporting a positive attitude towards computer science over time? 2. does our combination of game development, social relevance, and mentoring lead to students reporting a greater interest in pursuing a computer science degree? 3. does our combination of game development, social relevance, and mentoring lead to student academic motivation being maintained or increase over time?
1. What effect, if any, do the engineering design and digital fabrication process and the corresponding curriculum materials have on teachers' knowledge of content, knowledge of teaching, knowledge of curriculum, efficacy, and beliefs about mathematics teaching and learning? 2. How do teachers use the engineering design and digital fabrication process and the corresponding curriculum materials with students?

Research Questions (All Cohorts)
We have been researching several topics: • How children's perceptions of engineers, scientists or engineers changes with exposure • the effects that mentoring has on university students and youth • what do students take away from design thinking camps as evidenced in journals, their photos, immediate evaluations, and comic book productions.
1. Does prior skill level shape the ways in which different kinds of badges influence learner motivation and skill development? 2. What kinds of factors shape whether a high level of cognitive demand is maintained by students as they interact with intelligent tutors?
1. Increase both teachers' and students' awareness of business and industry applications of mathematics, science, and technology; 2. Modernize the curriculum for teaching mathematics, science and technology; 3. Improve both teachers' and students' STEM career awareness; 4. Enhance and build school-industry relationships and partnerships; 5. Improve retention of current mathematics, science and technology teachers.
GUTS y Girls investigated whether online social networking can be used to a) cultivate relationships between middle school girls and fellow participants, female STEM professionals, and mentors, b) to sustain girl's participation in the GUTS y Girls program, and c) to increase girls' interest in STEM and ICT. (See preliminary findings below)
What strategies can be developed to scale up an authentic research project in molecular biology and bioinformatics?
How does the project model impact Clean Energy-related knowledge, attitudes, and skills development among its participants?
1. Among the Intervention or Treatment Group of 9th grade students, was there an increase in levels of interest in math and science (pre/post)as a result of the CBIA ITEST project? 2. Among the Intervention or Treatment Group of 10th grade students, was there an increase in levels of interest in math and science(pre/post)as a result of the CBIA ITEST project? 3. Among the Intervention or Treatment Group of 9th grade students, was there an increase in levels of efficacy/confidence with math and science(pre/post) as a result of the CBIA ITEST project? 4. Among the Intervention or Treatment Group of 10th grade students, was there an increase in levels of efficacy/confidence(pre/post) with math and science as a result of the CBIA ITEST project? 5. Among the Treatment Group of 9th grade students, was there an increase in interest in taking AP courses in math and science as a result of the CBIA ITEST project? 6. Among the Treatment Group of 9th grade students, was there an increase in interest in STEM careers as a result of the CBIA ITEST project? 7. Among the Treatment Group of 10th grade students, was there an increase in interest in taking AP courses in math and science as a result of the CBIA ITEST project? 8. Among the Treatment Group of 10th grade students, was there an increase in interest in STEM careers as a result of the CBIA ITEST project? 9. Among the Treatment Group of 9th grade students, was there a change in their vision of their future, as a result of the CBIA ITEST project? 10. Among the Treatment Group of 10th grade students, was there a change in their vision of their future, as a result of the CBIA ITEST project? 11. Among the Treatment Group was there an increase in the number of students taking AP courses? (in 11th and 12th grade students)

Research Questions (All Cohorts)
Does the web-based Model My Watershed application enhance knowledge and interest in geoscience and STEM careers?
1. Did students using ITSI-SU materials increase their understanding of standards-based content? 2. Did students using ITSI-SU materials have increased interest in STEM, in STEM careers, and in the use of technology-based STEM tools?
1. How does the combination of the proposed UICP (ubiquitous information computing platform), current best practices in math teacher professional development, and professional role models impact 9th & 10th grade geometry and algebra student learning and dispositions toward STEM careers? 2. How does this model scale for implementation in wider school districts?
1. To what extent does Digispired ii build self-efficacy as the Digispired students deepen their knowledge and skills in comparison with students who joined only in 2010 and the Digispired students who did not get selected to participate in Digispired ii? To what extent does the project build self-efficacy equally (or differentially) in boys and girls selected to participate? 2. Is there a relationship between self-efficacy and intention to pursue STEM-related careers and fields? What differences do we find between males and females with reference to self-efficacy and intention to pursue STEM-related careers? To what extent do gender, other demographic characteristics, and perceived self-efficacy individually and/or collectively affect their interest in and choice for STEM careers or courses?
1a. What do PIs believe were the critical aspects of their ITEST teacher PD projects and what was the rationale for focusing on these aspects? 1b. What are the characteristics of the teacher roles and what rationale did PIs have for placing the teachers in one or other of these roles? 2a. What do ITEST teachers think were the critical aspects of the PD that had an impact on their IT implementation? How do they describe their teacher role? 2b. How do teachers in curriculum user role differ in their classroom technology implementation compared to teachers in the developer role, in terms of frequency and quality and duration? 2c. What is the relationship between critical aspects of ITEST projects as reported by teachers and their subsequent classroom implementation in terms of frequency and quality and duration? 2d. What are the similarities and differences between PI and teacher descriptions of teacher roles and critical aspects of PD? 3. How do ITEST teachers differ in their classroom technology implementation compared to teachers who have not participated in an intensive IT PD, in terms of frequency, quality, and duration? Do teachers who participated in ITEST PD describe using different kinds of technology and in different ways?
Study 1: Professional development fidelity study - This study will investigate if issues arise with the turnkey training model of PD that so reduce fidelity that the program cannot deliver the desired results. Question to be addressed include: (1) Do the teachers/informal educators teach the curriculum as designed? (2) If they make changes, what are these changes and why do they make them? (3) How much can be changed before the curriculum no longer has the intended impact? Study 2: Student impact study - This study will compare the two types environment (formal and informal), as well as cohorts of students within each environment. Questions to be addressed: (1) Is the curriculum as effective in a wider range of settings (i.e. after-school, Saturday, summer camp) as in the formal education setting in which it was originally developed? (2) Are student outcomes similar

