My Desktop
Prepare & Submit Proposals
Proposal Status
Proposal Functions
Awards & Reporting
Notifications & Requests
Project Reports
Submit Images/Videos
Award Functions
Manage Financials
Program Income Reporting
Grantee Cash Management Section Contacts
Administration
Lookup NSF ID

Preview of Award 1104214 - Annual Project Report

Cover |
Accomplishments |
Products |
Participants/Organizations |
Impacts |
Changes/Problems
| Special Requirements

Cover

Federal Agency and Organization Element to Which Report is Submitted:	4900
Federal Grant or Other Identifying Number Assigned by Agency:	1104214
Project Title:	Successful Academic and Employment Pathways in Advanced Technologies
PD/PI Name:	William T Tyson, Principal Investigator Marie Boyette, Co-Principal Investigator Lakshmi Jayaram, Co-Principal Investigator
Recipient Organization:	University of South Florida
Project/Grant Period:	09/01/2011 - 08/31/2015
Reporting Period:	09/01/2013 - 08/31/2014
Submitting Official (if other than PD\PI):	William T Tyson Principal Investigator
Submission Date:	07/31/2014
Signature of Submitting Official (signature shall be submitted in accordance with agency specific instructions)	William T Tyson

Accomplishments

*** What are the major goals of the project?**

"Successful Academic and Employment Pathways in Advanced Technologies" (PathTech) is a collaboration led by interdisciplinary researchers from the University of South Florida (USF) and the Florida Advanced Technological Education Center (FLATE) at Hillsborough Community College. Our project aims to better understand pathways into technician education at both the secondary and community college levels as well as the occupational trajectories into the manufacturing industry that this training facilitates. We have collected data at high schools, community colleges, and with industry partners in the Tampa Bay area as well as continue to analyze education and employment administrative data. Using multiple methodologies and data sources allows us to develop a deep and broad understanding of the experiences of students and workers in technician fields. As the global economy moves forward in our high-tech world, this knowledge is vital to sustain necessary workforce development as well as improve the life chances of individuals and the stability of their local communities. Perhaps the hallmark of the PathTech project is partnering with various stakeholders in education and industry. These partnerships create opportunities for local and state-level research and to continuously share our findings with our partners as we aim to empower positive social change.

This study contributes to the overall ATE mission by addressing the following goals:

1. Understand recruitment and pathways into engineering technology programs
2. Improve the education of engineering technology programs
3. Recommend interventions at high schools to increase the visibility of engineering technology programs at local community colleges
4. Produce more qualified science and engineering technicians to meet workforce demands

There are several audiences for this project that include high school students, teachers, local community/technical colleges and local industries. This project seeks to inform these stakeholders at each level about the efficacy of local engineering technology (ET) programs in order to promote ET pathways. We also hope to better equip FLATE and partner community colleges with information based on the personal experiences of students who are enrolling and not enrolling in these programs. With this information, we will work with FLATE to develop recommendations on how best to serve these audiences.

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

Major Activities: **Qualitative Interviews and Analysis**:

We completed 130 in-depth qualitative interviews in Year 3, the current reporting period. The breakdown of these interviews is as follows:

- 57 Engineering technology A.S. degree students
- 5 Follow up interviews with five of the six women engineering technology A.S. degree students
- 7 Industry employers
- 3 High school district faculty/administrators
- 3 High school teachers
- 55 High school students enrolled in engineering technology or engineering-related career academies

These do not include the interviews with 20 industry employers, four community college faculty/administrators, and 23 high school and community college pilot interviews that were conducted in Year 2.

In total, we have completed interviews with 174 unique key informants:

Community College ET Programs

- 67 ET A.S. degree students at four community colleges (includes 10 pilot interviews)
- 4 ET A.S. degree faculty and administrators
- Industry

Industry

- 27 Employers in Tampa Bay area technology and advanced manufacturing businesses

High Schools

- 70 ET or engineering-related students at four high schools (includes 15 pilot interviews)
- 6 High school teachers and district administrators affiliated with ET programs

These interviews were audio recorded, transcribed, and thematically coded. Coding trees were developed based on a priori and emergent themes (see Attachment 1A). We developed case studies to comprehensively describe the experiences of the community college women (see Attachment 1B) and profiles of industry companies and employers (see Attachment 1C). These analytic methods in qualitative research are well-established protocols for the identification of both emergent and saturated themes in the data. These approaches allow us to better understand both the specifics of particular issues as well as gain a broad understanding of the trajectories ET students experience and processes used by ET employers to recruit and hire workers in this field.

Additionally, we administered short surveys to the 57 community college student interviewees in order to learn more about their socio-demographic backgrounds. The questions included their age, marital and caregiving status, education attainment, funding sources of their ET degree, and parental education attainment. We analyzed these data to provide descriptive statistics (see Attachment 1D).

One result of these analyses is the paper, "Work to School Transitions and the Transformative Role of the Community College Education" which we be presented at the Annual Meeting of the American Sociological Association in August 2014, San Francisco (see Attachment 1G).

Quantitative Data Collection and Analysis:

In order to understand pathways from high school to community colleges and into technician occupations, we have conducted analyses with Florida Department of Education (FLDOE) PK-20 Education Data Warehouse (EDW) data and sought additional data for analyses. Analyses using FLDOE EDW were limited due to Florida restrictions of providing race and employment data in the same request and delays in the fulfillment of data requests as outlined in the Year 2 Annual Report. In order address this issue, we (1) developed a partnership to collect additional data, (2) conducted analyses using public data sources, and (3) requested additional FLDOE EDW data.

