

Preview of Award 1003034 - Final Project Report

Cover

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Federal Grant or Other Identifying Number Assigned by Agency:	1003034
Project Title:	Advancing Design-related Technological Education: A Three-way Partnership (TECH-FIT)
PD/PI Name:	Karen R Pearson, Principal Investigator Elaine Maldonado, Co-Principal Investigator
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Signature of Submitting Official (signature shall be submitted in accordance with agency specific instructions)	N/A

Accomplishments

* What are the major goals of the project?

A three-way college bridge linking high school and college to industry with eight innovative, bi-level green science modules, based on industry analysis, is key to the design of this Advanced Technological Education project. Led by PI Karen Pearson, curriculum for new modules will be cooperatively developed by a team of college science faculty, high school science teachers and industry representatives from participating career department Advisory Boards and/or who partner with the Student Career/Internship Center. High school participants have been drawn from schools with which FIT has cooperative programs such as the High School of the Fashion Industries.

The overarching objectives of this project are to: **1)** improve students' industry-critical science skills, specifically with regard to the development of green and sustainable products and **2)** improve faculty-teaching skills with a new, creative "synthesis of best teaching practices" model. The long-term goals are to increase design-related STEM employment opportunities for women, contribute to research on how women learn science and contribute to efforts to protect the environment and citizen health.

Bi-level teaching/learning modules will address industry situations, and each module will have an upper level *college* unit, as well as a *high school* level unit, to prepare students for college level work. In the two funded years, the project will be established in cooperation with the following career departments: Interior Design, Production (Year 1), Textile Development and Marketing, Visual Presentation and Exhibit Design and Fashion Design (Year 2). Subsequently, the project will be institutionalized and expanded to include: Packaging, Toy Design, Home Products Design, Accessories, Cosmetics and Fragrance, Tech Design and Jewelry Design.

*** What was accomplished under these goals (you must provide information for at least one of the 4 categories below)?**

Major Activities:

Teaching Sustainability: A Cross-disciplinary Outreach (2 part Faculty Mini Retreat supported jointly by the NSF and FIT's Sustainability Council) The two mini-retreats brought the science faculty together with career faculty, including those in the targeted career departments, to discuss infusing the curriculum with sustainability and green practice. Professor Scott Boylston, Savannah College of Art and Design, was the featured speaker at the November 12, 2010 sustainability mini-retreat. In addition, FIT faculty from a variety of disciplines made presentations including, Ecology, Packaging Design, International Trade, Interior Design and Exhibition Design. The day's activities focused on strategies for infusing courses with green and sustainable curriculum. The second event took place on March 4, 2011. Dr. Susan Elrod, Director of Project Kaleidoscope, a major science education center in Washington D.C., was the invited speaker. This second event focused on the role of science in preparing design and business students for the green and sustainable market place: **Science + Design = Effective Business!** Business faculty were especially encouraged to attend this event, and the CET conducted targeted outreach to these department chairs. Professor Allacci demonstrated FIT's Sustainable Design Resource Guides, a resource she also authored.

The Reflective Teaching Portfolio Professor Paul King, department of Architectural Technology The City University of New York, was featured at the December 1, 2010 and April 10, 2011, 2 part workshop for science faculty and other campus faculty who were interested in participating. Links and materials from the workshop are carried on the Center for Excellence in Teaching website. This methodology is now a campus recommendation for faculty applying for the SUNY Chancellor's award for Excellence in teaching.

How to Engage and Help Girls Learn STEM In February a 2 part hands on workshop was lead by Janell Catlin, PHD, an expert in science education from Columbia's Teachers College, this workshop addressed many methods to engage and help girls retain STEM content. Participants discussed current research and participated in hands on learning activities. These activities lead to the infusion of alternate methods in the classroom.

Women in Design-related Technology: Learning from Real-life Stories The April 26, 2012 event brought a panel of successful women from industry work in design (and fashion) related STEM positions to talk with students and faculty participating in the TECHFIT project. The event helped empower female students, promote broader opportunities for women seeking higher level positions in design-related tech industries and contribute to greater gender diversity in these fields. This event linked and built on other campus initiatives, extending their benefits and contributing to the institutionalization of these initiatives. It reinforced the pathways from college to the design-related STEM marketplace (an important aspect of this project), as well as the goal of better preparing women for the with innovative sustainable science curriculum. This activities fostered faculty development efforts by providing a model for student-centered activities. The event provided insight with regard to curriculum development designed to meet industry needs and built on the February workshops "How to Engage and Help Girls Learn STEM".

