

# Preview of Award 1104214 - Annual Project Report

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## 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**
- **Kathryn M Borman, Co-Principal Investigator**
- **Marie Boyette, Co-Principal Investigator**

Submitting Official (if other than PD\PI):

- **William T Tyson**
- **Principal Investigator**

Submission Date:

**08/30/2013**

Recipient Organization:

**University of South Florida**

Project/Grant Period:

**09/01/2011 - 08/31/2015**

Reporting Period:

**09/01/2012 - 08/31/2013**

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 are actively collecting data at high schools, community colleges, and with industry partners in the Tampa Bay area as well as analyzing education and employment administrative data from the Florida Department of Education. 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:

During Year 2 (the current reporting period), two qualitative pilot studies were completed. In these pilot studies, we sought to test and refine our interview guides, complete preliminary analysis of emerging themes, and use this knowledge to inform the greater study. The first pilot study was conducted with students from one of our partner community colleges and the second pilot study was with high school students attending a STEM magnet program with a focus in advanced technology education. The research objective of these pilot studies was to gain an in-depth understanding for the pathway(s) experienced by these students in their educational experiences as well as the career pathway(s) they expected. Namely, we explored the factors that contributed to their interest in engineering technology, details of their former and current educational coursework, as well as both the educational and occupational trajectories they anticipated into the future. In total, 25 in-depth interviews were completed with high school and community college students. The interviews were recorded, transcribed, and thematically coded. Several preliminary analyses have resulted and are discussed below.

Also during Year 2, we have completed 20 in-depth interviews with industry members. These interviews were recorded, have been transcribed, and are currently being analyzed utilizing a case study approach. Additionally, in-depth interviews with administrators have also been completed and transcribed at all four partner community colleges.

Interview guides and protocols have been developed, refined, and approved by the USF institutional review board for interviews with high school students, community college students, community college faculty and administrators, as well as industry members. The development of these research instruments represents a substantial intellectual contribution through synthesis of relevant research literature, pilot experience and analysis, as well as application of robust methodological techniques in qualitative research.

Specific Objectives:

In qualitative research, the data collection process is sometimes described as a "dance" where there is fluid exchange between the interviewer and the interviewee that describes and constructs understanding of lived experiences, refines scholarly knowledge, as well as informs ensuing data collection. This "dance," or collaborative and iterative process, develops a collective story that the research aims to tell. The specific research objectives first set forth in the pilot studies aimed to construct an understanding of the educational and occupational pathway(s) experienced in the ET field.

We asked high school students to describe what prompted their interest in pursuing advanced technology education, descriptions of their coursework, as well as their future plans.

We asked community college students ET students about several topics ranging from how they came to learn about ET programs, the factors that influenced their decision to enroll in an ET program, their high school preparation, and their perceptions of the ET job market. In our interviews with ET program administrators, we primarily sought to gain an institutional and historical understanding for the development of engineering technology programs, the key elements of these degree programs, the type of students these programs attracted and

retained, as well as ways in which community colleges were working to support their graduates in pursuing employment opportunities.

Our primary objectives in the industry interviews were to understand the skill sets industry leaders were currently seeking in ET workers, the process by which they recruited and hired workers, as well as their perception of the skills and knowledge that would be essential for the future workers in this field.

#### Significant Results:

At this stage, the pilot data has been fully analyzed, while industry and administrator data is in the early stages of analysis. For the purposes of this report, the significant results will be limited to the pilot analysis.

Analysis of the community college pilot data reveal three primary emerging themes influencing pathways in ET: life experiences, information flows, and motivating factors (see Figure 1 attached).

First, students articulate specific life experiences leading to pathways into ET. For example, some discuss having an inclination towards building, fixing things, and using their hands. Others talk about how previous education, and more specifically, high school coursework and extracurricular opportunities lead them to the ET program. And other students mention how their current work experiences, often in ET related fields, propel their journeys into the ET degree program.

Second, students describe the importance of information flows with respect to “how” students learn about technician education programs as well as “what” they know about this industry. Students learn about ET programs through various channels, such as their personal social networks, the web, and recruiters (especially at military installations). The majority of students in the pilot study came to the ET program because a friend, partner, or co-worker told them about it. From there, these students often spent substantial amounts of time doing internet research to learn more about the courses offered and the field in general.

One area of frustration was high school counselors’ lack of knowledge about associate’s degree programs in technician education. Several students wished they had learned of these opportunities sooner in their educational careers. In addition, students’ narratives convey some confusion and ambiguity over the differences between engineering and engineering technology. While many discuss an aspiration to become an engineer, often the work they are describing is, in actuality, technical tasks and processes. Some students even expressed some disappointment that their ET coursework would not count as “prerequisites” for bachelor’s programs in engineering.

Third, students described factors that motivated them to seek degrees and/or credentials in ET. In particular, respondents discussed hopes for social mobility, higher pay, better jobs, as well as the possibility for the two-year degree to lead towards a bachelor’s degree one day. This theme is critical to note because all of the students in the pilot study were returning to school many years after completing high school. This age demographic appears consistent across programs in ET in the Tampa Bay area. Many students went straight into the workforce or military after high school and most already had experience in manufacturing or similar industry. Their return to school was often marked by a job loss and/or need for re-skilling, especially using advanced technologies, in order to be marketable and valued in the current economy. These older students also often have partners and children, and many discuss their need to provide for their families as a key element motivating their desire to enter and complete the ET program (see Figure 2 attached).

Analysis of the high school pilot data shows that students had variegated plans for the future. About one-third had completed high levels of math and science coursework in high school and bound for four-year universities to study in STEM fields. Another third of the students were considering associate’s degree programs in technician education as a post-secondary destination. However, those students were only seriously considering programs that offered formal co-operative education or “co-op” opportunities to work in relevant industry jobs while taking classes.

The last third simply could not afford to continue in school without assistance. Their plans included joining the military in a technical field with hopes of going back to school with support from the GI Bill. Others planned to directly enter the workforce, with aspirations to work as technicians in various fields. These students desired post-secondary schooling, but share an uncertainty about funding post-secondary education due to their family finances, thus potentially derailing their hopes for future degree attainment.

General policy suggestions for community colleges based on these pilot results include:

- 1) Develop highly informational websites to improve the information flows about both what technician education is as well as how to enter and succeed in these programs,
- 2) Focus recruitment efforts on mid-career individuals seeking to re-skill and/or develop technical expertise to re-enter the workforce, and
- 3) Work specifically with high school counselors to improve their knowledge of the differences between engineering and engineering technology and the many opportunities for technicians in the current economy.

The pilot data also provide a basis to make a few concrete suggestions for improving the pathway from high school into post-secondary technician education programs.

- 1) Given the palpable stress personal finances presented for continuing in school, many more interested students with solid high school foundations would be attracted to associate's degree programs if financial assistance were more readily available. In particular, scholarships, grants, and loans would be very helpful.
- 2) Community colleges should more actively promote existing dual enrollment programs and explore partnerships with high schools to encourage dual enrollment to make programs more convenient for parents and students. Dual enrollment programs allow public high school students to gain important industry certifications that could lead to pathways straight into technician jobs.
- 3) High school and community college students are very attracted by opportunities for co-op experiences. This approach removes what students see as the abstract nature of what a technician's job is and allows students to understand and experience it first-hand. In addition, students view co-op opportunities as a concrete way to prove themselves and hopefully get a good job in the future with that experience. Co-op opportunities should be explored at both the secondary and post-secondary level as a viable method of growing the technician workforce.
- 4) Lastly, and very importantly, the pilot findings reveal the instrumental role of instructors in attracting students into this field of study as well as motivating them to continue on the ET pathway. For example, high school students across the board agree that the best aspect of their program is their instructor and explain how much he has taught them and nurtured their interests. Similarly, at the community college level, students discuss how they just keep taking classes with the same group of instructors, that it does not even matter what the course is anymore, but that they would take any class offered by this group. Such saturated themes, illustrating the transformative educational experiences instructors and classroom learning provides, give us an opportunity to consider and explore the potential role of educators in supporting and improving pathways into engineering technology fields.

One issue in particular, of how to improve the recruitment of high school students into community college ET programs, continually piques the interest of (and vexes) the technician community. These preliminary findings from the PathTech pilots indicate that educators can play a vital role in facilitating student development in technical fields. As a result, we recommend inquiry into developing a professional network for technician educators across educational institutions, spanning secondary and post-secondary programs, to connect and develop an infrastructure to "send" students from high school CTE classes into ET community college programs.

#### Key outcomes or Other achievements:

We have become part of the network for technician education in the Tampa Bay area. We are developing partnerships with other research entities interested in conducting targeted research on pathways into technician programs such as the National Academy of Engineering, National Academy Foundation, and the Community College Research Center. This organic process of identifying partner researchers and developing mutually beneficial research agendas is crucial to the success of this project. This achievement is also an important step toward increasing the visibility of ATE within social science and education research communities and practitioners outside of the current scope of ATE.

#### Literature Reviews

Over the past year, the PathTech team has reviewed a sizeable body of literature and completed detailed annotated bibliographies about several topics related to technician education. In particular, our literature reviews have spanned both secondary and post-secondary programs as well as industry, disparities in student and worker outcomes related to race and gender, school to work transitions, as well as a host of related and inter-related sub-topics.

Methodological literature reviews have also informed our research design and process. For example, after an exhaustive literature review we found that studies did not find significant differences in data quality between in person and telephonic interviews, allowing us to interview community college students who would have otherwise declined.

Methodological review of the merits of interview techniques versus focus group approaches also provided compelling evidence to use interviews as our primary method of data collection and focus groups as a triangulation tool. Additionally, as substantive themes emerge in the preliminary qualitative research findings, we continue to keep up with the relevant literatures and update our growing bibliographic library. For example, special literature reviews were completed related to career academies, worker displacement and retraining, the role of technician education in the deindustrialization to reindustrialization process, as well as ways research documents how educational and occupational transitions overlap with life course transitions in the contemporary period and global economy.

**\* 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 participated in the pilot studies. After collecting the data, they were also integrally involved in revising interview protocols, transcribing and coding data, preparing data matrices, identifying saturated themes, analyzing emerging findings, attending webinars to learn how to use qualitative data analysis software (Atlas.ti), as well as writing up preliminary reports. This hands-on active experience in doing research made the process transparent and provided students an important complement to their book knowledge.

In addition, graduate students and postdoctoral scholars were involved in several literature reviews and writing annotated bibliographies on varied topics related to technician education. This experience helped them both learn substantively about the field as well as develop important research skills. The graduate students and post doctoral scholar 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.

Dr. Tyson has been training Quantitative Investigator, Dr. Eddie Fletcher, on the use of student-level state longitudinal data including how to prepare Florida Department of Education (FLDOE) PK-20 Education Data Warehouse (EDW) data requests and conduct quantitative analyses. Dr. Tyson has nine years of experience working with EDW data and FLDOE. This training has reduced the learning curve for using administrative data for Dr. Fletcher and should prepare the team to conduct quantitative analyses using administrative data from other sources.

Dr. Tyson is actively mentoring Lead Qualitative Investigator Dr. Lakshmi Jayaram on grant management. Dr. Jayaram joined the project in January 2013. She will be appointed co-Principal Investigator starting in Year 3 of the project in September 2013 to replace Dr. Kathryn Borman who retired and stepped down from the project in May 2013.

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

The PathTech team led by Will Tyson 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. St. Petersburg College – Clearwater Campus. Clearwater, FL. April 4, 2013.
- "Summary of Educational Patterns in Community Colleges." Florida Forum on Engineering Technology. State College of Florida – Venice Campus. Venice, FL. September 28, 2012.