To secure the quantitative data on high school career academies, Drs. Will Tyson and Eddie Fletcher have regularly met with members of the National Academy Foundation's (NAF) research and evaluation team which includes Katherine Blasik (Assistant Vice President) and Patti Smith (Director of Research and Quality Assurance). PathTech has obtained letters of agreement with NAF, Miami-Dade County Public Schools, and Broward County Public Schools to gain access to high school STEM course-taking data (see Attachment 1E). We are awaiting receipt of this data that would allow us to better understand participation in career academies in Miami-Dade and Broward (Ft. Lauderdale), two of the largest districts in Florida.

The NAF is an acclaimed network of 546 career-themed academies in 39 states with a model based on high standards which provides students - particularly those in large urban settings - with access to industry-specific curricula, work-based learning experiences, and relationships with business and industry. They focus on five career themes – engineering, finance, health sciences, hospitality and tourism, and information technology. The primary objective of this collaborative effort is to analyze longitudinal national, state, and regional student level data in which the NAF team has collected from their school sites. Data include student academic performance, student demographic characteristics, and academy assessments. Analyses could include descriptive and inferential data on the recruitment, enrollment, retention, and prospects of students participating in high quality career academies, particularly those students in STEM-related areas.

Additionally, the quantitative team is working with the 1997 National Longitudinal Study of Youth data to determine how educational experiences and employment background influence who gets jobs in STEMH fields with a focus on technician jobs across several fields including engineering technicians, life and physical science technicians, and health technicians. We have also completed a longitudinal analysis of employment in STEMH technician and professional employment controlling for demographic factors and high school achievement as well as the timing of factors like college enrollment and degree attainment. This report titled, "A Longitudinal Analysis of Young Adult Pathways to STEMH Occupations" has been submitted to the 2015 Annual Meetings of the American Educational Research Association. The current report can be found in Attachment 1F. Future analysis will include later NLSY cohorts and include further analyses of employment experiences leading up to STEMH employment.

PathTech also has two data requests under consideration with Florida Department of Education. The requests track two groups of Florida high school students, Tampa Bay (districts of interest in the qualitative portion of the project) and the rest of the state. The non-Tampa Bay dataset would include race data and track students through high schools into their post-secondary schooling. It would not include employment data. The Tampa Bay dataset would track students from high school to post-secondary schooling and their employment but it would not include race data. These data requests should comply with state regulations that limit sharing state administrative data that includes both employment data and identifying information. See Attachment 1H for the full list of variables requested and correspondence between Dr. Tyson and

representatives from FLDOE on Year 3 data requests.

We are also collaborating with Dr. Daniel Kuehn (American University) who is using national datasets to conduct analysis for the National Academies of Engineering (NAE) Committee on Engineering Technology on which Dr. Tyson is a member.

Specific Objectives: Our primary objective in Year 3 for the qualitative component of the study was to complete all the data collection with community college and high school students as well as industry employers. In addition, all of the interview data has been coded and is being actively analyzed. On the quantitative analysis, we have continued accessing alternative data sets applicable to our project, and have been actively analyzing such panel data regarding ET pathways.

Significant Results: **Qualitative Analysis**

Community College

Analysis of the community college data found that there were four prototypic categories emerge for community college ET students:

1) The first group has a high school diploma or less. They enjoy working with their hands, have been indifferent towards schooling in the past, and have a winding work history. Through ET classes, they have now have found something they really interests them, and they are interested in going further in schooling for perhaps the first time.

2) The second group has at least a high school diploma and often some college. They describe themselves as good students in the past, but they were never exposed to ET in their earlier educational or work experiences. They have a stable work history and aim to enter the ET industry with the credentials/certifications from their ET programs.

3) The third group is focused on re-skilling and are eager to improve their job situation. These students have had careers in manufacturing or related fields, and have been laid off after many years employment. They often have families they are supporting and anxious to resume a job. They are taking ET classes/certification in order to gain a new and more stable job that will be able to support their families.

4) The fourth group is degree-seeking. They hope to empower themselves and gain the respect of others. Having a degree in higher education has often been a life-long dream, and the ET program provides a pathway for that.

Overall, ET community college programs have a transformative effect on students (see Attachment 1G).

High School

Preliminary analysis of the high school interview data suggests that students taking ET classes in high school enjoy hands-on learning and using technology. Most of these students expect to continue to four year colleges while others expect to work or join the military after high school. The main factors that

separate these two groups is that the students aiming to attend four-year colleges are often concurrently completing high-level math and sciences course, receive encouragement to pursue careers in engineering from their families, often have STEM-related experiences in and out of school, as well as receive advice and summer/afterschool/internship opportunities from teachers and other mentors. In particular, curricular and extra-curricular activities (e.g.robotics clubs/camps,industry tours, SolidWorks certification) further motivate high school ET students to continue on to four-year engineering programs rather than entering the ET industry or pursuing two-year ET degrees. We anticipate that students who are more likely to attend the two-year programs are likely to be the ones who have not had the opportunity to take ET classes in high school and participate in related curricular/extra-curricular activities.

Industry

Comprehensive analysis of the industry data found in Attachment 1C contains information about the companies, employers, and primary themes discussed in the interviews. The most prominent finding is that employers rarely include community college education as a primary pathway into ET careers. More often, employers seek workers with solid high school credentials who also have "soft skills" such as loyalty and reliability, and usually use their personal social networks or those of their employees to identify potential hires. Employers are confident they can teach skills necessary to perform the work required on the job if the student has a solid academic foundation and the right attitude. Some employers did indicate a preference for hiring workers with industry certifications rather than just a high school diploma, but did not discuss seeking to hire workers with AA/AS degrees in ET fields. Employers also discussed an interest in hiring veterans but noted veterans have problems in "translating" their military experience to the civilian skill set desired.