Research Questions (All Cohorts)
regardless of the teaching environment (formal vs. informal)? (3) If outcomes differ, what are the differences and what accounts for them? Study 3: Scale-up/sustainability research will be conducted which will investigate factors related to the effectiveness of the scale-up, the organizational issues, levels of collaboration and partnerships, capacity-building, and sustainability of the model. Questions to be addressed: (1) To what extent does/did each hub partner implement the BISU model and what is the correlation between the levels of success of hub partners in meeting the project's overarching goal and their fidelity to the BISU model? (2) What adaptations, adoptions, partnerships, and/or collaborations resulted from implementation of the project? (3) To what extent did hub sites become self-sustaining by their fourth year in the project? How and to what extent did hubs develop a local funding base? What capacity-building activities occurred to enable project sustainability? (4) To what extent did hub sites scale up or expand the Build IT program?
The fidelity of implementation concepts of adherence and exposure were explored as part of the NSF funded (DRL 0833403) Geospatial and Robotics Technologies for the 21st Century (GEAR-Tech-21) project. 1. To what extent did adult facilitators adhere to the GEAR-Tech-21 modules in 2010 camp programs? 2. What was the exposure of the implemented modules in terms of time and frequency?
What is the best way for teachers to use engineering-based learning in teaching their STEM courses in high schools?
1. RQ1: What is the impact of the intervention on students' interest in STEM careers across the various grade levels? To what extent is this impact influenced by factors such as the type of induction the students received and/or the demographic and academic characteristics (e.g., gender, prior technology usage, SES, prior academic performance) of the student? 2. RQ2: What is the impact of the intervention on student motivation in mathematics and in self-efficacy in mathematics across the various grade levels? To what extent is this impact influenced by factors such as the type of induction the students received and/or the demographic and academic characteristics (e.g., gender, prior technology usage, SES, prior academic performance) of the student? 3. RQ3: What is the impact of the intervention on the learning of algebra across the various grade levels? To what extent are these gains influenced by factors such as the type of induction the students received and/or the demographic and academic characteristics (e.g., gender, prior technology usage, SES, prior academic performance) of the student?
What individual and combined structural support components of the PURSE program influence the sustained motivation, engagement, science efficacy and science leadership skills of African American
1. Do students taking part in the Middle Schoolers Out to Save the World (MSOSW) project activities gain STEM content knowledge? 2. Do students become more positive in their assessment of their own creative tendencies during MSOSW project activities? 3. Do students become more positive in their perceptions of science, technology, engineering, or math during MSOSW project activities? 4. Do students taking part in MSOSW project activities increase their perceptions of and/or aspirations for STEM Careers? 5. Does the impact of MSOSW project activities differ for middle school students based on gender?
1. RQ1. What impact will the use of ICT-enhanced resources have on students understanding of key STEM concepts? 2. RQ2. What impact will professional development and mentoring to incorporate ICT-enhanced

Research Questions (All Cohorts)
resources have on teacher pedagogy and practice in middle school science classrooms? 3. RQ3. How will ICT-enhanced resources be successfully integrated in middle classroom curriculum targeting science standards? 4. RQ4. How will a Lesson Study Model for professional development and mentoring support middle school teachers in implementing ICT enhanced experiences for students? 5. RQ5. What impact will the use of ICT-enhanced resources have on students[1] understanding of ICT and their preparation as ICT-ready 21st century workforce? 6. RQ6. What impact do iQUEST learning experiences have on student choices for STEM courses in high school? 7. RQ7. What impact does exposure to STEM career resources and information for middle school students, teachers, counselors and families have on student career interests?
1. Test a Parent Engagement and Leadership (PEAL) model for building a network of support for Latino/a students' IT interest, readiness and orientation towards IT careers. 2. Test a 'Bridged Intensives' approach to out-of-school youth IT programming designed to increase the IT interest, readiness and career orientation of semi-rural Latino/a students.
1. Comparison of the effects of database and wetlab research on student learning and interest in STEM and careers: A fundamental question we are exploring, which has not been well researched previously (Bell, 2005), is the extent to which doing research with a database affects student learning and interest in STEM and careers compared to a wet-lab experience. During the 2010-11 school year, we conducted a research study in the classrooms of 11 Washington teachers. All students in this study experienced the entire Exploring Databases curriculum, including conducting research using the database. In addition, they conducted authentic genotyping at several candidate genes using a protocol developed previously by project staff. Classrooms were assigned to one of two conditions: one group conducted database research first followed by genotyping, and the other group conducted genotyping before database research. The amount of time that the groups spent using these curricula was matched so that time engaged was not a confounding variable. Groups of students were assigned to condition based on the best matching criteria available (e.g., gender, age, type of science class). In addition to pre/post assessments, six students from each condition were randomly selected to be interviewed after each research experience. In the 2010-11 school year, program evaluator Randy Knuth collected data from a total of 22 classrooms at 11 schools throughout Washington. Consented students within each class completed pre- and post-surveys that included a science attitude survey, multiple choice questions, and open-ended response questions. In addition, Dr. Knuth or his associate conducted focus groups with a subset of students after each of the two research experiences. The results of this study were presented in a poster and accompanying paper presented at the 2012 annual conference of the National Association for Research on Science Teaching (NARST) in Indianapolis. 2. Design experiment research: From 2010-2012, graduate students Hiroki Oura and Katie Van Horne conducted research in the classrooms of 13 high school student groups (2 to 4 students per group) in three public schools or a local summer program. Their research addressed two components: • The effects of scaffolding on student engagement in authentic research • Student engagement in argumentative reasoning Students experienced the entire Exploring Databases curriculum presented by their teacher, with additional presentations from Mr. Oura and Mark Gallivan. Data collection included video-taping and audio-taping of lesson presentations, student discussions, and student presentations; observations by