Board Meetings and Collaborative Activities

- Middleton High School: Pre-Collegiate STEM Academy STEM Advisory Board. Hillsborough Community College – Brandon Campus. Tampa, FL. August 7, 2013.
- High Impact Technology Exchange Conference (HI-TEC): Educating America's Technical Workforce, Austin, TX. July 21-24, 2013.
- Florida Sterling STEM Forum, Orlando, FL. May 30, 2013.
- FLATE Industrial Advisory Committee (IAC) meeting #25. Draper Laboratory. St. Petersburg, FL. May 16, 2013.
- Middleton High School: Pre-Collegiate STEM Academy STEM Advisory Board. Middleton High School. Tampa, FL. May 15, 2013.

The following publications also updated a national audience about PathTech goals, research methods, and early findings.

- "Research Methodologies & Findings Examining Educational and Professional Trajectories of Engineering Technology Students." Florida Advanced Technological Education Center: A National Science Foundation Center of Excellence. FLATE Focus. August 2013. [http://flate-mif.blogspot.com/2013/08/research-methodologies-findings\\_4450.html](http://flate-mif.blogspot.com/2013/08/research-methodologies-findings_4450.html)
- "PathTech Team at USF Analyzes Educational and Professional Trajectories of Engineering Technology Students." Florida Advanced Technological Education Center: A National Science Foundation Center of Excellence. FLATE Focus. July 2013. [http://flate-mif.blogspot.com/2013/07/pathtech-team-at-usf-analyzes\\_4242.html](http://flate-mif.blogspot.com/2013/07/pathtech-team-at-usf-analyzes_4242.html)

The PathTech team also presented preliminary research findings to the following academic audiences:

- "PathTech: Building Partnerships with Community Colleges to Study Pathways to Advanced Technology Degrees." 76th Annual Meeting of the Southern Sociological Society. Atlanta, GA. April 26, 2013. (see attached PowerPoint slides)

- “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. March 29, 2013.

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

We will conduct the following research activities in Year 3:

- Carry out site visits to four high schools with engineering career academies to conduct interviews and focus groups with students, interviews with teachers and administrators
- Complete interviews with students at the four community colleges with AS degrees in engineering technologies
- Complete interviews with employers/supervisors and engineering technology graduates at local industries
- 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
- 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 3:

- Author a quantitative paper for publication in a special issue of *Educational Evaluation and Policy Analysis*, a peer reviewed journal
- Author a qualitative paper using the pilot data findings of community college and high school student interviews for publication in a peer reviewed journal
- Author a qualitative paper which focuses on the findings of the industry interviews with employers/supervisors and engineering technology graduates
- Present research findings at the Forum on Engineering Technology at Hillsborough Community College in September 2013
- Conduct proposed sessions on: 1) University-ATE Center research partnerships and 2) state longitudinal data with Allen Phelps at University of Wisconsin - Madison for the 2013 ATE PI Meeting in October 2013; also present at the ATE Showcase. (see attached session proposals)

**Supporting Files**

	<b>Filename</b>	<b>Description</b>	<b>U B</b>
<a href="#">(Download)</a>	PathTech_ExternalEvaluationReport#2_ICF_Aug2013_final.pdf	PathTech's evaluation report authored by the external evaluator, Thomas J. Horwood, ICF International.	W T
<a href="#">(Download)</a>	FLATE Focus PathTech Articles - July and August 2013.pdf	FLATE Focus PathTech Articles - July and August 2013	W T
<a href="#">(Download)</a>	PathTech Significant Results - Figures 1 and 2_Final.pdf	PathTech Significant Results Figures 1 and 2	W T

**Products**

**Journals**

**Books**

## Book Chapters

## Thesis/Dissertations

## Conference Papers and Presentations

- 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, 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 (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
- 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

## Other Publications

- Edward Fletcher and Will Tyson (2013). *"The Impact of Florida Career Academy Legislation on In School and Postsecondary Student Outcomes"* (Working Paper). See attached outline and prospectus..  
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
- Rebekah Heppner and Lakshmi Jayaram (2013). *"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
- Lakshmi Jayaram and Will Tyson (2013). *"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 levels..  
Status = OTHER; Acknowledgement of Federal Support = Yes
- David Zeller, Lakshmi Jayaram, and Will Tyson (2013). *"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

## Technologies or Techniques

- Nothing to report.

## Patents

Nothing to report.

## Inventions

Nothing to report.

### Licenses

Nothing to report.

### Websites

PathTech: Successful Academic and Employment Pathways in Advanced Technologies

<http://www.sociology.usf.edu/pathtech/>

Title:

URL:

Description:

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.

### Other Products

Nothing to report.

### Supporting Files

	Filename	Description	Up By
<a href="#">(Download)</a>	PathTech Extended STEM Brown Bag Presentation - 2013.pdf	PowerPoint - 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. March 29, 2013.	W Ty
<a href="#">(Download)</a>	EEPA Paper Outline and Prospectus - 2013.pdf	Outline and prospectus for publication in a special issue of Educational Evaluation and Policy Analysis.	W Ty
<a href="#">(Download)</a>	Proposed ATE PI 2013 Sessions for Annual Report.pdf	Session proposals for ATE PI Meeting in October 2013.	W Ty
<a href="#">(Download)</a>	PathTech Presentation Southern Sociological Society - 2013.pdf	PowerPoint - PathTech: Building Partnerships with Community Colleges to Study Pathways to Advanced Technology Degree. 76th Annual Meeting of the Southern Sociological Society. Atlanta, GA. April 26, 2013	W Ty

## Participants

### Research Experience for Undergraduates (REU) funding

What individuals have worked on the project?



<b>Name</b>	<b>Most Senior Project Role</b>	<b>Nearest P</b>
David Zeller	Graduate Student (research assistant)	7
Will Tyson	PD/PI	2
Chrystal Smith	Postdoctoral (scholar, fellow or other postdoctoral position)	9
Christy Ponticelli	Faculty	1
Pangri Mehta	Graduate Student (research assistant)	7
Rebekah Heppner	Other Professional	5
Marc Hebert	Other Professional	4
Katherine Hagelin	Other	1
Edward Fletcher	Faculty	2
Michael DiCicco	Graduate Student (research assistant)	1
Margaret Cooper	Faculty	6
Marie Boyette	Co PD/PI	2
Kathryn M Borman	Co PD/PI	2
Michael Abrahams	Other	1
Lakshmi Jayaram	Faculty	5

**What other organizations have been involved as partners?**

## Name

Community College Research Center (CCRC) at Teachers College

Florida Advanced Technological Education Center (FLATE)

Hillsborough Community College

Hillsborough County Public Schools

ICF International

National Academy Foundation

National Academy of Engineering

Pinellas County Schools

Polk County Public Schools

Polk State College

Sarasota County Schools

St. Petersburg College

State College of Florida

**Have other collaborators or contacts been involved? Y**

## Impacts

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

Our second 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 disciplinary 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

### Changes in approach and reason for change

We had to request additional human subjects approval from USF Institutional Review Board to obtain verbal consent from community college students interviewed over the telephone. This change is precipitated by changes at the community colleges where they are moving to open access programming, workplace certification processes, as well hybrid online courses. Hence, the traditional classroom is no longer actually a reality in these programs, and often there is not a viable physical space where we can meet, recruit, and interview some of the ET students.

We have had to change our quantitative analysis approach in response to State of Florida policies and unanticipated delays in fulfilling data requests.

The State of Florida Department of Economic Opportunity has instituted a policy by which employment data from the Florida Education and Training Placement Information Program (FETPIP) is not released in conjunction with EDW educational data that includes demographic information such as gender, race, free lunch status, and date of birth. The stated reason for this policy is concerns about anonymity. This is a new policy that was instituted sometime in 2010 or 2011. Dr. Tyson did not encounter such data restrictions when working on prior NSF projects and did not anticipate this restriction in the initial grant proposal in October 2010 or the initial data request in October 2011. The restrictions were not made clear until the October 2011 request was fulfilled in December 2012 and the student race variable was omitted.

In order to mitigate this issue, Dr. Tyson has negotiated with representatives from FLDOE to resubmit the October 2011 data request with full demographic data and omitted employment data pending the destruction of the original dataset after submitting a manuscript to *Educational Evaluation and Policy Analysis* journal in September 2013. Dr. Tyson and Dr. Fletcher will continue working with FLDOE to obtain demographic and employment data in order to fully understand post-secondary and post-degree employment pathways. Dr. Tyson and Dr. Fletcher are also working to find additional sources of data to address our research questions within the state of Florida.

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

We have experienced delays in receiving the requested Florida Department of Education data. The nature of these delays is unclear. Based on Dr. Tyson’s experiences acquiring FLDOE data for prior NSF projects, it seems that FLDOE has fewer resources and/or increased workload compared to the past. The original October 2011 data request submitted when the grant was officially awarded was split into two requests in May 2012 and the first part of the request was awarded in December 2012. Two additional requests were submitted in June 2012 and February 2013 and have not been fulfilled as of August 2013.

Dr. Tyson did not anticipate these delays in the initial grant proposal in October 2010 or the initial data request in October 2011. Data requests for prior NSF grants typically were fulfilled in 3-6 months as part of a less formal data request process. Dr. Tyson will continue to work with his FLDOE contacts to resolve any issues and to expedite the data request process as much as possible.

In order to resolve these data issues, Dr. Tyson and Dr. Fletcher are pursuing relevant data from other sources. Dr. 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.

Dr. 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.

Dr. Tyson and Dr. Fletcher are also exploring the use of public datasets and obtaining access to other data sources to address project questions.

In addition, we experienced delays receiving approval from the school districts to recruit high schools for our research in Fall 2012. Consequently, we recently received approval and will be conducting our qualitative research in the high schools in Fall 2013 instead.

Personnel changes during Year 2 include:

- Dr. Chris Ponticelli stepped down as Lead Qualitative Investigator in November 2012
- Dr. Kathryn Borman retired and stepped down as co-Principal Investigator in May 2013
- Dr. Marc Hebert stepped down as Post-doctoral Scholar in June 2013
- Dr. Lakshmi Jayaram was hired as Lead Qualitative Investigator in January 2013
- Michael DiCiccio was hired as a Graduate Assistant in May 2013
- Dr. Lakshmi Jayaram will be promoted to co-Principal Investigator at the start of Year 3 in September 2013