Florida manufacturers recommend hands-on internships as part of the education of students in community college engineering technology programs. However, few employers interviewed offer such internships. Most employers who did have interns or who employed students, were providing those opportunities to students whose goal is a bachelor’s degree in engineering at a university. Furthermore, while in the internships, some of these university-bound students are actually *doing* the jobs for which the community college students are being trained, thus reducing job and training opportunities for future technicians.

Quantitative Analysis

“Technician” in the NLSY data includes three categories according to Census Occupational/Job Codes: (1) Engineering and Related Technicians, (2) Life, Physical, and Social Science Technicians, and (3) Health Care Technical Support. Other STEMH occupations were coded as “Professional” jobs: (1) Mathematical and Computer Scientists, (2) Engineers, Architects, and Surveyors, (3) Physical Scientists, (4) Health Diagnosis and Treating Practitioners.

Longitudinal analyses of post-secondary employment outcomes of young adults

reveal demographic and educational trends with respect to the timing of entrance into STEMH technician or professional workforces. First, females were significantly more likely to obtain employment in technician occupations and less likely to be employed in STEMH professional occupations in young adulthood. Second, Black respondents were significantly more likely to obtain technician occupations. White Hispanics were less likely to participate in STEMH professional occupations. This study also indicated Hispanics who did not consider themselves Black or White were significantly less likely to participate in STEMH professional occupations, which is consistent with the literature (Fletcher & Zirkle, 2009).

Analyses of high school curricular programs, both participation in CTE and dual programs were significantly related to technician and professional occupation participation. In fact, those who participated in dual (both college preparatory and CTE) programs were significantly more likely to participate in technician occupations. And, those who participated in CTE were significantly more likely to participate in both technician and professional occupations. This finding is quite promising for dual program completers and substantiates prior research which used the NLSY 1997 dataset and found CTE graduates to be more likely to participate in STEMH occupations compared to general education graduates in 2006 (Fletcher & Zirkle, 2009). Therefore, participation in both CTE and dual programs in high school is associated with positive long-term STEMH labor market outcomes.

In terms of science and math course-taking, individuals in technician occupations were significantly more likely to have completed lower and middle level math courses compared to taking Algebra II, and both technician and professional workers were significantly more likely to have completed advanced math courses. This suggests further analyses is necessary to determine which occupations draw students with higher and lower levels of math preparation. For science, professional workers were significantly more likely to enroll in chemistry and physics courses, whereas, those who completed primary and secondary science courses in high school were significantly less likely to obtain professional occupations.

Analyses of college enrollment reveal that individuals who enrolled in 2 year colleges were more likely to enter technician occupations. Upon earning a degree, individuals with AS and BS degrees were more likely to enter both STEMH technician and professional occupations. Those who earned BA degrees were significantly less likely to be in STEMH technician and professional occupations.

Key outcomes or Other achievements:

Qualitative Outcomes

Our descriptive analysis of the 57 community college students found that the majority of our community college participants are white males (37 of 57 participants) with a mean age of 31 and an age range of 19 to 54 years. Our analysis of the ethnicity data by gender found 37 (72%) white men, eight (16%) Latino men, four (8%) black/African American, one (2%) 24 year old Asian man, and one (2%) 54 year old Native American man. Of the six women in our sample, four are white (66.7%) and two are Latina (33.3%), and are 30 and 44 years old.

Our participants finance their ET degree using a variety of methods, sometimes more than one. Of our 57 participants, the majority 23 (40%) use loans finance their ET degree. The next most common type of funding is through grants and scholarships. Twenty (35%) of the 57 participants use either grants or scholarships to pay for their ET degree. In their interviews, most participants stated that they use Perkins grants. A few have scholarships funded by their community college or programs such as the federally funded Workforce Investment Act. The full descriptive analysis is attached (see Attachment 1D).

An in-depth analysis of the six women community college students found:

Three were pursuing the ET degree to re-skill, while the other three wanted to gain additional credentials as well as their colleagues respect.

- Course flexibility and availability of online courses were important to all the women because they worked and/or had family responsibilities.
- All the women relied on some form of financial assistance to fund their ET program.
- Five of the six women stated that they needed assistance in seeking an ET job and/or internship, especially because they had no or limited experience in the field.

Quantitative Outcomes

The number of respondents in both sets of occupations grew overtime, with the tech jobs growing earlier than professionals jobs. Both made up over 4% of the sample in the most recent years. The data runs from 1997 to 2011. About a third of the sample is missing occupation data at any given time.

Altogether, about 12.5% of respondents had at least one tech job and around 10% had a professional job during one year from 1997-2001. The actual number is likely larger due to missing data. Of particular interest is a jump in Tech from 2003, 2004, 2005 from 4.0% to 4.6% to 5.6% among non-missing. Respondents were 18-22 in 2003 and 20-24 in 2005. That is encouraging and may match up with AS/AAS degree attainment. There is a similar jump in professional a little bit later that may match with bachelor's degree attainment.

Strengthening Stakeholder Relationships

Stakeholder interest in women and girl participation in ET careers led us to conduct follow up interviews with women community college students and further analysis these data.