Industry in the Classroom October 10, 2011 Amy Leonard, Senior Vice President

with Levi Strauss came and presented to both the high school classes (two sections) and FIT SC112 students (2 sections). These presentations allowed student to see how companies are addressing issues related to sustainability and have the opportunity to speak directly the industry representatives.

Women in Design-related Technology: Learning from Real-life Stories, April 26, 2012, brought a panel of successful women from industry work in design (and fashion) related STEM positions to talk with students and faculty participating in the TECHFIT project. (full description above)

Industry Advisory Board Events

- Fall 2010 “Kick off” Breakfast for all stakeholders including FIT staff, administration, faculty and industry partners
- January 2011 Board Meeting, industry members shared ideas; thoughts and their needs were discussed. The specific need for sustainable practices and products to meet the double bottom line (fiscally sustainable)
- Fall 2012 Board Meeting, TECHFIT faculty development activities and gave examples of modules that had been developed. Industry members shared ideas, thoughts and needs in today’s “Fashion” and related industries. These ideas and needed skills/knowledge were used in the development of the remaining modules. Module developers were invited to attend and participate with the industry board.
- Spring 2013 Advisory Board breakfast and workshop to share with you the new developments in our National Science Foundation project (TECH-FIT). The workshop lunch will focus on interactive teaching methods and curriculum in the sciences. TECHFIT advisory board members and faculty attended.

Student/Faculty Roundtable December 1, 2011 and March 29, 2012 TECHFIT faculty and students participated “Sustainability Roundtables”. Jeffrey Silberman board member, the Chairperson of the Textile Development and Marketing Department at the Fashion Institute of Technology (FIT) in New York City and the Executive Director of the International Forum for Cotton Promotion (IFCP), presented his recent publication Demand Enhancement Ingredient; The New Sustainability. Addition the event addressed the following questions.

- What does sustainability mean to you?
- How would you differentiate between the terms green and sustainable?
- What sustainability efforts do you see on-campus?
- Which departments at FIT that have made significant efforts to infuse sustainability in the curriculum?
- If you have taken classes that address sustainability, please describe assignments or projects in that class.
- What products are examples of successful sustainable design?
- How can business classes help change the way people think?
- Please give your opinion on interdisciplinary courses that would address design, science and business.

April 11,2013 event provided a great opportunity to explore the role of social media in education--- from both the student and faculty perspectives. TECHFIT students and faculty participated in the event.

Technology Training for TechFIT Faculty Workshops and training for adjunct, full time and high school faculty in tools and methods to increase effective use of

technology in classroom included the following areas. All areas were presented by instructional designer Jeffery Riman and included a presentation and hands on training portion along with follow up activities.

- Learning Management System Training (Angel)
- Voice Thread
- Interactive media content in courses
- Rubrics
- Interactive lectures, use of tools such as Wacom tablets and clickers

Specific Objectives:

This ATE project promotes “thinking green” across the curriculum. Specifically focused on introductory science, it was intended to better prepare FIT’s graduates to meet industry demands for the design, development and manufacture of green and sustainable products such as textiles, toys, home products, cosmetics, and packaging. The current marketplace is demanding highly skilled employees and upper level study. Through innovative curricula and creative pedagogies, faculty will motivate FIT students, eighty-five percent of whom are female, to persist in the study of science and to improve their skills. The goals of this National Science Foundation ATE project at the Fashion Institute of Technology/SUNY are to 1) improve students’ industry-critical science skills and 2) improve teaching effectiveness. The primary audiences are FIT’s two-year college students and science faculty. The secondary audiences are high school students and science faculty from schools such as the High School of the Fashion Industries that typically send students to FIT. The project’s two major foci are Curriculum and Educational Materials Development and Professional Development for Educators.

Optimizing the creative talents of FIT’s students and faculty, scientific invention, as well as student persistence, will be fostered through the following activities: 1) the development and implementation of bi-level, college and high school science modules jointly developed by FIT science faculty, high school teachers and industry partners, 2) the creation of project-based, green/sustainable introductory science curricula based on industry needs, and 3) guided by research on how women learn science, a new teaching model based on a “synthesis of best teaching practices” that includes convenient resources for adjunct faculty. Activities will be anchored by a strengthened three-way bridge from high school, to college, to industry, paving a more seamless pathway from pre-college to workforce

This project will produce nationally replicable products such as its innovative three-way bridge design, bi-level science modules that closely link high school and college industry-based, green science curricula and a creative faculty development model that addresses the needs of our nation’s part-time and off-campus faculty. In the long term, this project will contribute to increasing design-related STEM employment opportunities for women, add to research on how women and art/design students learn science, and contribute to efforts to safeguard the environment and protect the health of citizens. Plans for dissemination will begin locally and expand through the Professional Development Center of the State University of New York, the country’s largest public university system.