Research Questions (All Cohorts)
Mr. Oura and Mr. Gallivan; and informal interviews with students and teachers. All subjects had provided informed consent, and data are stored in password-protected computers. In 2012, the results of this research were presented at two national conferences, the annual conference of the American Educational Research Association in Vancouver, Canada and the International Conference of the Learning Sciences in Sydney, Australia.
1. What combination of EnvironMentors program components is most effective in engaging youth to environmentally related STEM programs? 2. What combination of training and development efforts are most effective in building capacity for a university based program that targets under served audiences?
During the Pipeline Project, Did the program integrate workplace technologies, communication, collaboration skills, and critical thinking and risk taking behavors in the project-learning environment.
1. Can HS juniors in under-performing schools learn linear algebra and like it? 2. Are after school activities engaging to students in urban southern minority schools. 3. Will teachers sustain computer education initiatives after the ITEST support leaves.
How can one broaden participation of students in computer science through game design? f1: The motivational levels of girls are highly dependent on the pedagogy employed. f2: Sustainability can be measured by how many schools goes beyond the expected activities covered in the PD and supported by the team. In our project over 80% of schools participating continued.
1. How do teachers implement a game-based biotechnology curriculum unit? What are teachers' perceptions of a game-based biotechnology curriculum unit, including the game and the supporting curricular resources? What are teachers' perceptions of their classroom implementation of the game-based biotechnology curriculum unit? 2. Can a game-based, biotechnology curriculum support student learning of biological principles? What are the effects of a game based curriculum on relative to varying academic levels? 3. Does a game-based biotechnology intervention invoke changes in students' interest in science and careers in science? How is interest in science and careers in science related to student prior knowledge? 4. Is the learning that takes place in video games equivalent or similar to learning that takes place in more traditional settings or are there epistemic differences in the kinds and quality of learning that takes place between the two mediums?
Please see the attached Final Report
1. How effective is the project in enhancing student STEM understanding, and in creating and sustaining a link between the STEM experiences and ICT careers for the participants? 2. What factors or settings most effectively enhance the ICT experiences for middle-school youth, and how well does the SED project support that enhancement? 3. To what degree do students perceive that the skills and conceptual knowledge developed in the project are potentially valuable for entering an ICT career or another STEM vocation?
What individual and combined components of the Tri-IT program influence the science perspectives, motivations, dispositions, and behaviors of girls in urban and suburban high schools? 3 subquestions: 1. How are the perspectives, motivations, dispositions, and behaviors of girls in the Tri-IT program different from girls who are not in the program? 2. How does enrollment in STEM and IT courses, out of school time STEM related experiences, grades, attendance, attitudes, and behavior of girls in the Tri-IT program differ from girls who do not have opportunities to participate in an IT intervention program? 3. Does sustained participation influence girls' perceptions about their confidence to succeed in IT and STEM related careers? Does it differ between girls in the treatment group compared to those not in

Research Questions (All Cohorts)
the treatment group?
1. Do students taking part in the Middle Schoolers Out to Save the World (MSOSW) project activities gain STEM content knowledge? 2. Do students become more positive in their assessment of their own creative tendencies during MSOSW project activities? 3. Do students become more positive in their perceptions of science, technology, engineering, or math during MSOSW project activities? 4. Do students taking part in MSOSW project activities increase their perceptions of and/or aspirations for STEM Careers? 5. Does the impact of MSOSW project activities differ for middle school students based on gender?
The Perceptions of Instrumentality Scale (PI) asks the students if they would use what they learned in the CompuGirls program in the future and that the skills and information will be important to their future success. The response categories ranged from strongly disagree (1) to strongly agree (5). Although the mean score slightly fluctuated over time, it remained high (an average of 4.6).
Are Students: • Developing an awareness of and interest in careers that use ICT? • Growing in awareness of the complexity of environmental issues and their role as global citizens? • Learning science through applying ICT to environmental issues within local and international contexts? • Developing ICT skills fundamental to conducting investigations of environmental topics? • Are teachers: Learning innovative strategies for teaching with IT? • Actively and effectively participating in the Crossing Boundaries community? • Incorporating ICT into their science teaching to address environmental issues within local contexts? • Incorporating ICT into their science teaching to address environmental issues within international contexts? • Promoting the development of student awareness of and interest in careers that use ICT?
1. Under what conditions do educators and students create productive, sustained, community-focused inquiries? 2. How does the addition of augmented reality and/or geospatial tools (GIS and GPS) enhance students engagement and depth of inquiry?
1. What strategies best prepare students for STEM and information technology career of the future and education endeavors? 2. What are the most significant predictors of student completing PL2? 3. What characteristics define the constituent groups involved in the project? 4. What are the experiences of students in PL2? 5. To what extent does the project influence the number of students to a choose STEM discipline? 6. What instructional strategies did teachers learn?
To what extent to students who complete GRADUATE projects have an increased understanding of science, science careers, and problem solving skills employed in science careers compared to their classmates who do not create GRADUATE projects?
1. What were the effects of Bio-ITEST program participation on teachers' knowledge and perceptions of bioinformatics and related STEM careers? 2. What were the effects of Bio-ITEST participation on students' knowledge and perceptions of bioinformatics and related STEM careers? 3. Did change in participating teachers' knowledge and perceptions correlate with change in students'

Research Questions (All Cohorts)
knowledge and perceptions of bioinformatics and related STEM careers?
see evaluation questions below.
If teachers are exposed to elementary programming and computational thinking ideas using Alice, Python and Java: • will teachers add a few lessons about computing to their existing STEM classes? • will teachers explain the importance to their students about learning about computing for their future career (even if it isn't computer science)? • will students express greater interest in learning about computing in their high schools?
To investigated girls' STEM persistence in Year 4 of InnovaTE3, the research team used a case study approach to address the following three research questions: 1. RQ1. What support networks and sociocultural contexts are associated with activities that girls have persisted in and been interested in over time? 2. RQ2. How have girls' support networks contributed to their (a) persistence in STEM learning? (b) identity in either science, technology, engineering, or mathematics? (c) career interests and planning? 3. RQ3. What modifications to the InnovaTE3 program need to be made to strengthen the role that InnovaTE3 can play in supporting STEM persistence, interest, and career thinking?

Evaluation Questions (All Cohorts)
1. Do minority students that achieve the targeted affective, cognitive, and behavioral outcomes necessary to prepare them for science careers in zoos? 2. Do minority students that realize longer-term outcomes that put them on a path toward pursuing science careers in zoos? 3. To what extent and with what quality are the Bridging the Gap activities completed.
a) What are the needs and expectations of afterschool facilitators for materials and training that will facilitate project-based engagement with science in community-based settings? b) What are levels of engagement and reported value of professional development sessions for facilitators in afterschool programs?, and c) What successes and challenges have emerged in the early implementation of each of the components of the 3-D approach to engagement across home, afterschool and community?
Is the program meeting the objectives. Are the measure of evaluation efficient. What does the data show? How can we implement this information to improve the program.
1. Measures include examining the number of applicants, Fellows' demographics and teaching subjects. 2. Measures include surveys and tests of Fellows at the end of training program, surveys at the end of each school year, number of new courses offered, number of existing courses modified to integrate the results of the co-robot program, and the enrollment numbers for these courses. 3. Measures include the number of Algebra I classes taught using the curriculum developed by the project, the number of exemplary lessons developed and downloaded. 4. Measures include teacher and student surveys, the classroom observations in conjunction with videotaping to observe changes in student participation, frequency of collaboration, and implementation of dual programming collaborative learning model. 5. Measures include pre and post surveys and content knowledge tests administered by Fellows to