#### **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.

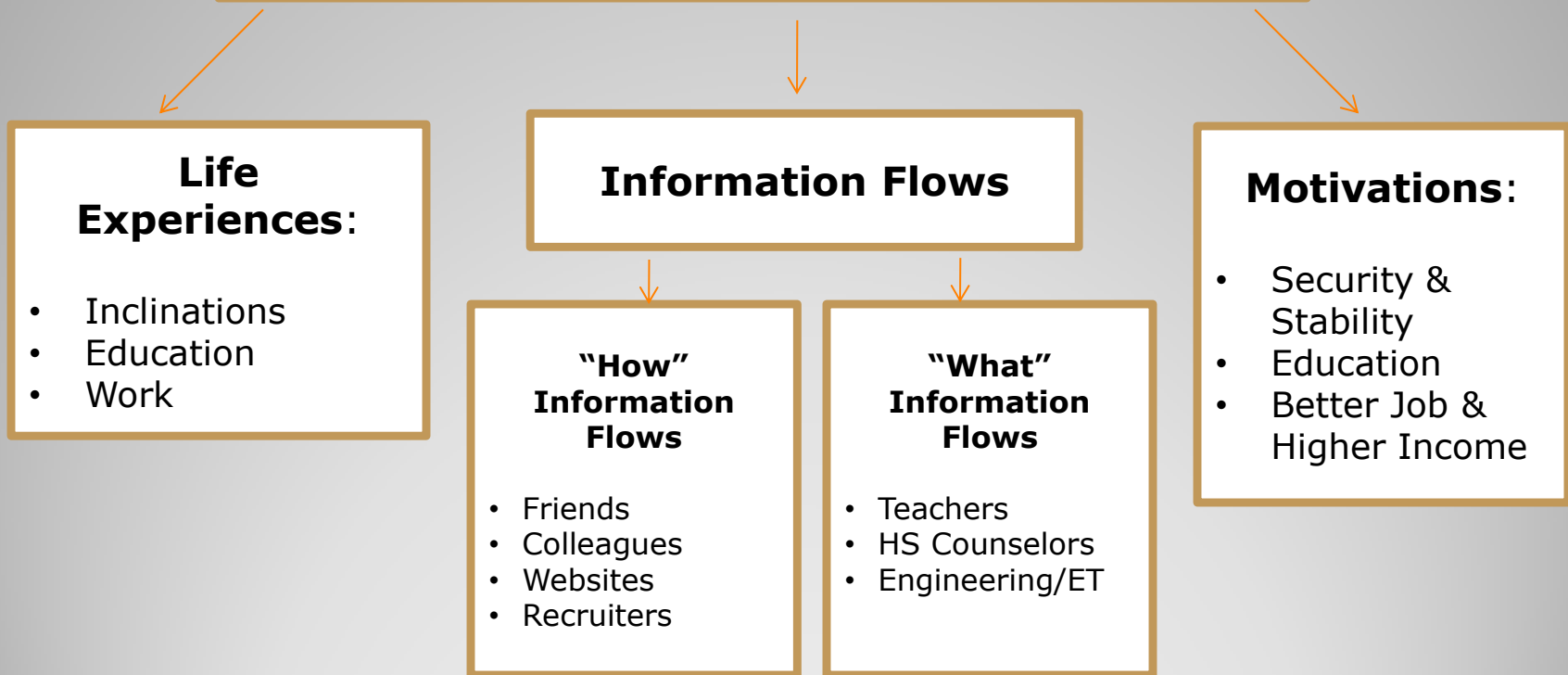
## **Special Requirements**

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

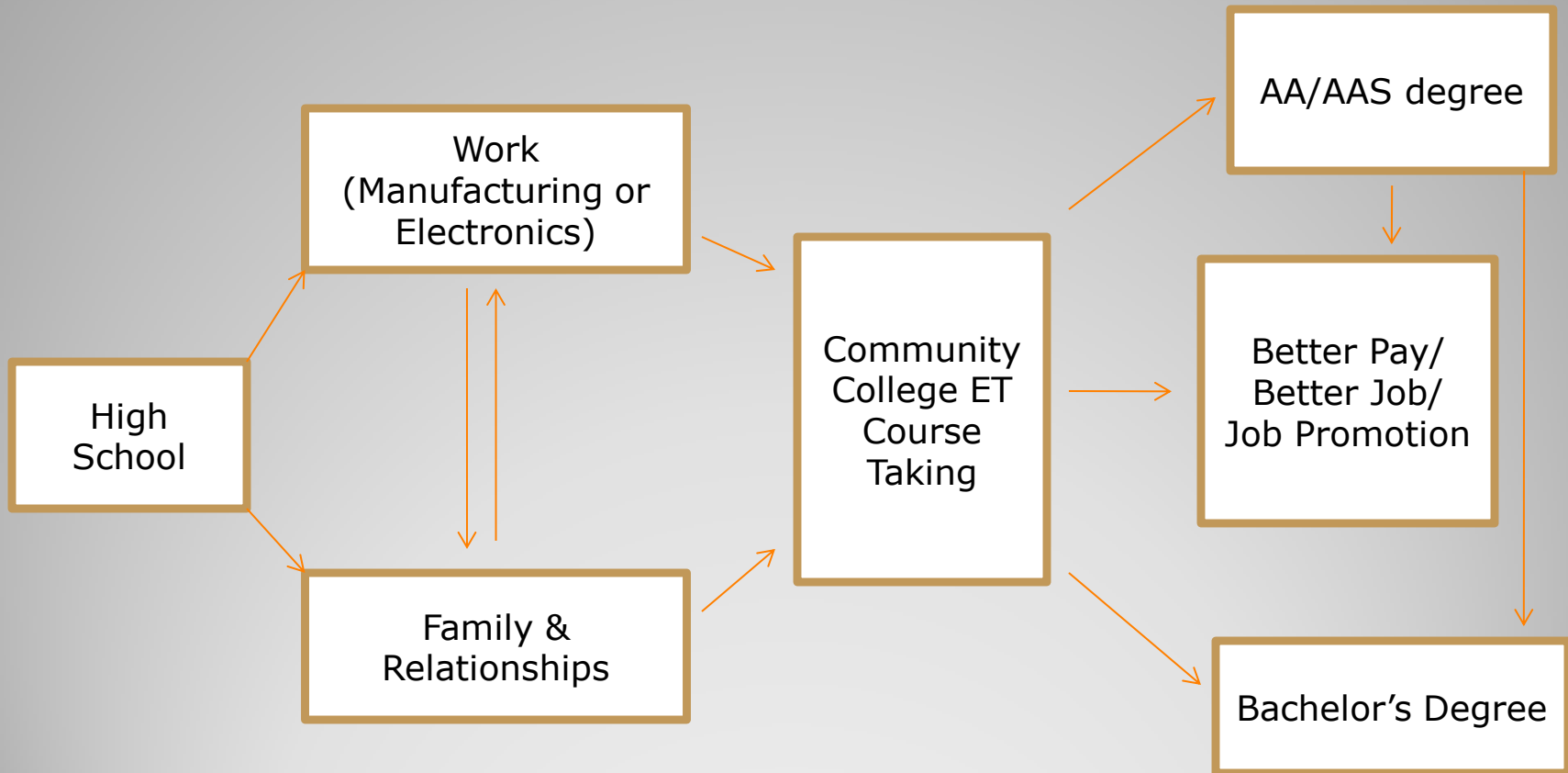
Nothing to report.

# Figure 1

## Factors Influencing Engineering Technology Pathways



# Emerging Pathway





Annual External Evaluation Report

# PathTech: Successful Academic and Employment Pathways in Advanced Technologies

NSF Award #1104214

August 28, 2013

**Submitted by:**

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# 1. Overview of PathTech and the External Evaluation

## 1.1 About the PathTech Project

The Successful Academic and Employment Pathways in Advanced Technologies (PathTech) project is funded through a grant from the National Science Foundation (NSF) Directorate for Education and Human Resources (DEHR) under the Advanced Technological Education (ATE) program (NSF Award #1104214). The NSF ATE program promotes the improvement of education, particularly at two-year colleges, for science and engineering technicians entering into high-technology fields. The ATE program supports different types of activities, including the development of curriculum, educator professional development, career pathways, articulation between two-year and four-year programs for potential educators, and research to add to the understanding of various aspects of educating technicians for careers in high-technology fields.

PathTech is a research study designed to examine the progression of students from high school into advanced technology programs, specifically engineering technology (ET), at community colleges and into the workforce. This study is being conducted over four years between September 1, 2011 and August 31, 2015. Grant funds for this project period total \$1,196,790.

The NSF ATE grant for the PathTech project was awarded to the University of South Florida (USF), which established a collaboration of higher education institutions in Florida, including researchers from the Departments of Sociology at USF, the Florida Advanced Technological Center (FLATE) at Hillsborough Community College (HCC), Polk State College (PSC), St. Petersburg College (SPC), and State College of Florida (SCF). Dr. Will Tyson (USF – Sociology) is the principal investigator, and Dr. Marie Boyette (FLATE at HCC) has been serving as co-principal investigator since the project inception. Dr. Kathryn Borman (USF) served as another co-principal investigator until her retirement at the end of the spring 2013 semester. In Year 1 of the grant, the project leaders expanded the research team to include university students and other research staff to contribute to the PathTech project. In January 2013, Dr. Lakshmi Jayaram (USF – Sociology) was added to the project as the lead qualitative investigator and Dr. Edward Fletcher (USF – Education) was added as a quantitative investigator. Dr. Chrystal Smith (USF – Sociology) is the PathTech program manager.

### 1.1.1 PathTech Research Design and Methodology

The PathTech project continues to work toward contributing to a growing body of knowledge on advanced technician education and to the overall mission of the NSF ATE program by:

- increasing understanding of recruitment and pathways into ET programs,
- providing information to improve the education of engineering technicians,
- discovering promising practices and recommending interventions at high schools to increase the visibility of ET programs at local community colleges, and
- providing information about practices that produce more qualified science and engineering technicians to meet workforce demands.

### RESEARCH QUESTIONS

The purpose of the PathTech research study is to answer two main research questions, each with three subquestions:

1. Who enrolls in ET community college programs out of high school?

- a. How are student demographic and academic characteristics related to ET enrollment?
  - b. How do students learn about ET programs (i.e., outreach)?
  - c. How can the pathway from high school into ET programs be improved?
2. How do ET students benefit from enrolling (in degree programs) and earning degrees through these programs?
    - a. What are the most critical steps in ET degree attainment from enrollment through gatekeeper courses and to the degree?
    - b. How do these students become ET graduates?
    - c. How do ET students differ from comparable students in their degree and employment outcomes?

These research questions continue to be the main focal points of all aspects of the research study, including the instruments that are used to collect qualitative data from various stakeholders and the quantitative analysis plans.

## METHODOLOGY

PathTech is a mixed-method study that is employing both descriptive statistics and empirical analysis of verifiable quantitative data from state databases along with ethnographic (qualitative) methods. Quantitative analyses examine statewide trends in career academy participation and engineering technology enrollment. Quantitative data from the Florida Department of Education (FLDOE) PK-20 Education Data Warehouse (EDW), Florida Education & Training Placement Information Program (FETPIP), and from site visits are used to construct several indicators of high school preparation that predict enrollment into ET programs. The research team is analyzing retrospective data from students during Grades 9-12 to measure high school and post-secondary coursetaking, achievement, and degree attainment. Four cohorts of students who graduated from high school and entered into the full-time workforce or post-secondary schooling in 2007-08, 2008-09, 2009-10, 2010-11 will be tracked.

Qualitative analyses focus on four engineering technology programs housed at community college campuses in the Tampa Bay region of Florida, as well as feeder high schools and local industry partners. Site visits are being conducted in this region, which contains a concentration of high school STEM career academies, STEM industries, and community colleges that offer advanced technology associates degrees.

### 1.1.2 PathTech Project Timeline

In Year 2 of the PathTech project, the research team planned to conduct the following activities, which included seven tasks in Year 1 that carried over into Year 2, as well as five tasks initially planned for Year 2:

#### Year 1 (tasks carried over into Year 2)

1. Create project brochure highlighting goals and purpose of study for stakeholders
2. Conduct pilot site visits to pilot test instruments in one high school, community college, and industry
3. Request additional Florida Department of Education (FLDOE) data updates

4. Carry out data preparation, descriptive analysis of current FLDOE data
5. Conduct propensity score analysis to create samples of students with equal propensity of being in a STEM-themed career academy and propensity score analysis at the school level to create pairs of schools with equal propensity of having a STEM-themed career academy in using Cohorts 1 and 2
6. Conduct a literature review on technician education
7. Write one paper for dissemination at a relevant conference and/or journal article for a peer reviewed journal

## Year 2

1. Carry out site visits to:
  - a. Four community colleges with Associate of Science degrees in ET
  - b. Four high schools with engineering career academies
  - c. Local industry partners that hire Associate of Science degreed engineering technicians
2. Conduct multivariate, multi-level analysis of ET enrollment based on student-level demographic and academic factors and school-level characteristics among students in STEM career academy propensity groups
3. Carry out data preparation, descriptive analysis of Florida Education & Training Placement Information Program (FETPIP) employment data and post-secondary academic outcomes
4. Conduct multivariate, multi-level analysis of the impact of enrollment in engineering technologies on early post-secondary outcomes among Cohorts 1 and 2 students who enrolled in ET programs compared to students who did not
5. Write 1-2 papers for peer-review journal and/or conference presentations (e.g., AERA)

## 1.2 About the External Evaluation

The external evaluation of PathTech is being conducted by ICF International, led by Thomas Horwood as lead evaluator, Kristen Peterson as the lead analyst, and supported by Dr. Teresa Duncan and Dr. Katerina Passa. The external evaluation is intended to complement and support the efforts of the PathTech research team. The approach to external evaluation involves: (1) monitoring the progress of the various aspects of the project (e.g., outreach, data collection, quantitative analysis, qualitative analysis); (2) providing objective reviews of project instruments, protocols, analysis plans, and reports; and (3) serving as an external resource for technical advice.