Significant Results:

The following is an excerpt from the attached external evaluations report:

- Activities, events and trainings sessions were offered to roughly 500 (503) faculty, students, industry representatives and other educators (duplicated headcount).

- At the onset of the project FIT faculty expressed that FIT graduates may be “somewhat prepared” for design-related STEM careers based on the pre-assessment questionnaire. (progress in this perception is)
- 95 percent of faculty participants rated their experience as “good” or “excellent” for retreats.
- The majority of retreat participants (72%) indicated that they were more aware of the Green and Sustainability initiatives at FIT.
- 91 percent of retreat participants mentioned that they would like to learn more about specific techniques to use to make teaching and curriculum more eco-friendly.
- Six FIT faculty members participated in extensive Tech-FIT training and delivered the newly created science modules to close to 300 FIT students.
- 60 high school students and two secondary educators were a part of the science modules development pilot.
- Three fully developed science modules were created, piloted and implemented into the Physical Science, Earth Science and Biology curricula.
- Science outcomes on the CAPP-National science assessment show mixed results.
- Students self-reported answers about science confidence were mixed, however there is evidence of increased student interest in taking science courses based on student and industry feedback which is supported by increases in enrollment for Physical Science and Earth Science.
- Students believed their knowledge about sustainability and green product design after completing the Tech-FIT enhanced science course was greater.
- Faculty retention show signs of having an impact on teacher effectiveness and thereby student outcomes as measured by the CAPP.

Key outcomes or Other achievements:

The TechFIT project resulted in innovative bridge models for design related STEM education which can be modified to meet the needs of specific groups of faculty and students.

- TechFIT created a model for faculty development geared toward non major science curriculum and instruction. Giving faculty the opportunity to explore new methodologies in teaching and engage directly with industry leaders in the fashion related industries.
- Bi-level modules allowed the collaboration between high school and college level educators
- Both high school and college level classes showed a high level of student engagement.
- Students at the college level have asked that minor in Sustainability be offered at FIT (this is now in progress)

*** What opportunities for training and professional development has the project provided?**

The TECHFIT project provided professional development to fulltime, adjunct and K-12 faculty members, including providing opportunities to attend and present at professional conference in the STEM area and to participate in a robust interactive faculty development program.

The faculty development program was made accessible to all faculty participates and allowed for participation in webinars, hands on workshops and both face to face and online discussion of best practices. Highlights include; *Teaching Sustainability: A Cross-disciplinary Outreach*, *The Reflective Teaching Portfolio*, *How to Engage and Help Girls Learn STEM*, Student/Faculty Roundtables and Technology Training for TechFIT (A full detailed list of activities can be found in the major activities section)

Dominic Cammorota, High School of Fashion Industries faculty, participated in grant events (activities) and module development. The TECHFIT project was able to support him attending the "Green Schools National Conference" in Bolder, Colorado. This conference focused specifically on teaching sustainability in K-12 school. He attended this conference in the Spring 2012.

*** How have the results been disseminated to communities of interest?**

The TECH-FIT project and its findings have been disseminated locally, regionally and nationally. In 2010, a press release on the project was generated by the State University of New York, and the award was announced at FIT's Board of Trustees meeting and Convocation in New York City.

The project website, which is updated on an ongoing basis, is linked directly to the main FIT website via the Center for Excellence in Teaching, and usage is recorded with Google Analytics. Routinely, visitors from countries such as the UK, Spain and Austria (list not all inclusive) visit this site and benefit from shared resources. This site is also a resource for FIT's international partners such as the Polimoda Institute in Milan, Italy.