Evaluation Questions (All Cohorts)
their students to measure student interest and intentions, and content assessments of student knowledge each program year, as well as the number of students and non-participating teachers attending the annual UC Davis C-STEM Day and C-STEM Conference. 6. Participating students will be compared to demographically similar students on dimensions of course completion (e.g. completion of higher level math and science courses) and performance on relevant state and local Math assessments (particularly those measuring Algebra readiness and Algebra course performance) 7. Measures include pre-post student and teacher surveys and also include comparisons between the students of participating teachers who do and do not choose to compete in the event. 8. Measures include the number of students participate in RoboPlay Competitions and their demographic information.
What strategies were effective in implementing the DAS Academy curricular sequence and in increasing enrollment by underrepresented students and by all students? What strategies show the most promise in increasing student STEM/ICT career interest, content knowledge, and 21st century skills? What PD strategies lead to increased teacher STEM content knowledge and technology-rich pedagogy skills? What strategies were effective in increasing entry into STEM/ICT college coursework/programs?
1. How are students engaged with Studio STEM/Save the Seabirds? (Becca and Erica take lead) 2. How are students' beliefs about technology expressed in Studio STEM/Save the Seabirds? (I take lead) 3. How are students concept of science ideas changing over the course of Studio STEM/Save the Seabirds? (Sammie and you take lead)
1. How does teacher participation relate to their classroom students' STEM performance and attitudes? 2. How does teacher participation impact their students' STEM career motivation? 3. Does participation support teachers in moving towards more reformed-based and technology infused pedagogy? 4. Does participation improve teachers' and students' knowledge of STEM careers and career development?
Evaluation documents the project's fidelity of implementation and impact. Are the project activities being completed, and how well? Is the project adding to the knowledge base on enhancing the STEM workforce? Guided by the following project goals: 1) enhance the use of new and emerging technologies to network and enhance learning across at these middle schools and across the districts, 2) Increase student, teacher, and leader STEM awareness and interest in STEM careers through contact with minority STEM scientists and educators, 3) Update students' and teachers' contextually relevant STEM skills and content knowledge resulting in increased student achievement, 4) Build a sustainable Strategic Teaming Model from within the district.
Our Year 2 (2011-2012) Evaluation examines school team members' views of: 1. The effectiveness of the training received to understand, design, and implement the GCE modules, 2. The quality of the GCE modules, and 3. The ways in which the GCE modules were infused into existing middle school curricula. As well as, 4. Focus group feedback from students and parents who engaged in the curriculum module interventions regarding their experiences of the GCE modules.
A. Is a curriculum development (design) team selected and convened? 1) Does the team convene to produce an outline for an afterschool curriculum? 2) Does the outline provide a basis for additional detailed development of the complete curriculum?

Evaluation Questions (All Cohorts)
B. Is a new interdisciplinary model for science enhancement for fifth grade produced? 1) Are the materials developmentally appropriate and appealing to students in grade 5? 2) Are the materials for teachers clear, complete and easy to use? 3) Are the materials scientifically accurate and in accord with national, state and local standards? 4) Do the materials address needs of fifth grade students identified by the design group? C. Are the curriculum materials evaluated with diverse populations of teachers and students? 1) Are qualitative and quantitative data collected from teachers and students during field-testing, and are the results reported and used to revise the materials as needed? 2) Are objective assessment tools used to measure cognitive gains? 3) Are teachers and students selected for participation in field test/ evaluation activities without bias? 4) Is the progress of MSS Readiness students compared with similar groups of students not in the program? D. What are the scalable aspects of the project dissemination? 1) Do the online resources, streaming video presentations, and discussion forums provide sufficient support for new users of the program? 2) What kinds of additional support are needed? 3) Does project-related professional development adequately prepare instructors to deliver the curriculum and after school program? E. How effective are the technology components in creating/maintaining a community of users? 1) What is the level of user satisfaction with the web-based delivery, professional development and other resources? 2) What proportion of users were satisfied with the online format and functionality, in terms of their learning preferences and needs? 3) Are web components effective in dissemination?
1. To what extent and under what conditions are effective out-of-school time programs established that enable students to experience inquiry science and technology? (Program Implementation) 2. How much do students change their awareness and understanding of, engagement and interest in, attitudes towards, and skills around science, technology, and ultimately their interest and ability to pursue careers in STEMrelated fields? (Student Outcomes) 3. To what extent did SCI-TALKS develop the personal and professional capacity of pre-service and mentors to plan and deliver an inquiry-rich out-of-school time curriculum? (Teacher Outcomes)
1. To what extent have program activities increased the likelihood that underrepresented high school students will choose to pursue computer science or related study in college? 2. What impact have program activities had on improving the preparedness of underrepresented students for college studies in computer science and mathematics? 3. What is the relative merit of the two programming languages used in the two cohorts?
1. What changes occur as the result of project activities in teachers' perceptions of the engineering design and digital fabrication process, the corresponding curriculum materials, related STEM content (especially mathematics), and interest in STEM topics? 2. What changes occur in student perceptions of the engineering design and digital fabrication process, the corresponding curriculum materials, related STEM content (especially mathematics), and interest in STEM topics? 3. To what extent do positive teacher perceptions of the areas listed foster positive dispositions in their K-12 students with corresponding interest in STEM careers?
• How teachers react to design thinking. Do they see it as a form of pedagogy they can use in their classrooms? Does it change the ways they think or teach?
n/a
1. RQ1: Does the program have an impact on the knowledge, attitudes and behaviors of students who participated in the CMB summer residential research program? 2. RQ2: Does the program have an impact on the knowledge, attitudes, and behaviors of participants