This report serves as the second in a series of four annual evaluation reports and covers the second year of the implementation of the PathTech project. It serves as a mid-point update on the progress of the research project in meeting its goals, and includes cumulative updates for the first two years of the project. Data were collected for this report through conversations with the PathTech project team during monthly calls, an external evaluation database used to track monthly progress of project activities, two evaluation site visits to USF and the ET Forum, and a review of project documents (e.g., grant application, research instruments, research protocols, reports).

## 2. External Evaluation Findings – Year 2

This annual external evaluation report #2 assesses the PathTech project team's progress according to the workplan during the first year of the grant. The Year 2 project period was September 1, 2012 to August 31, 2013. Exhibit 1 shows the activities conducted in Year 2 for the seven Year 1 tasks that carried over into Year 2, as well as an update on the status of these tasks at the end of Year 2. Of the seven Year 1 tasks, one involves marketing the PathTech project (an ongoing task), another task is for qualitative data collection protocols, three tasks are for quantitative data collection and analysis, and other tasks involve literature reviews and dissemination of information at relevant conferences and articles in peer reviewed journals.

**Exhibit 1: Status of Year 1 PathTech Tasks in Year 2 (September 1, 2012-August 31, 2013)**

Year 1 Task	Activities Completed – Year 1	Status at End of Year 1	Activities Completed – Year 2	Status at End of Year 2
1. Create project brochure highlighting goals and purpose of study for stakeholders	<ul style="list-style-type: none"> <li>▪ <a href="#">PathTech web site</a> landing page was developed and includes a brief project overview</li> </ul>	In Progress	<ul style="list-style-type: none"> <li>▪ Established a social media presence through Facebook and Twitter</li> <li>▪ Updated web site with project information, staff biographies and event photographs</li> </ul>	Completed
2. Conduct pilot site visits to pilot test instruments in one high school, community college, and industry	<ul style="list-style-type: none"> <li>▪ Conducted the pilot site visits at one community college and one ET company</li> <li>▪ Conducted 12 pilot interviews with community college students at St. Petersburg College</li> <li>▪ Conducted pilot interviews with one employee and one employer/recruiter on-site at the ET company location</li> <li>▪ Trained 14 student interviewers in ethical issues and fundamental interview strategies</li> <li>▪ Conducted one-on-one training sessions on analytic strategies after interviews were transcribed</li> </ul>	In Progress	<ul style="list-style-type: none"> <li>▪ All remaining community college interviews were transcribed, coded and analyzed</li> <li>▪ Pilot interviews were conducted with 15 Middleton High School students in February and March 2013.</li> <li>▪ Graduate students were trained to code and analyze transcription data.</li> <li>▪ Interviews were transcribed in April 2013 and coded and analyzed in May 2013.</li> </ul>	Completed
3. Request additional Florida Department of Education (FLDOE) data updates	<ul style="list-style-type: none"> <li>▪ Submitted data requests to FLDOE</li> </ul>	Delayed	<ul style="list-style-type: none"> <li>▪ Submitted additional data requests to FLDOE</li> <li>▪ FLDOE data was obtained, but missing the race variable</li> </ul>	Completed
4. Carry out data preparation, descriptive analysis of current FLDOE data	<ul style="list-style-type: none"> <li>▪ See Task 3</li> </ul>	Delayed	<ul style="list-style-type: none"> <li>▪ Data was examined and cleaned, although it is of limited use without the race variable</li> <li>▪ Exploring access to National Academy Foundation (NAF) data through contact with NAF staff</li> </ul>	In Progress

Year 1 Task	Activities Completed – Year 1	Status at End of Year 1	Activities Completed – Year 2	Status at End of Year 2
5. Conduct propensity score analysis to create samples of students with equal propensity of being in a STEM-themed career academy and propensity score analysis at the school level to create pairs of schools with equal propensity of having a STEM-themed career academy in using Cohorts 1 and 2	<ul style="list-style-type: none"> <li>▪ Created analysis plans based on known variables expected to be collected</li> <li>▪ See Task 3</li> </ul>	Delayed	<ul style="list-style-type: none"> <li>▪ No action</li> </ul>	Delayed
6. Conduct a literature review on technician education	<ul style="list-style-type: none"> <li>▪ Conducted a literature search to collect articles and other materials in three topic area: high schools, community colleges, and industry</li> <li>▪ Wrote three literature reviews, which will be updated on a regular basis throughout the grant project period to continually inform the project</li> </ul>	Completed	<ul style="list-style-type: none"> <li>▪ Additional literature reviews were written about the quality of phone versus in-person interviews and on school-level data and racial disparity.</li> </ul>	Completed
7. Write one paper for dissemination at a relevant conference and/or journal article for a peer reviewed journal	<ul style="list-style-type: none"> <li>▪ No action</li> </ul>	Not Started	<ul style="list-style-type: none"> <li>▪ Integrated into Year 2 disseminations plans</li> </ul>	In Progress (See Year 2, Task 5 in Exhibit 2)

Of the six Year 1 tasks that carried over to Year 2,<sup>1</sup> three are completed, two are in progress, and one is delayed. The marketing task (Task 1) is in progress and will continue to be ongoing throughout the evaluation. The team made the most progress on the second task to develop and pilot the qualitative data collection protocols (Task 2) in Year 1, as the team was able to pilot test the data collection instruments in a high school in Year 2. The team was able to make progress in Year 2 on the three Year 1 quantitative data collection and analysis tasks (Tasks 3-5). They were able to obtain student data from FLDOE, prepare data for analysis, and submit additional data requests. Propensity score matching is delayed still at the end of Year 2 due to the delay in getting the right level of data, but this will be conducted in the next two years. The status of the literature review task is was complete at the end of Year 1, but the literature reviews continued to be updated to inform all tasks in Year 2. Additional literature reviews focused on the quality of phone versus in-person interviews and on school-level data and racial disparity were conducted by the team in Year 2 (Task 6). The dissemination task (Task 7) is in progress, and this Year 1 task has folded into the Year 2 dissemination task since disseminating findings is a key task each year and because the process of submitting abstracts to journal editors and having them approved by peer reviewers takes more time than was originally anticipated.

<sup>1</sup>Task 6 was complete at the end of Year 1

In addition to the Year 1 tasks that carried over to Year 2, Exhibit 2 shows the activities completed, status, and notes about each of the five tasks planned for Year 2 of the grant project period. Of the five major Year 2 tasks, one is for qualitative data collection, three are for quantitative data collection and analysis, and one involves dissemination.

**Exhibit 2: Status of Year 2 PathTech Tasks in Year 2 (September 1, 2012-August 31, 2013)**

Year 2 Task	Activities Completed – Year 2	Status at End of Year 2	Notes
1a. Carry out site visits to 4 community colleges with AS degrees in ET	<ul style="list-style-type: none"> <li>▪ Developed all participant consent forms and interview protocols based on pilot experience</li> <li>▪ Developed demographic questionnaire for community college students and employee survey for industry interviews</li> <li>▪ Recruited 4 community college partners and are actively recruiting participants through AutoCAD courses and online tool</li> </ul>	In Progress	<ul style="list-style-type: none"> <li>▪ Will carry over into Year 3</li> <li>▪ Will kick off interviews with recruited participants as soon as the 2013-14 school year begins</li> </ul>
1b. Carry out site visits to 4 high schools with engineering career academies	<ul style="list-style-type: none"> <li>▪ Developed all participant consent forms and interview protocols based on pilot experience</li> <li>▪ Recruited two high schools and looking at other STEM magnets</li> </ul>	In Progress	<ul style="list-style-type: none"> <li>▪ Contacts were established with Middleton High School, a Sarasota-Manatee High School and a Maritime Academy</li> <li>▪ Will carry over to Year 3 due to challenges recruiting participating high schools in Year 2</li> </ul>
1c. Carry out site visits to local industry partners that hire AS degreed engineering technicians	<ul style="list-style-type: none"> <li>▪ Developed all participant consent forms and interview protocols based on pilot experience</li> <li>▪ Developed demographic questionnaire for industry interviews</li> <li>▪ Recruited participants during the annual ET Forum</li> <li>▪ Conducted 10 interviews with industry staff in April and May 2013</li> <li>▪ Interviews were transcribed</li> <li>▪ Coding and analysis are in progress</li> </ul>	In Progress	<ul style="list-style-type: none"> <li>▪ Using a case analysis approach to explore pathways for specific industry partners</li> </ul>
2. Conduct multivariate, multi-level analysis of ET enrollment based on student-level demographic and academic factors and school-level characteristics among students in STEM career academy propensity groups	<ul style="list-style-type: none"> <li>▪ Initial analysis of ET enrollment being conducted with FLDOE data</li> </ul>	In Progress	<ul style="list-style-type: none"> <li>▪ Delayed due to Year 1 delay in obtaining data</li> <li>▪ Race variable missing; exploring alternate datasets</li> </ul>



Year 2 Task	Activities Completed – Year 2	Status at End of Year 2	Notes
3. Carry out data preparation, descriptive analysis of Florida Education & Training Placement Information Program (FETPIP) employment data and post-secondary academic outcomes	<ul style="list-style-type: none"> <li>Data obtained and prepared for descriptive analysis</li> </ul>	In Progress	<ul style="list-style-type: none"> <li>FLDOE will not release employment data in conjunction with demographic data</li> <li>Also determined to pull in data from other publicly available datasets (e.g., Florida Education and Training Placement Information Program [FETPIP])</li> </ul>
4. Conduct multivariate, multi-level analysis of the impact of enrollment in engineering technologies on early post-secondary outcomes among Cohorts 1 and 2 students who enrolled in ET programs and comparable students who did not	<ul style="list-style-type: none"> <li>Analysis plans developed</li> </ul>	In Progress	<ul style="list-style-type: none"> <li>Plan to conduct preliminary analyses in the early part of Year 3</li> </ul>
5. Write 1-2 papers for peer-review journal and/or conference presentations (e.g., AERA)	<ul style="list-style-type: none"> <li>Submitted abstract using FLDOE data to <i>Educational Evaluation and Policy Analysis</i> journal on using state longitudinal data to address policy issues</li> <li>Paper drafted using the pilot data, planning to submit to the <i>Youth &amp; Society</i> journal</li> </ul>	In Progress	<ul style="list-style-type: none"> <li>Includes carryover from Year 1 Task 7</li> <li>Also presented at the Florida Forum on Engineering Technology (ET Forum) the Annual Meeting of the Southern Sociological Society and made connections with important professional organizations and individuals like the National Academies Foundation and National Academy of Engineering</li> </ul>

All of the five Year 2 tasks are in progress as of the end of Year 2. The team has made significant progress on preparing for and carrying out site visits and conducting interviews with community college students and faculty/administrators, high school students, and industry partners (Task 1 a-c). This success will help the team continue this work into Year 3, as the connections have been made to ensure buy-in from the various stakeholder groups, such as students, educators, and industry partners. The team has made progress on the quantitative data collection and analysis by obtaining data from FLDOE, planning to merge data from other publicly available datasets, and developing analysis plans. The team is preparing abstracts and papers that will help them with the dissemination task (Task 5). Specifically, they are preparing submissions to the *Educational Evaluation and Policy Analysis* and *Youth & Society* journals. Lastly, the team has been successful in conducting outreach to promote PathTech at local events like the Florida Forum on Engineering Technology (ET Forum) and with organizations like the National Academies Foundation (NAF).