Through our interactions with stakeholders at ET forums and meetings, we discovered that they valued one-page handouts of our findings and policy recommendations that they can pass on to colleagues and college administrators (see Attachment 3).

Recommendations

1) Efforts to recruit students into community college ET programs would be best served through programming at high schools that DO NOT offer an established sequence of ET classes.. Such an introduction may lead to community college enrollment after high school or even dual enrollment while in high school.

2) More articulation agreements between high schools and community colleges for industry certification will likely also increase community college enrollment directly from high school.

3) Fostering relationships with veterans and veteran orgainzations will encourage a pathway between military technician skill sets and those needed in ET civilian fields.

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

Graduate students on the Qualitative Research team were trained in fundamental interview techniques which were used
when they conducted interviews in the field. They were also trained in appropriate field data collection methods which
include securing data and assuring confidentiality of participants. Both graduate students and post doctoral scholars actively
conducted qualitative interviews with participants. They are currently completing the coding of data, preparing data matrices, identifying saturated themes, analyzing emerging findings, and writing up preliminary reports that will used to guide the authorship of scholarly articles. This hands-on active experience in doing research made the process transparent and provided students an important complement to their book knowledge.

The graduate students and post doctoral scholar also collaborated on presentations at conferences and professional meetings as well. When asked, the graduate students say the aspect of their training they have appreciated the most is learning how to effectively be part of a collaboration and gaining experience in how to think, work, and write together.

Quantitative Investigator, Dr. Eddie Fletcher has been training PI Dr. Tyson on how to use national datasets such as NLSY97. Dr. Fletcher has several years of experience using this data and his experience complements Dr. Tyson's experience working with state administrative datasets.

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

The PathTech team led by Drs. Will Tyson and Lakshmi Jayaram participated in the following events to share our findings with the local stakeholders, including high school teachers and administrators, ET program faculty and administrators, manufacturers and other industry leaders who would otherwise be unaware of our research:

Presentations to FLATE and Engineering Technology stakeholders:

"PathTech Update." Florida Forum on Engineering Technology. Hillsborough Community College – Brandon Campus, Tampa,
FL. October 3, 2013.

"PathTech Update." Florida Forum on Engineering Technology. Polk State College – Bartow Campus, Bartow, FL. April 4, 2014.

We distributed one-page handouts with our preliminary findings at these forums (see Attachment 3).

Meetings with local stakeholders

We also established a collaboration with the Florida TRADE Consortium, a group of 12 state and community colleges located throughout Florida. We have met with Aneesah (Dominguez) Williams, MHEd, Data Quality Coordinator, to discuss collaborations in data collection and analysis between PathTech and Florida TRADE.

Presentations to academic and ATE stakeholders:

PathTech findings were presented as a showcase slide show to the NSF ATE National Principal Investigators Conference, Washington D.C., October 23–25, 2013.

PathTech poster was presented to the University of South Florida Seventh Annual Oktoberfest Research Poster Event, Tampa, Florida, Oct. 25, 2013

SFAA presentations

Rebekah Heppner (2014). *Pathways into High-Tech Manufacturing Careers: Where do Internships in Engineering Technology Really Lead?*. 74th Annual Meeting of the Society for Applied Anthropology. Albuquerque, New Mexico.

Will Tyson and Lakshmi Jayaram (2014). *Understanding Engineering Technology Education and Career Pathways through Research and Community Engagement*. 74th Annual Meeting of the Society for Applied Anthropology. Albuquerque, New Mexico.

Chrystal A. S. Smith (2014). *Women Forging Ahead in Traditionally Male Dominated Engineering Technology Fields*. 74th Annual Meeting of the Society for Applied Anthropology. Albuquerque, New Mexico.

*** What do you plan to do during the next reporting period to accomplish the goals?**

We will conduct the following research activities in Year 4:

1. Complete qualitative analysis of community college, high school, and industry interviews.
2. Conduct multivariate, multi-level analysis of the impact of AS engineering technology degree attainment on short and long-range post-secondary employment and academic outcomes among students who enrolled in ET programs and comparable students who did not in all cohorts.
3. Conduct quantitative analyses of extant data for students in grade 11, grade 12, and post-secondary cohorts.

We will conduct the following dissemination activities in Year 4:

1. Present the paper, *Work to School Transitions and the Transformative Role of Community College Education* at the American Sociological Association 14th Annual Meeting, San Francisco, California on August 16-19, 2014.
2. Author qualitative and quantitative papers for publication in peer reviewed journals.
3. Present research findings at the Forum on Engineering Technology in Fall 2014.

Supporting Files

Filename	Description	Uploaded By	Uploaded On
Attachment 1 - Annual Report 2013-2014.pdf	Attachment 1 includes completed qualitative data analyses with tables and graphics, letters of agreement to access	William Tyson	07/30/2014

Filename	Description	Uploaded By	Uploaded On
	quantitative course-taking data, paper presentations, and Florida Department of Education data requests.		
Attachment 2 - Annual Report 2013-2014.pdf	Attachment 2 includes PowerPoint presentations from professional conferences.	William Tyson	07/30/2014
Attachment 3 - Annual Report 2013-2014.pdf	Attachment 3 is the one-page PathTech handout that was distributed to stakeholders at the local ET Forums.	William Tyson	07/30/2014
PathTech_ExternalEvaluationReport_ICF_Jul2014_FINAL.pdf	ICF International External Evaluation Report	William Tyson	07/30/2014