Evaluation Questions (All Cohorts)
in the CMB professional development workshops? 3. RQ3: Does the program have an impact on the knowledge, attitudes, and behaviors of students of teachers who participated in the CMB professional development workshops?
1. Are students changing motivational stances towards mathematics? 2. Are students improving mathematically (proportional reasoning) through the intervention?
1. Teachers who participate in the externships will engage their students in activities that apply concepts in their field to real world applications. 2. Teachers who participate in the externships will demonstrate curriculum changes that incorporate Iowa Core Curriculum 21st Century skills such as employability skills, financial literacy, and technology literacy. 3. Students of teachers who participate in the externships will show improved understanding of content concepts and the Iowa Core Curriculum 21st Century skills, and increased interest in STEM-related careers, through improved grades, higher standardized test scores, and positive growth in attitudes about STEM study through surveys.
1. How has the program impacted participating students' NS&T content knowledge and skills, foundational knowledge and skills, and interest in and motivation for participating in postsecondary learning and credentials leading to participation in STEM fields? 2. How has the program impacted the parent/guardian's expectations and aspirations for students' future school and career goals in STEM? 3. What evidence is there that NanoExperiences can serve as a state and national model?
To what extent and under what conditions do community networks affect student knowledge of remote sensing for ocean and climate literacy and influence their interest in pursuing more education and careers in STEM using this technology?
GUTS y Girls evaluation questions were: To what extent was GYG successful in meeting its broader impact in terms of recruiting participants from underrepresented groups in STEM? Was GYG's design combining once a month face-to-face workshops with a private online social network engaging and supportive of girls' interest in STEM/ICT? Did the program retain students' interests? Did GYG participants gain knowledge and skills in visual/spatial thinking, mental rotation, and logical processing in comparison to a control group of students who did not participate in the GYG program? Did GYG participants gain self-efficacy in STEM/ICT?
1. How do attitudes about Science in General and about the Science of Energy or Clean Energy change through participation in the project? 2. How does knowledge of Science and Clean Energy Topics change through participation in the project? 3. How does the project impact ICT skills development among participants?
1. What have students learned about themselves, about teams and about using technology, because of participation in this program? 2. What changes have they experienced by participating in this program? 3. What parts of the program were most challenging and why? 4. What parts of the program were most rewarding and why? 5. What recommendations do students have for improving the model for other 9th and 10th graders? 6. What do teachers and school staff feel are the strengths and areas where improvements can be focused?
Does the place-based Model My Watershed application provide learning gains for students who are not in the geographic regions where the application is available?

Evaluation Questions (All Cohorts)
1. To what extent is there evidence of inquiry-based teaching in the classroom? 2. Does the professional development design influence student learning?
1. Does improved student learning occur from the use of mathematics advanced software? 2. Does student disposition toward STEM education and careers change positively with the project's diverse interventions?
1. To what extent does the Digispired ii team successfully design, develop, and implement the project's activities (Goal 1)? What is the impact of prior exposure to technology tools of current Digispired students about their interest in STEM subjects and careers in comparison with the students who are starting on Digispired ii? How does the type of exposure (technology as a tool in Digispired versus STEM related concepts and electronic technologies in Digispired ii affect the interest of the students in STEM when adjusted for variation for prior exposure? 2. To what extent does the project achieve its dissemination targets (Goal 3)? 3. To what extent does the project achieve desired outcomes for students (Objectives 1.1-1.6)? 3.a. How well do students understand key mathematics, science, and engineering concepts that underlie game programming before and after participating in Digispired ii? 3.b. To what extent do students develop a greater understanding of and skills in using STEM principles and programming with respect to game controllers and game creation? 3.c. How competent do students become in 21st century skills (e.g., problem solving and teamwork)? 3.d. To what extent does student confidence in their ability to successfully engage in STEM-related activities and projects change after participating in the project? 3.e. To what extent does student understanding of the STEM industries including the videogame industry change over time? 3.f. To what extent does participation affect high school course-taking choices in science, computer science, and technology; and college plans? 3.g. To what extent does student interest in STEM careers change over time? 3.h. What factors are associated with success in achieving these outcomes? 4. To what extent does the project achieve desired outcomes for teachers (Goal 2, Objectives 2.1-2.5)? 4.a. How well do teachers understanding critical technologies in STEM fields before and after participation? 4.b. How well do teachers learn to use key programs (e.g., Alice, Scratch) in classroom instruction? 4.c. To what extent do teachers integrate key programs in classroom instruction to integrate STEM concepts? 4.d. To what extent do teachers collaborate with students to create and use games investigating STEM concepts? 4.e. What factors are associated with success in achieving these outcomes?
How much the students learned as a result of using the new method of teaching of STEM courses?
Is this project using the correct research methods and intervention designs to answer these research questions?
Project Strategy 1. Provide professional development: workshops and Summer Institutes 1.1. Did the teachers gain confidence facilitating STEM learning experiences through the workshops? 1.2. What was the impact of the workshops on the teachers' decision to participate in the ROV competition? 1.3. Did attendance at the Summer Institutes lead to greater awareness/understanding of ocean STEM

Evaluation Questions (All Cohorts)
careers? Project Strategy 2. Support the development of the SCOUT (Entry Level) ROV Class 2.1. To what extent did participating in the ROV program lead to an increase in the students' interest in STEM and STEM careers? Did educators and parents observe an increase in the students' interest in STEM and STEM careers as a result of the program? An increase in the students' STEM knowledge and skills and SCANS skills? 2.2. Did participating in the workshops (or observing the competitions) lead to an increase in the parents' support of their children's interest in STEM careers? 2.3. Were the curriculum materials and workshops at the appropriate level for a middle school audience? 2.4. What was the impact of the workshops and other support on the teams' ability to build an ROV and participate in the regional competitions? Project Strategy 3. Modify career guidance resources to better suit middle & high school students 3.1. Has the Exploring Ocean Careers course and web site been modified so that the appeal, information and delivery are appropriate for the middle and high school audience? 3.2. Did students, educators and parents use the career guidance tools? Did their awareness of ocean STEM careers increase as a result of these tools? Project Strategy 4. Build ROVER, a cyberlearning center 4.1. Has ROVER increased access to career and instructional resources? Increased use of the resources? 4.2. To what extent were the website users satisfied with the ease-of-use of the website? With the materials available through the website? 4.3. Has ROVER increased communication between students, educators, industry professionals, and parents? 4.4. Did the availability of ROVER affect the teams' ability to build an ROV and participate in the regional competitions?
The following sub-level questions will be explored: 1. How are the perspectives, motivations, dispositions and leadership skills of girls in the PURSE program different from girls who are not in the program? 2. What is the impact of the collaborative cohort model on the science efficacy of African American girls? 3. What is the impact of structured mentoring from science and engineering undergraduate students attending a historically black women's college on the science efficacy of African American girls? 4. What are the best predictors of African American girls enrollment in college and selection of science and engineering majors?
1. Can students with monitoring kits be trained to enable them to conduct a consumer appliance power consumption audit of their own homes? 2. Can students use information technology applications tools to aggregate and clean individual data for future analysis, then participate in IT-intensive analyses of the data, under the guidance of the teacher? 3. Can students and teachers together conduct class exercises to analyze the aggregate student data, with an emphasis on "what if" projections of the financial and environmental implications of: a) doing nothing, or b) implementing specific, promising solutions on a wider scale? 4. Will student attitudes towards STEM content and careers change as a result of project activities?