### 3. Conclusions

In Year 2 of the PathTech project, the team has built upon the successes they achieved in Year 1, which focused on the startup of the project. In Year 2, the PathTech project team started to hit its stride in terms of carrying out the work of the project. The team has continued to market PathTech to key stakeholders who are both important to completing the project as well as to those in the field who have an interest in the outcomes of the study. This has generated



excitement about PathTech in Florida and beyond. While many of the Year 1 and Year 2 tasks are in progress at the mid-point of the project, due to shifting priorities and positive unanticipated factors (e.g., connections with a number of industry partners) that are associated with implementing a study of this size and scope. Through their outreach to various stakeholder groups, the PathTech team has been able to identify the pulse of these groups to better understand how to carry out their research based on a devised plan. As Year 3 begins, it will be important for the PathTech team to continue to look across all tasks in all four years and to create a plan that ensures all aspects of the study will be completed during the final two years of the project.

## 4. Next Steps in the External Evaluation

Evaluation activities over the next two years of the NSF grant period includes: (1) ongoing monitoring of the progress of the project against project timelines; (2) objective review of data collection protocols, site visit criteria, and quality of the propensity score matching results; (3) evaluation of the interpretability of course trajectories between the cohorts (years 3 and 4); (4) review of the replicability of the analyses conducted; and (5) provide recommendations for future directions of the project.

In addition, the evaluation team will continue to serve as external resources for technical advice, and will provide commentaries and written reviews of the project's various activities. In addition, the evaluation team will maintain regular, monthly contact with Dr. Tyson and the rest of the project team via monthly teleconferences and email, bringing in other members of the external evaluation team as needed. The evaluation team will continue to prepare monthly monitoring memos, in which the research team's progress towards project milestones is assessed and suggestions for addressing challenges are provided.

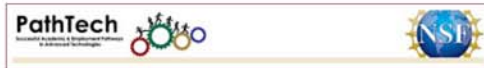
In each subsequent year, the external evaluation team will prepare an annual evaluation report similar to this one summarizing evaluation activities and findings. Each annual evaluation report will build off of the previous report, and will be submitted to NSF as part of the annual reporting requirements, as evidence of the quality of the project's quality assurance procedures.



# FLATE FOCUS

Connecting Manufacturers, Educators & Students with Florida's Workforce

## PathTech Team at USF Analyzes Educational and Professional Trajectories of Engineering Technology Students



Educational choices and professional trajectories of students and incumbent workers are widely varied and open ended. Some are dictated by interest and aptitude, lure of a lucrative opportunity, while others are rooted in individuals' quest for professional growth. To delve into the matter, and assist in a regional research initiative, FLATE, the National Science Foundation Center of Excellence at Hillsborough Community College in Brandon, has partnered with researchers at the University of South Florida's department of sociology, anthropology and college of education to conduct research aimed at analyzing high school and community college students enrolled in engineering technology degrees and the reasoning(s) behind their chosen field of study.

Successful Academic and Employment Pathways in Advanced Technologies, or PathTech, is part of the

National Science Foundation's (NSF) Advanced Technological Education (ATE) program committed to support/fund community college programs that boost technician education across the nation. The grant targets high school and community college programs, and is devoted to researching pathways into technician education programs, gauge effectiveness of these programs, analyze outcomes of these targeted programs, and answer some of the questions that germinate from the ATE projects. Will Tyson, P.I. & associate professor of sociology at USF says the PathTech initiative is targeted to better equip local community colleges with information, not just academic, but personal experiences that lead students into enrolling in Engineering Technology (ET) programs and/or related courses, and possibly make recommendations on how community colleges can serve these audiences.



Target audience includes high school students, teachers, local community/technical colleges and local industries. "We're not collecting all this information and sending it up an ivory tower" said Tyson. He hopes to inform colleagues in engineering technology about the scholarly importance of ET programs, stratification in education, and promote better understanding of challenges and transitions encountered by students in different educational contexts.

In all of this, partnerships have played an important role in advancing some of the goals and objectives of the PathTech initiative. Tyson describes the PathTech project as the beginning of a research agenda, and the

beginning of enduring partnerships in the Tampa bay area. PathTech represents a collaborative effort between several educational institutions in the region. Project partners include FLATE, Hillsborough Community College, University of South Florida, St. Petersburg College, Polk State College and the State College of Florida. "Our project partners have been extremely helpful in terms of helping us navigate the landscape of what are engineering technology programs, and defining ET students" Tyson said.



Furthermore, partnership with FLATE has afforded the team access to a broader academic and industry audience. FLATE's Industrial Advisory Committee has served a pivotal role in connecting PathTech with local industries who occupy an important role in the engineering technology network. Tyson views FLATE as a model for what we (PathTech) wants to do/accomplish in terms of the broader impact the research can have. "Working with FLATE has enabled us to further our research, accomplish our goals, and promote these educational pathways" Tyson said.

Stay tuned for the August edition of the FLATE Focus, where we will take a closer look at research methodologies employed by the PathTech team, and analyze results/findings from their pilot research. For information on PathTech visit <http://sociology.usf.edu/pathtech>, or contact Will Tyson at [wtyson@usf.edu](mailto:wtyson@usf.edu) and Lakshmi Jayaram at [ljayaram@usf.edu](mailto:ljayaram@usf.edu). For information on FLATE's K-14 STEM based curriculum and professional development programs, visit [www.madeinflorida.org](http://www.madeinflorida.org) and [www.fl-ate.org](http://www.fl-ate.org), or contact Dr. Marilyn Barger, executive director of FLATE at [barger@fl-ate.org](mailto:barger@fl-ate.org).



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## Events Calendar

- Aug. 6: PACE Girls Robotics Day at Hillsborough Community College. Brandon, FL.
- Aug. 7: Middleton STEM Advisory Board Meeting at Hillsborough Community College. Brandon, FL.
- Aug. 8: SDHC STEM Academies at Hillsborough Community College. Brandon, FL.
- Aug. 14: BEST Robotics Workshops at Hillsborough Community College. Brandon, FL.
- Sep. 5: FLATE IAC Meeting at College of Central Florida. Ocala, FL.
- Sep. 19: Upper Tampa Bay Manufacturers at Nielsen. Tampa, FL.
- Sep. 21: BEST Robotics Kick off day & Workshop at Hillsborough Community College. Brandon, FL.
- Sep. 27: Machining Workshop at Hillsborough Community College. Brandon, FL.
- Oct. 3-4: Engineering Technology Forum at Hillsborough Community College. Brandon, FL.
- Oct. 4: Manufacturing Day Tours. Statewide in FL.
- Oct. 9-11: NCATC Conference. Gulf Coast, SC.
- Oct. 13-14: NCPN Conference. San Antonio, TX.
- Oct. 16-18: NCWE. Milwaukee, WI.

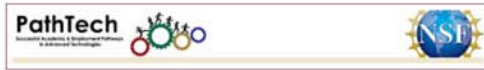




# FLATE FOCUS

Connecting Manufacturers, Educators & Students with Florida's Workforce

## Research Methodologies & Findings Examining Educational and Professional Trajectories of Engineering Technology Students



Last month we brought you a story about the PathTECH grant and its role in examining career pathways of students in engineering technology. This month we will take a step further in the same direction and take a closer look at some of the research methodologies and findings of the PathTECH team. As a recap, Successful Academic and Employment Pathways in Advanced Technologies, or PathTech, is part of the National Science Foundation's (NSF) Advanced Technological Education (ATE) program committed to support/fund community college programs that boost technician education across the nation. The grant targets high school and community college programs, and is devoted to researching pathways into technician education programs, gauge effectiveness of these programs, analyze outcomes of these targeted programs, and answer some of the questions that germinate from the ATE projects.

In keeping with the project goals, the PathTech initiative entails a qualitative and quantitative research component. The qualitative research represents an inductive approach whereby researchers are trying to build an understanding of a particular social experience. Lakshmi Jayaram, lead qualitative investigator for the PathTech grant and Sociology research assistant professor at USF, describes the qualitative component "as an attempt to gain an in-depth understanding of what the pathways (into engineering technology) are, and social experiences connected to each of those pathways." The PathTech team is currently conducting a series of interviews with high school and community college students, faculty and administrators at HCC, SPC, PSC and SCF as well as industry personnel and employers from Hillsborough, Pinellas, Polk and Sarasota-Manatee counties who are involved in engineering technology related career academies/CTE programs. Through the interviews, "we hope to construct a rich and in-depth understanding of what these pathways from education to occupation in the engineering technology field look like" Jayaram said.



The quantitative part of the project is an attempt to understand and develop a profile of students who enroll into A.S. degree programs in Florida. Quantitative research is heavily based on data from the Florida Department of Education data warehouse, and is targeted to gauge how students meet that profile in terms of the courses they take, location of the schools they attend, and compare how students who enter into the A.S. E.T degree programs fare in comparison to students who choose other pathways. The team also looked at factors that determine whether a student completes an A.S. degree, and whether a degree in these fields promote career in high-tech fields. "The future of our economy, workforce, students and their educational trajectories are all intertwined. The issues we are researching are relevant in terms of uncovering everyday struggles experienced by our target audience" Jayaram said.

Pilot data has uncovered an interesting mix of educational and career plans among interviewees. In terms of high school students, it shows they are either interested in pursuing a four year college degree, or contemplating on attending community colleges that offer co-op programs with local industries, or are interested in directly entering the workforce. Preliminary data from interviewing community college students suggests most are older students in their 30s, 40s, or 50s, are already working in ET related fields, and are either taking courses to add to their skills set, expand their responsibilities at work, or gain higher wages.



Then too, despite differences in their pathways, all students regardless of their age "articulated their

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## Events Calendar

- Aug. 6: PACE Girls Robotics Day at Hillsborough Community College. Brandon, FL.
- Aug. 7: Middleton STEM Advisory Board Meeting at Hillsborough Community College. Brandon, FL.
- Aug. 8: SDHC STEM Academies at Hillsborough Community College. Brandon, FL.
- Aug. 14: BEST Robotics Workshops at Hillsborough Community College. Brandon, FL.
- Sep. 5: FLATE IAC Meeting at College of Central Florida. Ocala, FL.
- Sep. 19: Upper Tampa Bay Manufacturers at Nielsen. Tampa, FL.
- Sep. 21: BEST Robotics Kick off day & Workshop at Hillsborough Community College. Brandon, FL.
- Sep. 27: Machining Workshop at Hillsborough Community College. Brandon, FL.
- Oct. 3-4: Engineering Technology Forum at Hillsborough Community College. Brandon, FL.
- Oct. 4: Manufacturing Day Tours. Statewide in FL.

enjoyment in working with their hands, repairing things, taking things apart and putting them together" as factors propelling their career interest in engineering technology. Empirical data also supported the theory that the higher the socio economic status, the greater the likelihood for an individual to go to college. "It is a really promising avenue of research," Jayaram said. "We're looking at a very big picture and examining the transformative nature of these degree programs."

As part of PathTech's dissemination strategy to inform its stakeholders, PathTech leadership team will publish results and reports of the study in professional and peer reviewed journals. The team will also publish briefs on its website. "This research is a much needed compliment to the other aspects of studying engineering technology. Whatever we find through our research is a contribution towards knowledge in this field" Jayaram said.