The PIs and participating faculty have shared project developments at numerous professional conferences and gatherings. Although participants at an ATE-NSF conference would have an interest in NSF work, the nature of this fashion-related project proved "eye-opening" to many participants. The PIs presented and/or facilitated roundtables at two ATE-NSF conferences. They presented this project at the SUNY-STEM conference 2011 and a presentation on the full project journey, including outcomes submitted in this report, is pending for October, 2013. The PIs have also modeled this project at a wide range of professional gatherings with dramatically diverse audiences. For example, in May of 2012 they presented their work at the Javits Green Festival in New York City. This global event attracted visitors from the far corners of the world, with interest in subjects as diverse as food sources, bio-energy and global warming---but with the common goal of contributing to a sustainable planet. The Women on Women (WOW) Conference at FIT, March 1, 2012, was open to the general public, and the PIs' presentation was the only presentation that addressed the "leaky-pipeline" with regard to women and STEM---specifically women in design-related STEM. Also at FIT, the presenters documented TECH-FIT at the Sustainability Conferences, March 27, 2012. This yearly conference draws participants from the entire New York metropolitan region and beyond. They again shared findings from this project at the Conference on Instructional Technologies 2012 and 2013, showcasing the technological innovation utilized in the delivery of new science modules. Additionally PI Karen Pearson and TECHFIT faculty member presented EGU 2012 and 2013 in Vienna Austria, giving the opportunity discuss the "leaky-pipeline" with regard to women and STEM and innovation utilized in the delivery of new science modules with an colleagues from around the globe.

By partnering with faculty development workshop facilitators from Columbia University-Teachers College, Project Kaleidoscope, Savannah College of Art and Design, New York University and the City University of New York, the progress of this project was shared with institutions within, as well as beyond the New York City region.

Because project activities were supplemented by internal funds, these activities were open to faculty across the campus from diverse disciplines. This was unexpected, but as a result, faculty from design departments not specifically included in the proposal, and the students in these departments, benefited. Subsequently, a number of representatives from these departments volunteered to participate in advisory board conversations.

An article documenting the project journey, with its contributions to design-related STEM at FIT and beyond, is pending final review for publication with the Journal of Educational Technology Systems (Baywood Publishing). A full color brochure describing the project, in its entirety, has just been produced for dissemination and will be distributed in fall, 2013.

Supporting Files

Filename	Description	Uploaded By	Uploaded On
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techfit_071013.pdf	Project highlights	Karen Pearson	08/18/2013
Agenda - Toward a Greener Sustainable Part II - March 4 2011.pdf	Example of an event flier.	Karen Pearson	08/18/2013
Tech_FIT_08_16_TBC_eval.pdf	External Evaluators Report	Karen Pearson	08/18/2013
Tech_FIT_Appendix_08_13 TBC.pdf	External Evaluators Report Appendix	Karen Pearson	08/18/2013

Products

Journals

Elaine Maldonado and Karen R. Pearson (2013). Building STEAM with Design-related Technology. *Journal of Educational Technology Systems*. NA (NA), NA.

Status = UNDER_REVIEW; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes ; DOI: NA

Books

Book Chapters

Thesis/Dissertations

Conference Papers and Presentations

Karen Pearson and Elaine Maldonado (2011). *Partnering for Greener + Sustainable Design-related STEM Curriculum: Improving Outcomes for Women & the Environment PRIMARY STRAND: PARTNERING (with sub-foci of Retaining and Releasing)*. SUNY STEM Conference. Albany, NY.

Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Karen Pearson and Elaine Maldonado (2013). *Building with STEAM*. 2013 SUNY STEM Conference Broadening Participation in STEM: SUNY's Commitment to Developing a Diverse STEM Workforce. Albany, NY.

Status = UNDER_REVIEW; Acknowledgement of Federal Support = Yes

Karen Pearson and Dominic Cammarota (2012). *Developing an Understanding of Sustainability by Example*. "The Winds of Change", FIT's 6th Annual Sustainable Business and Design Conference. New York, NY.

Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Karen Pearson and Elaine Maldonado (2013). *Multi Level Bridges: Science + Art = Innovation*. CIT2013 Transformation in High Education: Sharing Ideas and Showing Results. Utica, NY.

Status = ACCEPTED; Acknowledgement of Federal Support = Yes

Karen Pearson and Joseph Liddicoat (2013). *Online Higher Education in the Natural Sciences*. European Geosciences Union

General Assembly 2013. Vienna, Austria.

Status = ACCEPTED; Acknowledgement of Federal Support = Yes

Karen Pearson and Joseph Liddicoat (2013). *Fostering Gender Equality and Achievement in the Natural Sciences in Higher Education*. European Geosciences Union General Assembly 2012. Vienna, Austria.