Evaluation Questions (All Cohorts)
1. To what extent is Chi S & E implementing its theory of change? 2. To what extent has Chi S & E increased parents'/guardians' capacity to support their children in pursing education and careers in STEM fields? 3. To what extent is CHI S & E preparing diverse groups of students to participate in STEM fields? 4. To what extent has CHI S & E increased teachers' effectiveness at engaging students and parents in engineering- and science-related learning activities?
How W-TEC impacted interest and readiness among (1) participating youths' families and (2) the community in supporting youth in pursuing IT education and careers. In the evaluation of how PEAL impacted youths' families, three constructs were investigated: parental buy-in, knowledge, and identity.
How are teachers implementing the Exploring Databases curriculum in their classrooms?
Researchers sought to determine whether there were any changes in the following topics: 1. participants' perceived skill attainment o participants' confidence in their computer skills when using Second Life o participants' perceived skills related to software and media production o participants' perceptions about their abilities related to group work o participants' views of what skills they learned and how they may be useful in other aspects of their lives 2. participants' attitudes about curriculum elements o science and technology o climate change o career interests o college plans o o academic pathways in STEM 3. participants' opinions of program elements o program recruitment supports o program hands-on activities o presenters o o program overall
1. To what extent does EnvironMentors result in increased student interest in and/or pursuit of environmental and other Stem related high school courses college degrees and or careers among its student participants from underrepresented backgrounds? 2. What are the core capacities of high performing Environmental programs regardless of location?
Did the Pipeline Project: 1. Increase students' interest in and success with the study of mathematics and science in high school? 2. Increase student awareness of STEM and business vocations, university preparatory programs and their own talents as related to these fields? 3. Update teachers in content (concepts and skills_) in their own and related fields, technology, and STEM and ICT career opportunities? 4. Increase parents' knowledge of STEM and ICT workforce vocations, preparation for these vocations, and children's talents as related to these vocations?
1. Compared to college sophomores, what is the performance of high school students on final tests of linear algebra? 2. How does attendance track with after school versus in class computer activities? 3. What is the number of teachers/schools continuing to offer computer science/linear algebra courses? 4. How consistent and informative are artifact assessments of students' capabilities in CS?

Evaluation Questions (All Cohorts)
1. How was the program implemented? What were the barriers to implementation? What adjustments and improvements were made over the course of the project? 2. What student outcomes are associated with program participation? Do students develop improved STEM knowledge and skills, have more positive attitudes about STEM education, and enroll in STEM career academies? Do students become more engaged in school? 3. What structures and processes (intervention activities, teacher training, frequency of exposure, etc.) are related to improved STEM knowledge, skills, abilities, and attitudes, and/or enrollment in STEM-oriented career academies?
To both evaluate the program and contribute to the testing and refinement of the model, the evaluation was designed to answer the following questions: 4. Does teacher professional development lead to increased classroom use of STEM career materials, examples, and information? 5. Does guidance counselor professional development increase their knowledge of requirements for STEM careers and their encouragement of students to take more advanced STEM courses? 6. What impact do teacher professional development and the related curriculum units, IQWST and Engineering the Future, have on teacher knowledge and the classroom science experience? 7. What impact does participation in classes with more career information and examples—and with these additional curricula—have on student STEM interest, knowledge, and skills as well as their career knowledge and skill? 8. What, if any, value is added by students participating in different combinations of project activities?
Objective 1: Design & deliver 3D curricular materials to diverse students 1.1 To what extent were curricular materials designed for students 1.2 To what extent was the curriculum delivered to students? 1.3- What was the perceived quality of delivery 1.4- How diverse is the student population participating in the program? Objective 2: Students teach teachers 3D technological skills 2.1 Did students teach teachers 3D technological skills? 2.2. Did students adequately prepare to teach teachers 3D technological skills? 2.3 What skills did the students teach the teachers? 2.4 Did teachers think students successfully taught them 3D technological skills? Objective 3: Design & deliver professional development on pedagogical strategies using virtual 3D worlds. 3.1 When, where, and how was professional development on pedagogical strategies using 3D virtual worlds delivered to teachers? 3.2 To what extent did teachers perceive the professional development as being timely, useful, and of high quality? Objective 4. Students collaborate via 3D virtual worlds. 4.1 How did students collaborate in the virtual world during the summer workshops? 4.2 How have students collaborated via 3D virtual worlds during the school year? Objective 5: Teachers engage students in the use of 3D world tools to explore solutions to real world problems. 5.1 How have teachers engaged students in the use of 3D world tools to explore solutions to real world

Evaluation Questions (All Cohorts)
problems? Objective 6: Teachers build and sustain ongoing relationships with colleagues through interacting in the 3D world about topics related to 3D world pedagogy. 6.1 To what extent have ongoing relationships with colleagues been built and sustained by teachers in the 3D world? 6.2 What are the topics covered in the interactions with colleagues? Objective 7: Students develop virtual solutions to real world problems. 7.1 Have students developed virtual solutions to real world problems? 7.2 What real world problems and solutions were developed by students? Objective 8: Teachers mentor others. 8.1 Have teachers mentored other educators and if so, how? Objective 9: Students mentor others. 9.1 Have students mentored other students and if so, how? 9.2 Have students mentored teachers, and if so, how? Objective 10: Middle school students are motivated to pursue ICT careers. 10.1 Are middle school students more motivated to pursue ICT careers after participation in the STEM-ICT 3D program?
How can we measure computational thinking skills? f1: We have developed the Computational Thinking Pattern Analysis (CTPA) instrument. It can measure skills acquired over time. f2: CTPA can be applied to the classroom level to predict the pedagogy employed by a teacher.
1. Can an authentic research project in molecular biology and bioinformatic be conducted in a the high school setting? 2. To what extent can teachers attending a summer Institute be successful in conducting an authentic research project in molecular biology and bioinformatic in a the high school setting?
1. To what extent was the OUTBREAK project implemented as planned? 2. How well did the project activities meet the needs of participating teachers?
Program Level Questions: 1. What are the criteria of effective professional development models that result in teachers using robotics and science kits? What causes this change of practice? 2. What teacher learning resources and supports are essential so that teachers become effective facilitators of inquiry based learning, resulting in improved student learning and a reduced achievement gap? 3. What are the components of innovative technology-focused programs that result in increased student motivation to study science and interest in STEM careers? Project Level Questions: 1. Is the program helping encourage students to seek careers in and learn necessary skills to join the STEM workforce? Is the program motivating students to study STEM disciplines? 2. Is the program equipping teachers with knowledge and resources to help prepare students for the STEM workforce?