For more information on PathTech visit <http://sociology.usf.edu/pathtech>, or contact Will Tyson, P.I. & associate professor of sociology at USF at [wtyson@usf.edu](mailto:wtyson@usf.edu), and Lakshmi Jayaram at [ljayaram@usf.edu](mailto:ljayaram@usf.edu). For information on FLATE's K-14 STEM based curriculum and professional development programs, visit [www.madeinflorida.org](http://www.madeinflorida.org) and [www.fl-ate.org](http://www.fl-ate.org), or contact Dr. Marilyn Barger, executive director of FLATE at [barger@fl-ate.org](mailto:barger@fl-ate.org).



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- Oct. 9-11: NCATC Conference. Gulf Coast, SC.
- Oct. 13-14: NCPN Conference. San Antonio, TX.
- Oct. 16-18: NCWE. Milwaukee, WI.
- Oct. 14-15: Florida Energy Summit. Orlando, FL.
- Oct. 22-25: NSF ATE PI Meeting. Washington, DC.
- Oct. 23-25: FCPN Conference. Jupiter Beach, FL.
- Oct. 27-29: AVS SEW. Long Beach, CA.
- October 28-30: STEMtech Conference. Atlanta, GA.

## FLATE Awards



Nominate a FLATE Awardee TODAY!

Time is running out! Send in your nominations TODAY!

Visit [www.fl-ate.org/projects/awards.html](http://www.fl-ate.org/projects/awards.html).

## 2013 Manufacturing Day: Sign up NOW!

**MEG DAY** 10.04.13 in FLORIDA!

Open YOUR doors to YOUR future!

Host a "Made in Florida" Industry Tour  
 Show your company's story  
 Connect with your potential customers  
 Inspire a new generation of manufacturers

**FLATE Can Help**  
 Assist in organizing tour • Supply materials & materials  
 Complete data • Electronic results • Distribute T-shirts

**Manufacturers / Associations**  
 Districts / Schools / Community Groups

Provide transportation • Refreshments, beverages, information

[www.mfgday.org](http://www.mfgday.org)

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FLATE is looking for manufacturers, industry associations, students, schools and communities to partner with us on Manufacturing Day 2013 (Oct 4). Our goal is to have at least 200 "Made in Florida" industry tours and host 200 manufacturing tours across the state on Manufacturing Day which is OCT 4.

For more information and to sign up to host a tour, contact Dr. Marilyn Barger, executive director of FLATE at [barger@fl-ate.org](mailto:barger@fl-ate.org) and Desh Bagley, outreach manager at [bagley@fl-ate.org](mailto:bagley@fl-ate.org).

## Manufacturing in the News

- Valencia, state to train high-tech workers: 'Not your grandfather's factory job'

# PathTech: Building Partnerships with Community Colleges to Study Pathways to Advanced Technology Degrees

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# Project Collaboration

“Successful Academic and Employment Pathways in Advanced Technologies” (NSF #1104214) or PathTech

- Researchers from USF Sociology, Anthropology, and College of Education
- Florida Advanced Technological Education Center (FLATE) at Hillsborough Community College

# Project Aims

- To examine the progression of students from high school STEM career academies and the local workforce into engineering technology (ET) programs
- To examine workforce outcomes for ET students and graduates.
- Mixed methods research design



# Quantitative Goals

- Data: Education and employment data from FLDOE PK-20 Education Data Warehouse
- Identify a profile of HS students who enroll in ET and comparable AS/AAS programs.
- Compare educational and employment outcomes among these students who:
  - Enroll in Community College AS/AAS programs
  - Enroll in other Community College programs
  - Enter into the workforce out of high school
  - Enter into a university to pursue bachelor's degree



# Qualitative Goals

- Qualitative – develop narratives of ET pathways through various methods

Career Academies/ High Schools		Community Colleges		Industry	
Qualitative Sample	Methods	Qualitative Sample	Methods	Qualitative Sample	Methods
Faculty	Interviews	Faculty	Interviews	Workers Employers Recruiters	Interviews
Students	Interviews	Students	Interviews		
	Focus Groups		Focus Groups		
	Participatory Workshops		Participatory Workshops		
		FLATE Staff	Interviews		
Guidance Counselors	Interviews	Advisors	Interviews		
Archival Material	Document Analysis	Archival Material	Document Analysis		

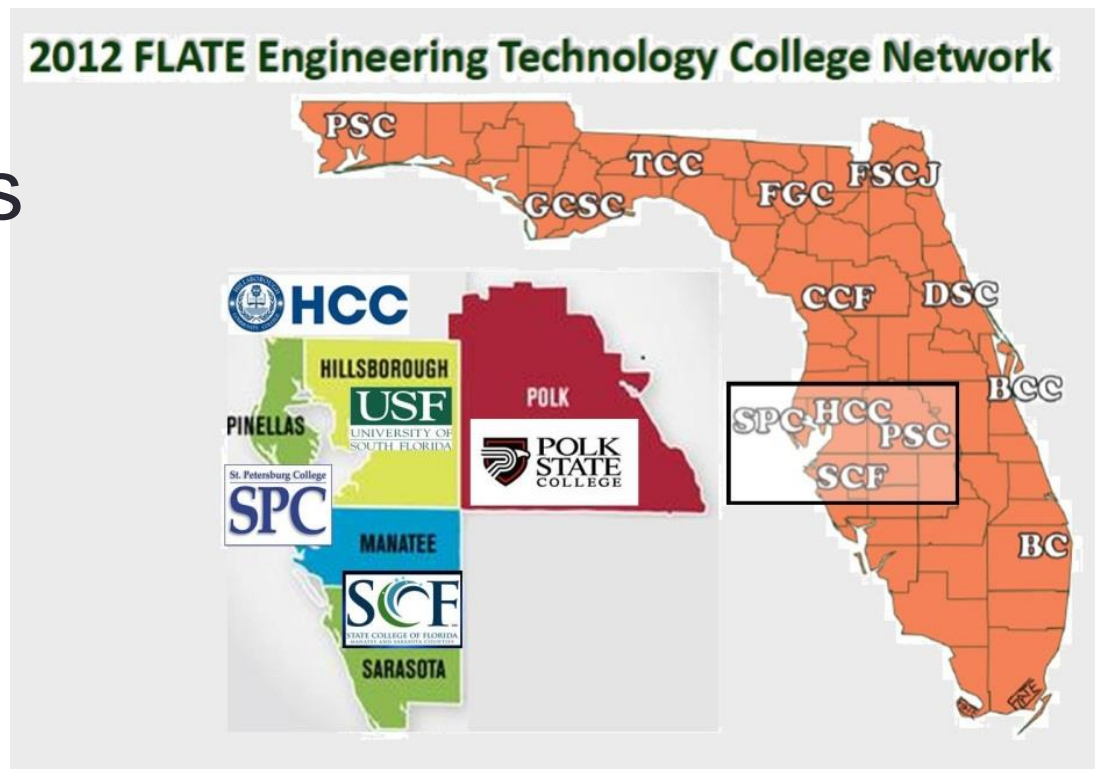
# Community College Partnerships

- The nexus of this study is partnerships with ET program faculty and administrators:
- **Hillsborough Community College** (Tampa) – Advanced Manufacturing
- **St. Petersburg College** (Clearwater) – Biomedical Systems, Digital Design & Modeling, Quality
- **Polk State College** (Lakeland) – Advanced Manufacturing
- **State College of Florida** (Venice) – Electronics, Digital Design & Modeling

# Community College Partnerships

- ET personnel link PathTech to Tampa Bay technology education and workforce:

- ET students
- ET graduates
- high schools
- industry partners



# PathTech Senior Leadership

- **Will Tyson, PhD** (Principal Investigator, Lead Quantitative Investigator, USF Sociology Associate Professor)
- **Kathy Borman, PhD** (Co-Principal Investigator, USF Anthropology Professor)
- **Marie Boyette, PhD** (Co-Principal Investigator, FLATE Associate Director)
- **Lakshmi Jayaram, PhD** (Lead Qualitative Investigator, USF Sociology Research Assistant Professor)
- **Chrystal Smith, PhD** (Project Manager, USF Anthropology Graduate)
- **Eddie Fletcher, PhD** (Quantitative Investigator, USF ACHE Career & Workforce Education Assistant Professor)

# PathTech Qualitative Team

- **Lakshmi Jayaram, PhD** (Lead Qualitative Investigator, USF Sociology Research Assistant Professor)
- **Margaret Cooper, PhD** (Qualitative Post-Doctoral Scholar, USF Sociology Visiting Instructor)
- **Marc Hebert, PhD** (Qualitative Consultant, USF Anthropology Graduate)
- **Rebekah Heppner, MBA, PhD** (Qualitative Consultant, USF Anthropology Graduate)
- **Pangri Mehta, MA** (Graduate Assistant, Sociology)
- **David Zeller, MA** (Graduate Assistant, Sociology)

# PRELIMINARY ANALYSIS

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Community College Pilot Study  
PathTech

# Introduction

- Engineering Technology (ET) is a new and emerging educational and occupational field about modern manufacturing processes that utilize and apply advanced technologies to the conversion of raw materials to a variety of consumer and industrial products.
- It is a growing field in the Florida economy, in particular, and four area community colleges offer associate's degrees in ET.
- The purpose of this pilot study is to talk with students in these programs to determine the educational and occupational pathways that brought them to this field of study as well as future opportunities they see for themselves in the ET field.
- The findings from this report will both add to our knowledge of these programs as well as inform research