Products

Books

Book Chapters

Conference Papers and Presentations

Heppner, Rebekah (2014). *Pathways into High-Tech Manufacturing Careers: Where do Internships in Engineering Technology Really Lead?*. 74th Annual Meeting of the Society for Applied Anthropology,. Albuquerque, New Mexico. Status = OTHER; Acknowledgement of Federal Support = Yes

Cox, E. Daniel, Victor Hernandez-Gantes, & Edward Fletcher (2014). *Predictors of career academy enrollment in a local school district*.. American Educational Research Association Annual Meeting. Philadelphia, PA. Status = OTHER; Acknowledgement of Federal Support = Yes

Tyson, Will and Lakshmi Jayaram (2014). *Understanding Engineering Technology Education and Career Pathways through Research and Community Engagement*. 74th Annual Meeting of the Society for Applied Anthropology,. Albuquerque, New Mexico. Status = OTHER; Acknowledgement of Federal Support = Yes

Smith, Chrystal A. S. (2014). *Women Forging Ahead in Traditionally Male Dominated Engineering Technology Fields*. 74th Annual Meeting of the Society for Applied Anthropology. Albuquerque, New Mexico. Status = OTHER; Acknowledgement of Federal Support = Yes

Tyson, Will, Lakshmi Jayaram, and Margaret Cooper (2013). *"PathTech Update."*. Florida Forum on Engineering Technology: Opportunities with Industry. St. Petersburg College, Clearwater, Florida. Status = OTHER; Acknowledgement of Federal Support = Yes

Tyson, Will, Lakshmi Jayaram, Margaret Cooper, David Zeller, and Pangri Mehta. (2013). *"PathTech: Building Partnerships with Community Colleges to Study Pathways to Advanced Technology Degree." (see attached PowerPoint slides)*. 76th Annual Meeting of the Southern Sociological Society. Atlanta, GA. Status = OTHER; Acknowledgement of Federal Support = Yes

Tyson, Will, Lakshmi Jayaram, Margaret Cooper, David Zeller, and Pangri Mehta (2013). *"PathTech: Building Partnerships with Community Colleges to Study Pathways to Advanced Technology Degrees"*. The STEM Research Group Brown Bag. USF College of Education. Tampa, FL. Status = OTHER; Acknowledgement of Federal Support = Yes

Tyson, Will (2012). *"Summary of Educational Patterns in Community Colleges."*. Florida Forum on Engineering Technology. State College of Florida, Venice, FL. Status = OTHER; Acknowledgement of Federal Support = Yes

Inventions

Journals

Licenses

Other Products

Other Publications

Zeller, David, Lakshmi Jayaram, and Will Tyson (2014). *"Deindustrialization, Reindustrialization, and Engineering Technology Education in Florida" (Working Paper)*. This paper explores the ET education in the local Tampa Bay region.. Status = OTHER; Acknowledgement of Federal Support = Yes

Jayaram, Lakshmi and Will Tyson (2014). *"Improving Pathways from High School to Community College Technician Education Programs: Policy Recommendations from the PathTech Pilot Analysis" (Working Paper)*. This paper uses the findings of the pilot data analysis to make policy recommendations for ET educators on both the community college and high school leves.. Status = OTHER; Acknowledgement of Federal Support = Yes

Heppner,Rebekah and Lakshmi Jayaram (2014). *"Industry Perceptions of Technician Skill Acquisition and Development: A Case Study of Tampa Bay" (Working Paper)*. This paper focuses on the finding of the interviews conducted with ET graduates and their supervisors in the local Tampa ET industry.. Status = OTHER; Acknowledgement of Federal Support = Yes

Margaret Cooper, Lakshmi Jayaram, Pangri Mehta, and David Zeller (2013). *"Multiple Educational and*

Occupational Pathways Intersecting with the Life Course: Preliminary Analysis of PathTech Pilot Data" (Working Paper). This paper focuses on the preliminary analysis of the PathTech community college and high school data.. Status = OTHER; Acknowledgement of Federal Support = Yes

Patents

Technologies or Techniques

Thesis/Dissertations

Websites
PathTech: Successful Academic and Employment Pathways in Advanced Technologies
http://www.sociology.usf.edu/pathtech/

The PathTech Web site is designed to inform our partners, the community college community, regional technological industries, the national and local media, and the general public about project activities and accomplishments.

Participants/Organizations

What individuals have worked on the project?

Name	Most Senior Project Role	Nearest Person Month Worked
Tyson, William	PD/PI	2
Boyette, Marie	Co PD/PI	2
Jayaram, Lakshmi	Co PD/PI	5
Cooper, Margaret	Faculty	6
Fletcher, Edward	Faculty	2
Smith, Chrystal	Postdoctoral (scholar, fellow or other postdoctoral position)	9
Heppner, Rebekah	Other Professional	5
DiCicco, Michael	Graduate Student (research assistant)	7
Mehta, Pangri	Graduate Student (research assistant)	8
Zeller, David	Graduate Student (research assistant)	7

Name	Most Senior Project Role	Nearest Person Month Worked
Abrahams, Michael	Other	1
Hagelin, Katherine	Other	1

Full details of individuals who have worked on the project:

William T Tyson
Email: wtyson@usf.edu
Most Senior Project Role: PD/PI
Nearest Person Month Worked: 2

Contribution to the Project: Dr. Tyson is an Associate Professor in the Department of Sociology. His primary responsibilities include the effective implementation of research activities and supervising project personnel. As the Quantitative Lead, he requests FLDOE data and other course-taking data for high school and community college students, analyzes the data, and produces manuscripts.