Status = ACCEPTED; Acknowledgement of Federal Support = Yes

Other Publications

Technologies or Techniques

TECHFIT, provides a model for engaging women and art and design students (non-majors) in STEM curricula. This project focused improving preparedness for roles in *Design Related STEM* fields. This was done by creating a three-way college bridge linking high school and college to industry with eight innovative, bi-level green science modules, based on industry analysis. The core of this model is innovative faculty and curriculum program.

Patents

Nothing to report.

Inventions

Nothing to report.

Licenses

Nothing to report.

Websites

Title: TECHFIT

URL: <http://tech-fit.net>

Description: Advancing Design-related Technological Education: A Three-way Partnership, this project website serves as a portal for all project events and prepared materials. The site contain information about the project and its events as well as specific portals for industry and faculty participants.

Other Products

Product Type: Educational aids or Curricula

Description: **Bi-level modules**

Eight science bi-level modules were developed during the year by Karen Pearson, FIT science faculty and high school science faculty and are currently being used. Each module contains science components that promote analytical and critical problem solving skills, as well as foster student understanding of concepts related to green design and sustainability. Creative, active learning projects built on product development and industry application will be central to the modules. Podcasts, animations, digital presentations, and the development of a digital learning object repository will enrich teaching/learning modules. High school curriculum is being designed to prepare students for college-level work. The modules developed include;

- Green Alternatives to the Plastic Bag
- To Age or Not to Age
- The life of your Jeans

- The Physics and Art of Bridges
- The Surfaces in the Kitchen
- The Transformation of Plastic Bottles to Shopping Bags and more...
- Bamboo...Floors to Textiles, is it a sustainable choice?
- From Broken Bottles to Durable Roads

The goal of each module was to expand students' STEAM skills (STEAM=Science, Technology, Engineering, Art and Math). Methodologies used in each module include the following industry initiative/projects, examination of current topics related industry and products and additionally students explored industry specific STEAM skills. Each module contains a faculty toolbox, which contains sample outlines, readings, videos, activities and many other resources. Access to module toolboxes is given to faculty by course coordinators.

These modules have been incorporated into the official course of study for SC111 (Introduction to the Physical Sciences), SC112 (Earth Science) and SC121 (Introduction to biology). The more junior level (high school) has been used to create a new science elective at The High School of Fashion Industries, the Science of Sustainable Design. At the high school level interest in the elective (not required for graduation) has been so great that multiple sections are offered and there is a waiting list.

Resources to Support Faculty and Students

A video of Sass Brown, FIT faculty member, presenting her new book, *Eco Fashion*, a comprehensive look at the environmentally conscious designers who are changing the fashion industry, was created. This gives students and faculty an inside look at designers that are promoting recycling, redesign, reuse, sustainability, fair trade, and community development, these artists combine concern for the planet with love for exceptional fashion. (October 2010)

The Materials and Physics of Athletic Footwear, Karen Pearson and Footwear Design Professor Ellen Lynch provide students in *D331 Athletic Footwear Design*, the opportunity to discuss material choice and function with an athlete, expert in bio mechanics, materials scientist and a designer. This class visit was recorded to give faculty the opportunity to see STEAM at work in the classroom and help them think how it can be used in their classroom.

Slides, audio and handouts from all mini retreats are available to faculty via the grant web page (tech-fit.net) and the college's webpage for the Center for Excellence in Teaching (www.fitnyc.edu/cet)

Related content from conference presentations by TECHFIT faculty are available via the TECHFIT website.

Official updated course of study guides for SC111 (Introduction to the Physical Sciences), SC112 (Earth Science) and SC121 (Introduction to biology) are available in the department office and via the internal department website (this is available to all faculty including adjuncts actively teaching at the college). For these courses the course coordinator provides appropriate "toolboxes" and training to new faculty. Each module toolbox contains a detailed template, which contains the needed physical and digital materials to complete the module.

Other:

Participants

Research Experience for Undergraduates (REU) funding

What individuals have worked on the project?

Name	Most Senior Project Role	Nearest Person Month Worked
Jeffery Riman	Technician	2
Celia Baez	Other	3
Jonathan Guzi	Technician	1
Esther Rifkin	Community College Faculty	1
Dominic Cammarota	K-12 Teacher	2
Shaghayegh Harbi	Community College Faculty	1
Karen R Pearson	PD/PI	12
Elaine Maldonado	Co PD/PI	6

What other organizations have been involved as partners?

Nothing to report.