Evaluation Questions (All Cohorts)
3. Does MarineTech provide viable strategies to parents and community members that support and develop student understanding for science? During Year 2 and 3, we began to engage a series of evaluation questions based on the study objectives outlined in the proposal, most of which we had not yet collected data at the time of the first year's report. These questions include: Marine Science Learning. a. What kinds of marine science topics are pedagogically appropriate and lend themselves to existing curriculum tied to SOLs b. How these concepts and activities teach mathematics and science in ways different from traditional modes. 2. Project-Based Learning Design. a. To what extent do teachers adopt project-based learning (PBL) designs? 3. Career Choice. a. Is program successful in inspiring students to seek continued education in the marine sciences and technology
We used a quasi-experimental, fine-grained research design to capture both 1. the efficacy of standards-based professional development on the STEM and Information and Communication Technology (ICT) learning of both teachers and students, and 2. the interest and persistence of students in pursuing a career in a STEM or ICT field
1. Does the project team achieve stated goals and objectives? What contributes to program success? What inhibits the team from actualizing goals and objectives? What additional information and strategies are necessary to improve program performance? 2. What are the administrative support structures across and within the partnering institutions that contribute to the development of high quality OST programs and teachers? 3. What are the strategies for ensuring consistent communication and progress about the project across stakeholder groups: 4. How will the Tri-IT program develop a focused and tight implementation plan to make sure that different sites implement the programs in the same way, especially in afterschool program settings? 5. How will the PD program be developed? How will the PD be delivered across the three primary sites?
1. Can students with monitoring kits be trained to enable them to conduct a consumer appliance power consumption audit of their own homes. 2. Can students use information technology application tools to aggregate and clean individual data for future analysis, then participate in IT-intensive analyses of the data, under the guidance of the teacher? 3. Can students and teachers together conduct class exercises to analyze the aggregate student data, with an emphasis on "what if" projections of the financial and environmental implications of: a) doing nothing, or b) implementing specific, promising solutions on a wider scale? 4. Will student attitudes towards STEM content and careers change as a result of project activities?
Students were asked to reflect on their final CompuGirls research project. The evaluation sought to connect their work with current "real life" situations whereby they were able to apply the knowledge or skills they learned. Students mentioned their increased confidence with technology and research skills,

Evaluation Questions (All Cohorts)
and how it assists them in school. •Like in class for projects, I don't even use PowerPoint anymore. I just make websites of projects, and games and stuff with Scratch. Because I started using that when I first came here like for help and everything. Now I use it for all of my classes. That's why I have an A in every class! •Me, too. I use Prezi a lot for projects instead of PowerPoint. •Sometimes we're asked to make presentations using a PowerPoint so it's funner using a video so I get more points. When I have to cite, I know how to do that and it's easier. I have more presenting skills, so I can standup in front of a group without getting nervous.
1. What have been the impacts of the program on participating teachers, students, and faculty, and why has this program intervention had these impacts? 2. What have been the extent, nature, quality, and impacts of the professional development (PD) provided to High School Enterprise (HSE) teachers? 3. What systems and resources are in place to sustain the HSE effort after NSF funding? What has been the nature and quality of support materials created through the project? 4. What are the strengths and limitations of the project? What evidence is there that HSE is a national model?
1. Does students' knowledge of two key conceptual domains (algebra and electricity) increase after participation in SENSE IT? 2. Does students' attitudes toward math, science, and engineering as subjects for future study and as career fields change after participation in SENSE IT? 3. Does students' understanding of sensors increase after participation in SENSE IT? 4. Does students' understanding of water quality issues increase after participation in SENSE IT? 5. Does students' understanding of how sensors are used to study water quality increase after participation in SENSE IT? 6. Do teacher practices demonstrated in the teacher workshops have an impact on student learning? 7. Does the curriculum work better with some students (weaker/stronger, older/younger, male/female, lowSES/highSES)?
To what extent is the Crossing Boundaries program: Motivating and preparing students for participation in the STEM workforce? 1. Helping teachers develop effective and technology intensive pedagogical practices in reference to STEM education? 2. Demonstrating the value of focusing on environmental issues within international contexts? Broadening participation of underrepresented groups, particularly girls and students in underserved urban and rural settings?
1. What were the best practices from CSI for educators over the long term? What practices, pedagogies, or tools do educators continue to use? 2. How did CSI educators overcome relevant obstacles? What advice do educators have for the CSI program to increase its long-term effectiveness?
1. In what content areas do students show gains? 2. What career opportunities do students identify? 3. What requirements do students identify? 4. What are the effects of internship experiences? 5. What are the effects of the internship experiences? 6. What strategies do teachers identify as most useful?
1. Is the GRAUDATE model effective at providing teacher with the training needed to implement project based learning?

Evaluation Questions (All Cohorts)
2. Who are the students who choose to participate in the GRADUATE program? 3. To what extent do students who complete GRADUATE projects demonstrate improved attitudes about science and technology? 4. What student characteristics moderate interest in and the success of GRADUATE projects? 5. To what extent is the quality of students' GRADUATE projects higher compared to graduation projects that are not created using this model?
1. In what ways does Bio-ITEST add to our understanding of how to best prepare teachers to develop knowledge and skills necessary for participation in the STEM workforce? 2. In what ways did this project contribute to the preparedness of young people to join the STEM workforce? 3. In what ways does Bio-ITEST contribute to our understanding of how to engender student interest in STEM careers?
1. How do we anticipate Greenfab will impact students in the short-term, intermediate, and long-term? What are the characteristics of students entering the Greenfab program? How likely are they to benefit from the Greenfab program? 2. Does participation in Greenfab improve mastery of basic science content? 3. Did participation in the Greenfab program improve students understanding of STEM topics? 4. Did participation in the Greenfab program improve students' motivation and learning about STEM, STEM related careers, and the research design process? 5. How did students experience the program? Do Greenfab students feel that learning about STEM is relevant to their own lives? Do students feel they are better prepared for the workforce after having participated in the Greenfab program? 6. What effective strategies did Greenfab staff use to promote learning and collaboration?
For each workshop, pre- and post-workshop surveys included a series of fourteen to sixteen scaled items, focusing on self-perception of ability to perform and teach workshop skills. Sample questions: [Alice] • I can, in a general sense, describe how an object will behave when it is told to move, to turn, or to roll. • I can use functions to ask questions about an object, its world, and its relationship to other objects. • I can write a conditional statement (using if-else) to compare some property of an object to a given value, and have the object perform different behaviors based on the result of the comparison. • I am able to create an interactive world by having elements in the world respond to different mouse and keyboard events. [Computational Thinking] • I can trace through a computation that includes a loop instruction and determine the final outcome of the computation. • I can compute the maximum number of routes a traveling salesperson can take to visit each of n cities once. • I can create a computer application to plot a series of data values in a window. • I can describe three majors in college that combine the use of math/science and computing. [Java] • I can explain the role of variables in a Java program. • I can write a Java method that prints out the result of a mathematical computation. • I can use an ArrayList to store and access multiple data items in a Java program.