Funding Support: None

International Collaboration: No
International Travel: No

Marie Boyette
Email: mboyette3@hccfl.edu
Most Senior Project Role: Co PD/PI
Nearest Person Month Worked: 2

Contribution to the Project: Dr. Marie Boyette is a co-Principal Investigator and Associate Director of FLATE. She facilitates communication between PathTech and FLATE and assists with scheduling interviews with ET faculty and administrators and local industry employers. Dr. Boyette also assists in integrating PathTech team members into related activities in the Tampa Bay area sponsored by FLATE and other organizations.

Funding Support: None

International Collaboration: No
International Travel: No

Lakshmi Jayaram
Email: ljayaram@usf.edu
Most Senior Project Role: Co PD/PI
Nearest Person Month Worked: 5

Contribution to the Project: Dr. Lakshmi Jayaram is the Qualitative Lead of the PathTech project. Dr. Jayaram developed the qualitative instruments and is guiding the qualitative data analysis. She is co-authoring manuscripts based on the qualitative findings. She works closely with Drs. Tyson and Smith to implement research activities and supervise graduate students on the project.

Funding Support: None

International Collaboration: No
International Travel: No

Margaret Cooper
Email: mcooper5@usf.edu
Most Senior Project Role: Faculty
Nearest Person Month Worked: 6

Contribution to the Project: Dr. Margaret Cooper is a Post-Doctoral Scholar and adjunct faculty in the Department of Sociology. She has conducted interviews and assisted with their analysis. She is also a member of the literature review team and is contributing to manuscripts on our research findings.

Funding Support: None

International Collaboration: No
International Travel: No

Edward Fletcher
Email: ecfletcher@usf.edu
Most Senior Project Role: Faculty
Nearest Person Month Worked: 2

Contribution to the Project: Dr. Eddie Fletcher is an Assistant Professor in the College of Education in the Department of Adult, Career, and Higher Education. He has an extensive experience in Career and Technical Education and has strong quantitative skills. He works closely with Dr. Tyson on the quantitative component of our research. He also requests FLDOE data and other course-taking data for high school and community college students, analyzes the data, and co-authors manuscripts.

Funding Support: None

International Collaboration: No
International Travel: No

Chrystal Smith
Email: casmith5@usf.edu
Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)
Nearest Person Month Worked: 9

Contribution to the Project: Dr. Smith is an anthropologist with extensive experience in qualitative research. She administers the grant on a daily basis which includes addressing IRB and budget issues and administrating the PathTech Web site, and co-authoring correspondence and reports. She also works closely with Drs. Tyson and Jayaram as they develop instruments, conduct field work, data analysis, meet with the external evaluators, and produce manuscripts. She also trains graduate students and team members in effective field methods.

Funding Support: None

International Collaboration: No
International Travel: No

Rebekah Heppner
Email: rsheppner@gmail.com
Most Senior Project Role: Other Professional
Nearest Person Month Worked: 5

Contribution to the Project: Dr. Rebekah Heppner is a Qualitative Investigator. She earned her PhD in Anthropology and has an MBA and is a small business owner in the Tampa Bay area. She has an extensive background in local Florida industry. She is leading the industry component of the grant. She assists in the development of interview protocols for ET employees and employers. She also conducts these interviews and assists with their analysis.

Funding Support: None

International Collaboration: No
International Travel: No

Michael DiCicco
Email: mdicicco@usf.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 7

Contribution to the Project: Michael DiCicco is a graduate student in the Department of Secondary Education. He is also a member of the qualitative team that conducted interviews and has assisted in the qualitative data analysis.

Funding Support: None

International Collaboration: No
International Travel: No

Pangri Mehta
Email: pmehta3@mail.usf.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 8

Contribution to the Project: Pangri Mehta is is a graduate student in the Department of Sociology. She is also a member of the qualitative team that conducted interviews, has assisted in the qualitative data analysis. and is contributing to manuscripts on our research findings.

Funding Support: None

International Collaboration: No
International Travel: No

David Zeller
Email: davidzeller@mail.usf.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 7

Contribution to the Project: David Zeller is a graduate student in the Department of Sociology. He is also a member of the qualitative team that conducted interviews, has assisted in the qualitative data analysis. and is contributing to manuscripts on our research findings.

Funding Support: None

International Collaboration: No
International Travel: No

Michael Abrahams
Email: mabraham@usf.edu
Most Senior Project Role: Other
Nearest Person Month Worked: 1

Contribution to the Project: Michael Abrahams is the Webmaster of the College of Arts & Sciences at University of South Florida. He designed the PathTech Web site and assists Dr. Smith in its administration.

Funding Support: None

International Collaboration: No
International Travel: No

Katherine Hagelin
Email: lpmkate@yahoo.com
Most Senior Project Role: Other
Nearest Person Month Worked: 1

Contribution to the Project: Katherine Hagelin is the project transcriptionist. She transcribes the interview recordings and provides written transcripts to the project team.

Funding Support: None

International Collaboration: No
International Travel: No

What other organizations have been involved as partners?