Have other collaborators or contacts been involved? N

Impacts

What is the impact on the development of the principal discipline(s) of the project?

TECHFIT, provides a model for engaging women and art and design students (non-majors) in STEM curricula. This project focused improving preparedness for roles in *Design Related STEM* fields. This was done by creating a three-way college bridge linking high school and college to industry with eight innovative, bi-level green science modules, based on industry analysis.

TECHFIT establishes a link for faculty and students between science, industry and design. Faculty participants learn from a synthesis of best practices geared toward improving STEM outcomes for women. Participation in faculty and curriculum development enhances the classroom presence and methodologies of all faculty results in better prepared more effective classroom teaching. Students whom receive the innovative STEM curriculum from trained leave the classroom better equipped for technical design related industries that include packaging, toy and fashion design for example.

What is the impact on other disciplines?

The TECHFIT project has had a direct impact on how STEM is taught at FIT. It has also had a direct impact on the FIT design curriculum, better preparing students to be sustainable designers. Examples include but are not limited to the

following areas; textile development, exhibit design, home products, packaging, jewelry and technical design, cosmetics and toy design. Additionally this work can serve as an educational model for art schools and to engage women in developing competitive STEM skills K-16.

What is the impact on the development of human resources?

Faculty development activities including mini retreats and teaching methodology discussions have lead to the development of science educators who better understand how to help women improve STEM related learning outcomes while completing basic college science courses. Additionally the project has help faculty in the career departments understand the role of science in the design process. These connections are especially important in fields such as toy design, fashion and accessories design, interior design and packaging.

What is the impact on physical resources that form infrastructure?

1. The FIT campus has been particularly receptive to the changes to content delivery and the connection of career departments with the department of Science and Mathematics. These efforts have been supported with technology and technology education for faculty in CET (B502). The CET has provided a “smart” work area for faculty to work cooperatively and learning new teaching methodologies and practices. The department of science and mathematics has provided the needed support and lab space for faculty to develop new and innovative curriculum and participated in the piloting of the learning content.
2. FIT’s President’s Sustainability council awarded TechFIT \$5000 dollars to expand the reach of the TechFIT project to include the entire campus in the discussion of sustainability in curriculum innovation and collaboration between all areas and disciplines.
3. FIT’s Diversity Council awarded TechFIT \$5000 dollars to host an event and to create video documentaries of women innovators and leaders in sustainability efforts with the design and fashion industries.

What is the impact on institutional resources that form infrastructure?

The TECHFIT projects has served as the catalyst for campus wide initiatives including “Interdisciplinary Learning” (IDL). These are highlighted in the FIT’s Faculty of the future can be seen at <http://www.fitnyc.edu/10442.asp> . TECHFIT PI’s were invited in 2010 to present the TECHFIT project at a “Board of Trustees” meeting. Since that time FIT has used the project as a model for other grant funded research initiatives. Additionally when award 1003034 was awarded in 2010 FIT did not have an IRB board. (the original application was part of a special project solicitation for campuses that had not had ATE/NSF funding in more than 10 years.) As a direct result of FIT’s support and interest in expanding these opportunities there is now an IRB board on campus and FIT is actively seeking other funding opportunities.

What is the impact on information resources that form infrastructure?

A direct conection has been made between the Fashion Institute of Technology's main web page and our project website.

What is the impact on technology transfer?

Innovative science modules on sustainability for design students have been designed. This science curriculum, along with teachers better prepared to deliver both the science as well as design curriculum, are the major accomplishments of this project. In the long term, students will be better prepared and equiped as responsible designers. The reasources we have developed are available to faculty internally as well as externally via our website. These resources include key articles, video's and presentations.

What is the impact on society beyond science and technology?

Innovative science modules on sustainability for design students have been designed. This science curriculum, along with teachers better prepared to deliver both the science as well as design curriculum, are the major accomplishments of this

project. In the long term, students will be better prepared and equipped as responsible designers.

Changes

Changes in approach and reason for change

Nothing to report.

Actual or Anticipated problems or delays and actions or plans to resolve them

Nothing to report.

Changes that have a significant impact on expenditures

Nothing to report.

Significant changes in use or care of human subjects

Nothing to report.

Significant changes in use or care of vertebrate animals

Nothing to report.

Significant changes in use or care of biohazards

Nothing to report.

Special Requirements

Responses to any special reporting requirements specified in the award terms and conditions, as well as any award specific reporting requirements.