Evaluation Questions (All Cohorts)
• I can write Java code to draw something simple using computer graphics. --- Teachers were given an assessment quiz at the end of the workshop to see if they could solve 3 simple problems using Alice, computational thinking (with Python) or Java, depending on which workshop they attended. Sample questions: 1. (Alice) Create a world where a monkey is sitting on top of a ball, correct from all visible perspectives. 2. (Computational Thinking/Python) Compute the number of possible trips a presidential candidate can make to give a speech at each state capital and fly to another state capital, and indicate why this problem is intractable. 3. (Java) Given a simple robot world, write a function that paints every tile of the floor in a dark color until the robot hits the opposite wall.
The evaluation research questions in Years 1-3 of the project were: 1. To what extent do girls develop interest and confidence in pursuing additional STEM content knowledge? 2. To what extent do girls enhance their knowledge of a variety of STEM careers and interest in pursuing a specific STEM career? 3. To what extent do girls develop understanding of core concepts in Earth systems science and apply that understanding to engineering design challenges? 4. To what extent do girls deepen their environmental awareness, particularly their recognition of the human role in earth systems, and change their attitudes and behaviors as a result of this awareness? 5. To what extent do girls increase their fluency in the innovation process and preparedness for the engineering workforce?

Names of externally developed and validated instruments used with teachers (All Cohorts)
Science Teaching Efficacy Belief Instrument (STEBI, Riggs & Enoch, 1990),
1. RTOP (Reformed Teacher Observation Protocol, 2. TBI (Teacher Belief interview) 3. STEM-CIS (STEM Career Interest Surveys)
1. EEBEI (Nathan et al.,2010) 2. DET (Yasar et al., 2006)
SETAKIST
STEBI-B
Yale Climate Study 2009
Moore, R.W. and Foy, R.L.H. (1997). The Scientific Attitude Inventory: A Revision (SAI II). Journal of Research in Science Teaching, 34 (4), 327-336.
Test of Algebraic Reasoning.
1. Q1 of the Science Teacher Questionnaire is the GE Math Excellence Teacher Survey. 2. Q 2 of the Science Teacher Questionnaire was taken from the Urban Institute's Effective USI Schools Study: Teacher Survey
1. TechLiteracy Assessment 2. Motivated Strategies for Learning Questionnaire (MSLQ) 3. Computer Attitude Questionnaire (CAQ) 4. Technology Self-Assessment Tool (TSAT)
Inventory of Teaching and Learning (ITAL)

Names of externally developed and validated instruments used with youth (All Cohorts)
1. Career and College-going Interest in STEM (Q19-27) Oh, Y., Jia, Y., Lorentson, M., LaBanca, F. (2012, in press). Development of the Educational and Career Interest Scale in Science, Technology, and Mathematics for High School Students. Journal of Science Education and Technology. 2. Academic Self-Concept (Q28-36) Marsh, H. W., Hau, K.-T., Artelt, C., Baumert, J., & Peschar, J. L. (2006). OECD's brief self- report measure of educational psychology's most useful affective constructs: Cross-cultural, psychometric comparisons across 25 Countries. International Journal of Testing, 6(4), 311-360. 3. Mathematics and Science Engagement (Q37-50) Fredricks, J. A., Blumenfeld, P., Friedel, J., & Paris, A. (2005). School engagement. In K. A. Moore & L. H. Lippman (Eds.), What do children need to flourish: Conceptualizing and measuring indicators of positive development (pp. 305-321). New York, NY: Springer. 4. 21st Century and Inquiry Learning Skills (Q3-18) LaBanca, F., Oh, Y. Lorentson, M., Jia, Y., Sibuma, B. (2012, under review). Development of a 21st Century Inquiry Skill Assessment in STEM. Submitted to American Educational Research Association Annual Meeting. 5. School Climate (Q51-63) Brand, S., Felner, R., Shim, M., Seitsinger, A., & Dumas, N. (2003). Middle school improvement and reform: Development and validation of a school-level assessment of climate, culture pluralism, and school safety. Journal of Educational Psychology, 95, 570–588. Emmons, C. L., Haynes, N. M., & Comer, J. P. (2002). The School Climate Survey Revised Edition–Elementary and Middle School version. New Haven, CT: Yale University Child Study Center. Jia, Y., Way, N., Ling, G., Yoshikawa, H., Chen, X., Hughes, D., Ke, X., & Lu, Z. (2009, Sep-Oct). The influence of student perceptions of school climate on socio-emotional and academic adjustment: a comparison of Chinese and American adolescents. Child Development, 80(5), 1514-1530.
1. Interest in school (Osborne, 1997) 2. Self-efficacy in math & science (Fouad & Smith, 1997)
1. MSSE (Fouad, Smith, & Enochs, 1997) 2. Modified Fennema Sherman Scale (Doepka, Lawsky, & Padwa) 3. Occupational Values Scale (Weisgram & Bigler, 2006)
Assessment of Academic Self-Concept and Motivation (AASCM)
STEM Dispositions Semantic Survey
The pre- post- Attitudes, Interest, and Awareness survey used by GUTS y Girls includes scales from 1. Children's Science Curiosity Scale (CSCS) (Harty and Beall, 1984) and 2. Modified Attitudes Towards Science Inventory (mATSI) (Weinburgh and Steele, 2000).
Carroll-CBIA Math and Science Index Evaluator (MSI)©
Student STEM Career Survey - Gerald Knezek and Tyler-Wood Christensen, upper elementary version

Names of externally developed and validated instruments used with youth (All Cohorts)
was adapted for reading level.
Moore, R.W. and Foy, R.L.H. (1997). The Scientific Attitude Inventory: A Revision (SAI II). Journal of Research in Science Teaching, 34 (4), 327-336.
Test of Science Related Attitudes (TORSA)
Middle School Students Science Technology Engineering and Mathematics (STEM) Attitude Survey (MARS)
CLASS science motivation test.
1. TechLiteracy Assessment 2. Motivated Strategies for Learning Questionnaire (MSLQ) 3. Computer Attitude Questionnaire (CAQ)
Science Project Rubrics by Thousand Oaks
1. Science Interest Survey 2. Self Efficacy in Technology and Science Short Form