Name	Type of Partner Organization	Location
Community College Research Center (CCRC) at Teachers College	Academic Institution	New York, NY

Name	Type of Partner Organization	Location
Florida Advanced Technological Education Center (FLATE)	Academic Institution	Tampa, FL
Sarasota County Schools	Academic Institution	Sarasota, FL
St. Petersburg College	Academic Institution	Clearwater, FL
State College of Florida	Academic Institution	Venice, FL
Hillsborough Community College	Academic Institution	Tampa, FL
Hillsborough County Public Schools	School or School Systems	Tampa, FL
ICF International	Industrial or Commercial Firms	Fairfax, VA
National Academy Foundation	Other Nonprofits	New York, NY
National Academy of Engineering	Other Nonprofits	Washington, DC
Pinellas County Schools	School or School Systems	Largo, FL
Polk County Public Schools	School or School Systems	Bartow, FL
Polk State College	Academic Institution	Lakeland, FL

Full details of organizations that have been involved as partners:

Community College Research Center (CCRC) at Teachers College

Organization Type: Academic Institution
Organization Location: New York, NY

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: Dr. Will Tyson is coordinating with a colleague at the Community College Research Center (CCRC) at Teachers College at Columbia University to combine efforts to analyze state longitudinal data from community college technician education programs outside of Florida. CCRC is the leading independent authority on two-year colleges.

Florida Advanced Technological Education Center (FLATE)

Organization Type: Academic Institution

Organization Location: Tampa, FL

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: PathTech has established a partnership with FLATE. We collaborate closely with Dr. Marilyn Barger, Executive Director, and Dr. Marie Boyette, Associate Director, on recruiting students, faculty, and administrators for interviews. Drs. Barger and Boyette also facilitates PathTech's contact with local industries and relevant community college data. FLATE has a subcontract with PathTech.

Hillsborough Community College

Organization Type: Academic Institution
Organization Location: Tampa, FL

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: PathTech has established a partnership with Hillsborough Community College. We collaborate closely with Dr. Alessandro Anzalone, Engineering Technology, Instructor and Program Manager, on recruiting students, faculty, and administrators for interviews.

Hillsborough County Public Schools

Organization Type: School or School Systems
Organization Location: Tampa, FL

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: PathTech has established a partnership with Hillsborough County Public Schools. With the assistance of the district's ET officials, we are in the process of identifying a high school with an ET career academy that acts as a feeder school for Hillsborough Community College to conduct student interviews and focus groups along with faculty and administrator interviews. We conducted our pilot with Middleton Magnet High School in Hillsborough County. PathTech Principal Investigator, Dr. Will Tyson, serves on the Middleton High School STEM Advisory Board.

ICF International

Organization Type: Industrial or Commercial Firms
Organization Location: Fairfax, VA

Partner's Contribution to the Project:
Collaborative Research
Other: Evaluation

More Detail on Partner and Contribution: Thomas Norwood at ICF International is our external evaluator for program assessment. His team has also collaborated with us on FLDOE quantitative data requests. The Year

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2 external evaluation report is attached to Accomplishments section of this annual report.

National Academy Foundation

Organization Type: Other Nonprofits
Organization Location: New York, NY

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: Dr. Eddie Fletcher is leading efforts to coordinate with representatives from the National Academy Foundation (NAF). The NAF is an acclaimed network of 546 career-themed academies in 39 states with a model based on high standards which provides students - particularly those in large urban settings - with access to industry-specific curricula, work-based learning experiences, and relationships with business and industry. They focus on five career themes – engineering, finance, health sciences, hospitality and tourism, and information technology. The primary objective of this collaborative effort is to analyze longitudinal national, state, and regional student level data collected by NAF from their school sites. Data include student academic performance, student demographic characteristics, and academy assessments. Analyses could include descriptive and inferential data on the recruitment, enrollment, retention, and prospects of students participating in high quality career academies, particularly those students in STEM-related areas.

National Academy of Engineering

Organization Type: Other Nonprofits
Organization Location: Washington, DC

Partner's Contribution to the Project:
Other: Collaboration

More Detail on Partner and Contribution: We are collaborating on workshops and sharing research findings with Greg Pearson, Senior Program Officer for K-12 Engineering Education and Public Understanding of Engineering, National Academy of Engineering.

Pinellas County Schools

Organization Type: School or School Systems
Organization Location: Largo, FL

Partner's Contribution to the Project:
Facilities

More Detail on Partner and Contribution: PathTech has established a partnership with Pinellas County Schools. With the assistance of the district's ET officials, we have identified high schools with STEM career academies. We will conduct student interviews and focus groups along with teacher and administrator interviews.

Polk County Public Schools

Organization Type: School or School Systems
Organization Location: Bartow, FL

Partner's Contribution to the Project:
Facilities

More Detail on Partner and Contribution: PathTech has established a partnership with Polk County Public Schools. With the assistance of the district's ET officials, we are in the process of identifying a high school with an ET career academy that acts as a feeder school for Polk State College. At our initial meeting, high school administrators agreed to participate in our study. However, our research request was denied by district personnel because of the school's heavy testing burden.

Polk State College

Organization Type: Academic Institution
Organization Location: Lakeland, FL

Partner's Contribution to the Project:
Facilities

More Detail on Partner and Contribution: PathTech has established a partnership with Polk State College. We collaborate closely with Dr. Eric A. Roe, Director of Applied Technology, Manufacturing Talent Development Institute (Manufacturing TDI).on recruiting students, faculty, and administrators for interviews. Dr. Roe also facilitates PathTech's contact with local industries and the feeder high schools.

Sarasota County Schools

Organization Type: Academic Institution
Organization Location: Sarasota, FL

Partner's Contribution to the Project:
Facilities

More Detail on Partner and Contribution: PathTech has established a partnership with Sarasota County Schools. With the assistance of the district's ET officials, we are in the process of identifying a high school with an ET career academy that acts as a feeder school for State College of Florida Manatee-Sarasota to conduct student interviews and focus groups along with faculty and administrator interviews.

St. Petersburg College

Organization Type: Academic Institution
Organization Location: Clearwater, FL

Partner's Contribution to the Project:
Facilities

More Detail on Partner and Contribution: PathTech has established a partnership with St. Petersburg

College. We collaborate closely with Dr. Bradley E. Jenkins, Associate Dean, Engineering Technology & Building Arts, on recruiting students, faculty, and administrators for interviews. Dr. Jenkins also facilitates PathTech's contact with local industries and the feeder high schools. Dr. Will Tyson, PI has offered assistance to St. Petersburg College research personnel on an NSF S-STEM grant proposal. He also participated in a workshop on Pinellas County STEM career pathways in Summer 2012.

State College of Florida

Organization Type: Academic Institution
Organization Location: Venice, FL

Partner's Contribution to the Project:
Facilities

More Detail on Partner and Contribution: PathTech has established a partnership with State College of Florida. We collaborate closely with Adrienne Gould-Choquette, Program Manager, Engineering Technology, on recruiting students, faculty, and administrators for interviews. Ms. Gould-Choquette also facilitates PathTech's contact with local industries and the feeder high schools.

What other collaborators or contacts have been involved?

YES

Impacts

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

Our third year research findings impact the knowledge about student pathways from high school through community college to industry in-depth in one region of Florida. These findings meet NSF ATE's goals of improving the education of students in engineering technology and in addition produce more graduates to meet labor demands.

One of the essential components of the PathTech study has been collaboration between USF and FLATE as well as the other community college, high school, and industry partners. This type of collaboration allows for organic development of research objectives and processes where knowledge is constructed and produced through interface and interaction with those experiencing technician educational and occupational pathways as administrators, teachers, students, employers, and policy makers. Most importantly, such collaborations also allow for real-time sharing of emerging findings and developing knowledge, which allows all collaborative members to benefit from the research.

What is the impact on other disciplines?

In addition to STEM research, our research findings make a significant impact to the disciplines of sociology of education and educational anthropology. These disciplines explore the societal factors that contribute to the students' education and learning experiences. Our research findings elucidate the experiences of community college students in the STEM fields.

As local economies have experienced significant shifts and dramatic changes in recent decades, the movement

of jobs and people has grown, and new industries have emerged. Central to these dynamics has been the role of technology, particularly in production processes. While bodies of literature have examined these phenomena, these studies largely reside within disciplinary boundaries and within the towers of the academy. The PathTech research model utilizes interdisciplinary frameworks and multiple methodologies, with a focus on collecting and analyzing data from various sources and levels, all in shared partnership with schools, industry, and community. This approach provides a bold and innovative way of doing social science research on workforce topics crucial to our society that moves beyond disciplinarity and academia and into classrooms, boardrooms, and policy conversations.

What is the impact on the development of human resources?
Nothing to report.

What is the impact on physical resources that form infrastructure?
Nothing to report.

What is the impact on institutional resources that form infrastructure?
Nothing to report.

What is the impact on information resources that form infrastructure?
Nothing to report.

What is the impact on technology transfer?
Nothing to report.

What is the impact on society beyond science and technology?

Our research findings contribute knowledge about community colleges as a student pathway into engineering technology careers. This makes a positive impact on the employment strategies and decisions made by ET industries seeking qualified technicians from the U.S. labor market.

Social science research has long noted that as individuals transition from school to work they are often simultaneously experiencing other life transitions as well. Furthermore, societal expectations for the degrees and jobs one holds are influenced by factors such as social class, race/ethnicity, gender, geography, and what is considered normative given the specific confluence of such individual characteristics. This space, where one's educational and occupational transitions meet with life course transitions, all shaped in many ways by social and cultural forces, is the area of inquiry that can be broadly understood as "pathways" research. This type of work is especially important in the contemporary moment, as fewer and fewer students experience a linear progression from school to work; rather, it is a winding road characterized by fluid movement between school and work as "re-skilling" has become often necessary to survive the current economy and its demands for a highly skilled technological workforce.

Technician education, preparing students for entry into jobs across industries, is especially important for individuals who are not part of the service or knowledge economy, or in other words, those who are not pursuing graduate degrees or manual labor fee-for-service jobs. Occupations as technicians can provide a family wage, secure stable employment with opportunities for promotion, and a genuine possibility for accomplishing important social milestones and achieving middle-class status. Studies that consider one dimension, such as the educational training students receive, or the experiences on the job, or work-life balance, cannot fully examine the intersections between school, work, family, the economy, and the life course, or the ways that individuals are nested in each of these spheres. It is this type of holistic examination that we call "pathways" research and that reveals both the complexities and subtleties of becoming educated, getting and keeping a job, providing for families, all while growing and maturing as individuals in a dynamic and evolving global economy. Better understanding the confluence of these many social forces will allow us to improve the life chances and well-being

of individuals in our societies, make progress as an educated and skilled nation, and contribute to positive change related to policies supporting education and employment.

Changes/Problems

Changes in approach and reason for change

We will not be conducting qualitative data collection from high schools or district high school administrators in Polk County. The Principal and ET instructor at Bartow High School agree to participate in our study, but district officials from Polk County rejected our request to conduct the research because of testing and other activities at the school. Consequently, we decided to move forward on completing the analysis of our high school data that we had collected at four high schools which met the goals established in the proposal. After data collection was completed, qualitative team members, Michael DiCiccio, Rebekah Heppner, and Margaret Cooper stepped down from the project. Their primary responsibilities were conducting project interviews.

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.
Nothing to report.