# Methodology

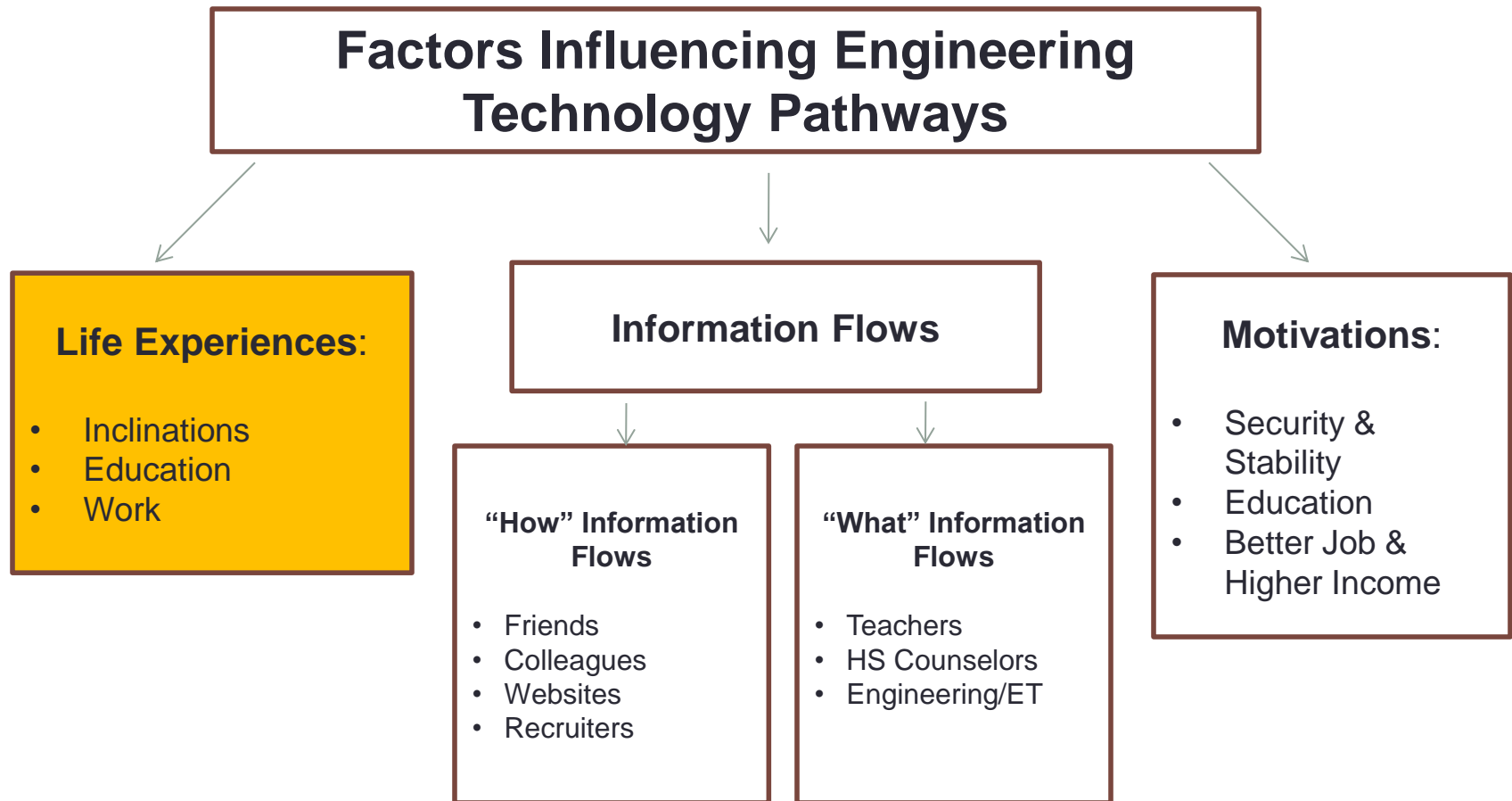
- Data collection was facilitated by community college faculty who invited us to their classes.
- Interviews were conducted by the PathTech qualitative team including faculty, post docs, and graduate research assistants.
- Interviews occurred on the community college campus just before and during their class.
- Data collected from (10) community college students, eight male and two female students.
- Though specific sociodemographic information was not collected, the information shared in the interviews indicates that students were not entering the program directly from high school, but were older, and many had work experience and families.
- Each interview lasted 20-30 minutes.
- Interviews were transcribed, coded, and thematically analyzed.



# Interview Questions

- How did you learn about the Engineering Technology (ET) program?
- At what point in your education or career did you enter the ET program? What factors influenced your decision to enroll?
- What did you know about the ET program when you were in high school?
- Did you participate in a career academy in high school? If so, how did the career academy prepare you for the ET program?
- What is your perception of the ET job market? What are your career plans after graduating?

# Findings



# Life Experiences

- Personal Inclinations:

“...I was just interested in the field from the get-go. I had always been interested in the...blueprinting process and everything from architectural to mechanical anything really, blueprinting-wise. ...it started like with ‘Roller Coaster Tycoon’ type of things and then you know progressing...it’s very interesting, I think, I just take it that it’s because it’s what I’m into for me. ...I think they had offerings to where you could take a test to see what you were supposed to do but I already knew. And so I had known since I was ten.”

(Edward)

# Life Experiences

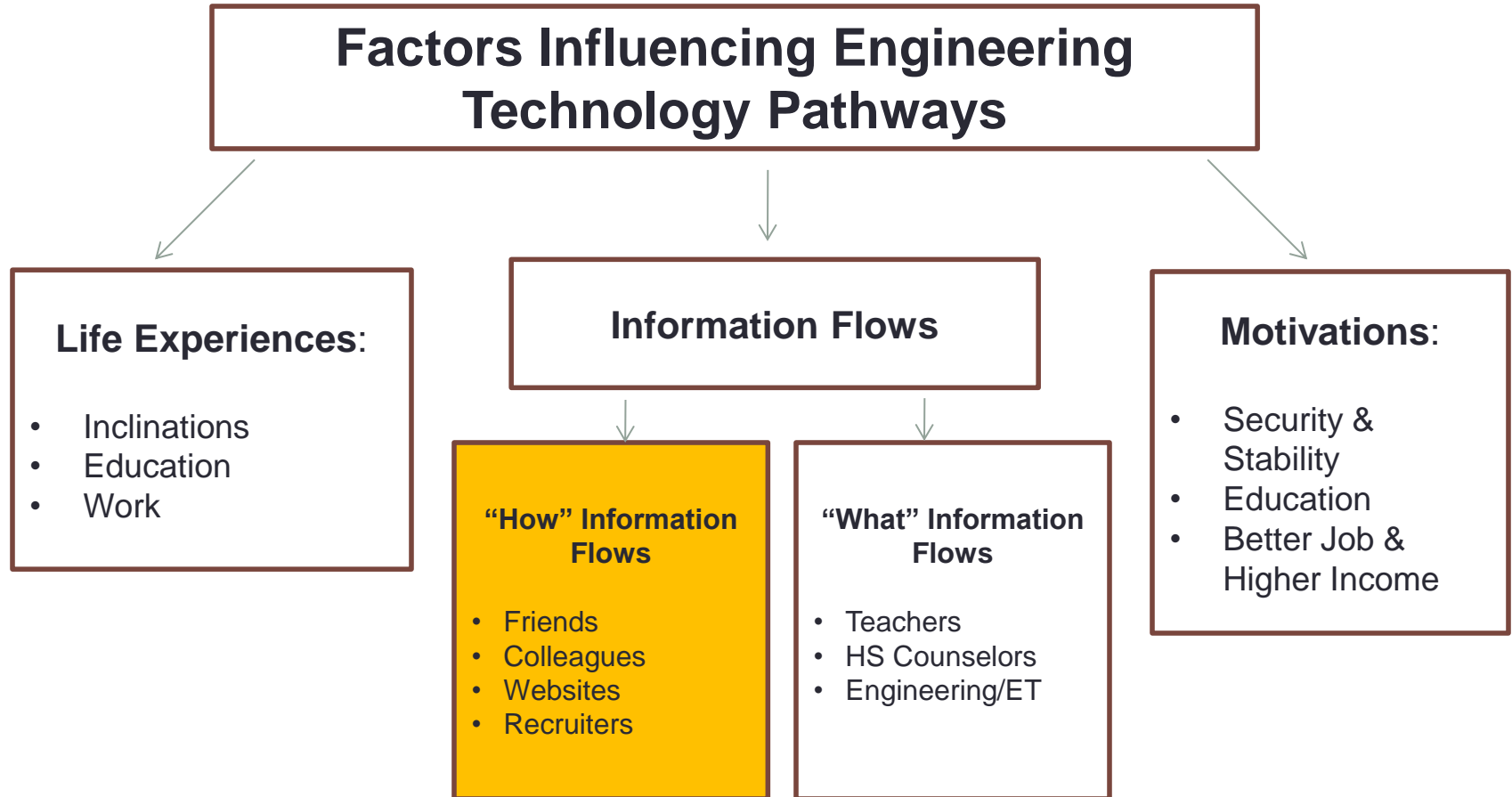
- Educational Experiences:
- “I took a couple of technical classes in high school, and thought it was fun, thought it was amusing, so I wanted to do more with it...They had computer programming. They had little majors for us like, mine was Pre-Engineering was like my major for high school. When they had me take computer programming classes then I took a drafting class on my own, basic softwares, stuff like that. They had all of that in my high school...I’m actually in the Solid Works class now and I had Solid Works in high school. So I pretty much know my way around because of the classes I took in high school and it helps me become better in what I am doing. Obviously I can further my education here but it’s not like I’m being thrown in and I don’t know what I’m doing. I actually know what I’m doing by having high school experience.” (Sarah)

# Life Experiences

- Work Experiences:

“...military-wise I’m a career avionics technician...So I’ve been military trained to work on aircraft avionics... gives me a little more, furthers my knowledge basically in military training... that I can apply outside civilian-wise when I retire from the military.... I graduated from electronics school from the military so [the ET program] really builds on to it, gives us a lot more in-depth knowledge into everything and makes us more of a technical level as well, instead of a systems troubleshooter. Gives you a lot more in-depth as far as technical information goes and fixing.” (Curtis)

# Findings



# Information Flows

- ‘How’ - Friends:

“...so far everything I heard from my friends who had gone through the program, the classes and stuff they were learning, it’s right on par with what they told me. It’s a very thorough program, lots of information, a lot of technical data, a lot of the stuff I was looking for...”

(Curtis)

# Information Flows

- ‘How’ - Colleagues/Professional Networks:
- Edward said he has “met a few people that work with engineering companies” and believes that these contacts will help him to “try and just get [his] foot out there.”



# Information Flows

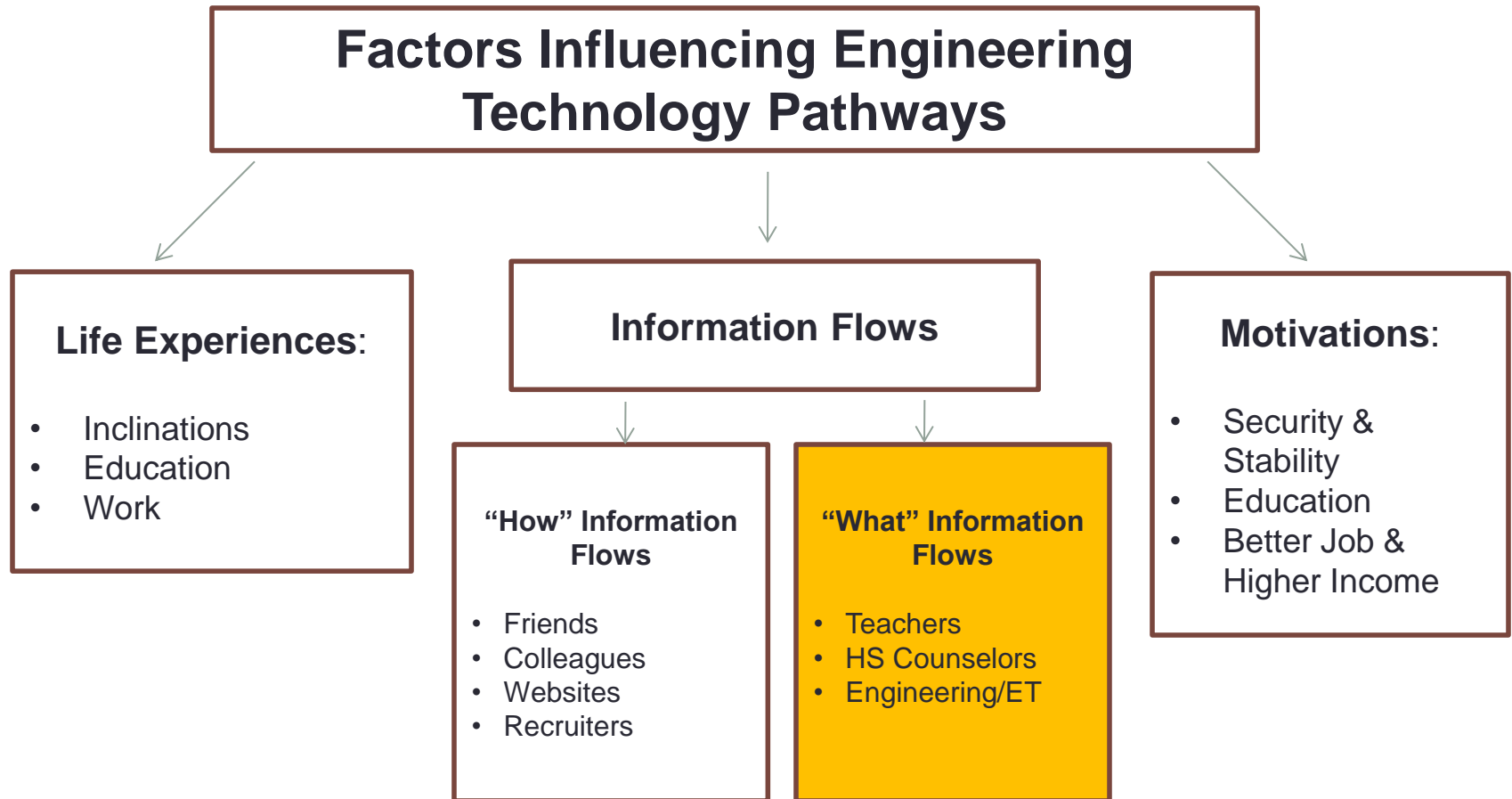
- ‘How’ - Internet Resources:

“Through the website, the Internet, pretty much I was looking for a job and they required me to have some technology background on certain softwares [*sic*] so I went on the community college website and looked up what kind of classes they’ve got available and there was a huge section of it.” (Anthony)

# Information Flows

- ‘How’ - Recruitment:
- “...we have about four and a half miles of the St.Pete/Clearwater airport, it’s a big base there, avionic/techs everywhere so this school is really close to where the base is. They do a good job of advertising there.” (Curtis)

# Findings



# Information Flows

- ‘What’ - Teachers:
- “It’s really interesting stuff when you’ve got someone like Mr. Bell who’s as passionate about it as he is and can talk to people. And he’s very outgoing and it’s a catalyst for getting people involved, getting high school kids involved. Mr. Green is really good, does the AutoCAD classes. I took some of his, and my electronics teacher, he’s great. He’s fantastic. I mean I wouldn’t be able to get through most of these classes without him because it’s a lot, but it’s a great program.”(Dan)

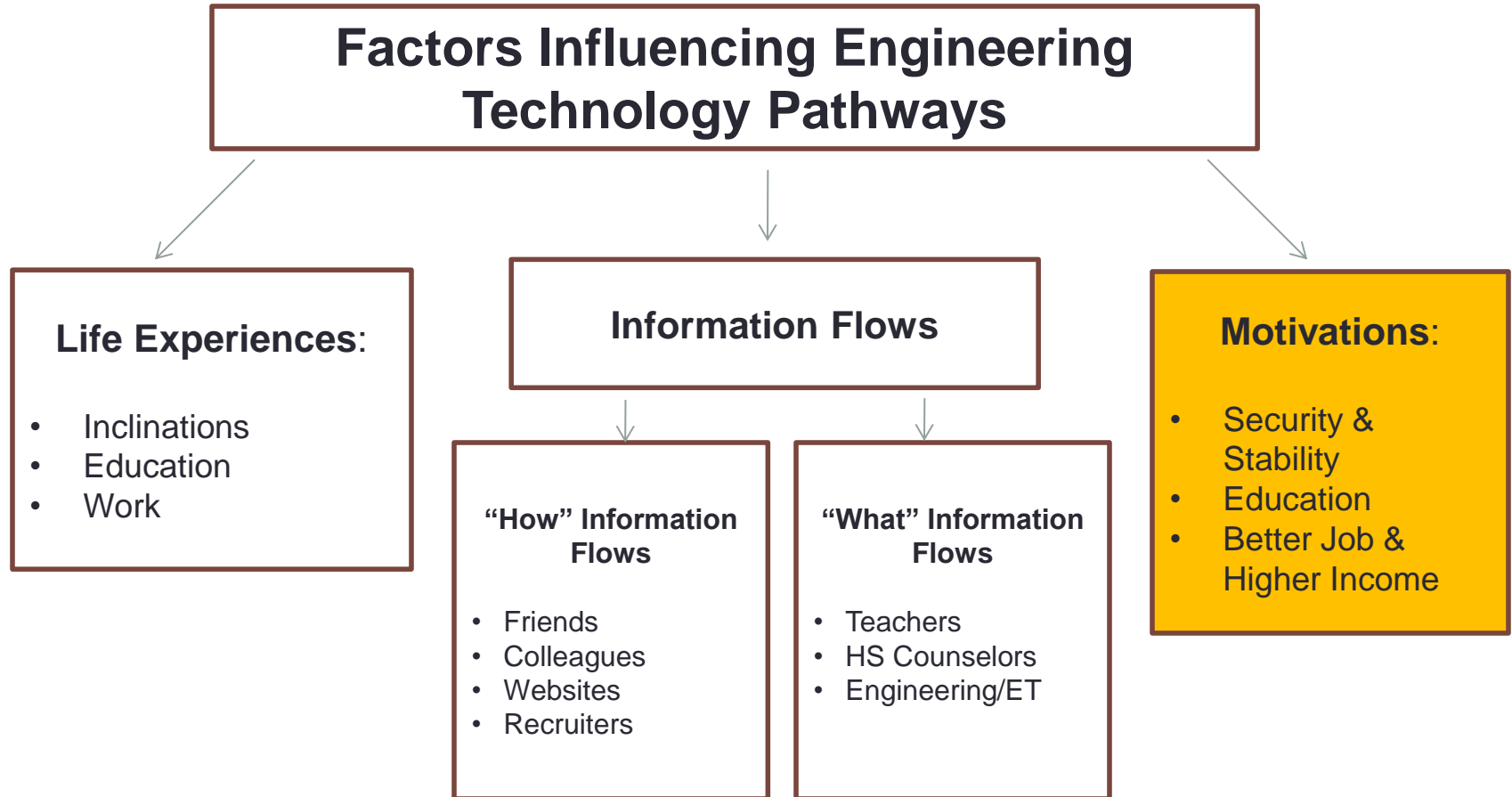
# Information Flows

- 'What' – High School Counselors
- Students discuss high school counselors as not really understanding their interests, unaware of the ET field and potential opportunities, and a bit frustrated that counselors are not more helpful.

# Information Flows

- ‘What’ – Engineering/Engineering Technology
- “...a lot of people here are set on just getting their two year degree. Some people have been working for fifteen, twenty years and want to go back to school and just get their associate’s which this is perfect, [this]is great but if you really want a four year degree I don’t think they tell you enough...about how to get further educated.” (Brian)

# Findings



# Motivating Factors

- Stability & Security
- Darryl had worked as a police officer, but now that he has a wife and children, he is concerned about his safety. “My family depends on me,” Darryl shared, “and if I had to pay a small price and get my degree, I will have to do it because I have children and I have a wife at home, so I have to do what I have to do for them.”



# Motivating Factors

- Further Education
- “I don’t want to just stop at the associate’s level. I do want to get a bachelor’s also, but I want a stepping stone right now, and get my associate’s and get into the field that I want to get into, and then I’ll work on my bachelor’s.”  
(Darryl)

# Motivating Factors

- Higher Income:
- Ian talked about his goals of improving his income. He talked about now being able to break “the glass ceiling” of \$15 or \$16 dollars an hour. Although some thought that was a good salary, he felt that, “In reality, that isn’t very much, you know...That’s why I went back and I finished my AS degree and I’m taking a few more classes for my AA. I’m just hearing a lot that there’s a lot of engineering jobs but there’s not enough people to fill them.”

# The Impact of Florida Career Academy Legislation on In School and Postsecondary Student Outcomes

## I. Problem Statement

- a. Document the need for using longitudinal student data systems to examine the impact of educational programs such as career academies on student in school and postsecondary outcomes
- b. Describe the use and content of the Florida Department of Education (FLDOE) dataset
- c. Introduce the Career and Professional Education (CAPE) Act in Florida as well as the need to document student outcomes as a result of participation

## II. Central Questions

- a. Outline our research questions and critical data elements which align to strategic priorities of the FLDOE to include who participates in career academies, factors which contribute to persistence in career academies from ninth to twelfth grades, and variables which explain postsecondary degree attainment of career academy graduates

## III. Review of Literature

- a. Present literature which describes the knowledge base regarding student participation and outcomes in career academies
- b. Acknowledge gaps in the career academy literature
- c. Explain the need for the use of the FLDOE longitudinal dataset to respond to critical questions on the impact of the CAPE Act on student in school and postsecondary outcomes

## IV. Theoretical Framework

- a. Identify and describe Curriculum Tracking as a framework which sheds light into factors which contribute to status attainment and social inequalities as a result of exposure to high school curricula

## V. Findings

- a. Present findings from FLDOE student level data

## VI. Implications for Research, Policy, Practice, and Future Partnerships

- a. Describe the relation of findings to prior research as well as contributions to our current understanding regarding the impact of career academies on student outcomes
- b. Identify implications for P-12 educational practice
- c. Uncover challenges and opportunities for developing synergistic relationships with state agencies for mutual benefits and to respond to critical questions in the field of Education

## **The Impact of Florida Career Academy Legislation on In School and Postsecondary Student Outcomes**

Traditionally, strong emphasis has been placed on equipping high school students with skills needed to pursue postsecondary studies (Cohen & Besharov, 2002). However, there has been an increasing national awareness of the need to better prepare high school students for both college and careers in order to remain internationally competitive (Fletcher, 2006; Fletcher & Zirkle, 2009; Symonds, Schwartz, & Ferguson, 2011). Symonds et al. (2011) wrote about the “skills gap” in which adolescents lack the 21<sup>st</sup> Century knowledge, skills, and dispositions as well as work ethic needed for many middle wage careers. They argued “...a focus on college readiness alone does not equip young people with all of the skills and abilities they will need in the workplace, or to successfully complete the transition from adolescence to adulthood” (p. 6). The terms college and career readiness are being pervasively used throughout contemporary educational circles. Stone (2013) attempted to conceptualize what is meant by the terms college and career readiness. He explained for students to be college and career ready in the 21<sup>st</sup> Century, they need to have the following three domains of knowledge, skills, and dispositions: (a) academic; (b) occupational; and (c) technical skills. Academic skills include being proficient in the areas of Mathematics, Science, and Communications. These skills include critical thinking, teamwork and collaboration, problem solving, creativity, oral and written communication, ethics, professionalism, and many others. Occupational skills include: (a) employability skills; (b) soft skills; (c) 21<sup>st</sup> century skills; and (d) the Secretary’s Commission on Achieving Necessary Skills (SCANS) which include basic and thinking skills as well as personal qualities. Technical skills are the specific competencies in which employers desire. Therefore, it is of critical importance that students are equipped with academic, occupational, and technical skills to be college and career ready. According to the Partnership for 21<sup>st</sup> Century skills (2010):

## **The Impact of Florida Career Academy Legislation on In School and Postsecondary Student Outcomes**

College and career readiness is the new direction for K–12 education. Preparing students to transition without remediation to postsecondary education or to careers that pay a living wage, or both, is the ultimate aim of federal and state education policies, initiatives and funding. (p. 6)

Since the Smith Hughes Act of 1917, there has been federal interest and support of career and technical education (CTE) programs which were historically aimed at preparing students for work (Fletcher, 2006). On the federal level, the Carl D. Perkins Career and Technical Education Act (Perkins IV) is the major federal legislative initiative which supports CTE programs across the nation. It was originally authorized in 1984 and most recently reauthorized in August of 2006. It is now – in 2013 – due for reauthorization. Its purpose is to provide students with college and career readiness skills needed to pursue further education and for successful employment in high demand and high wage careers (Fletcher, 2006). On a state level, Florida is one of the trailblazers in terms of its focus on middle and high school CTE programs to assist in workforce development, specifically in pursuit of a strategic plan to align high schools, colleges and universities, and workforce opportunities for its residents. A pivotal legislative initiative in Florida is the Career and Professional Education (CAPE) Act which was passed in 2007. It requires all school districts in the state to establish at least one career academy by the 2008-2009 academic school year (Dixon, Cotner, Wilson, & Borman, 2011). The primary objective of the legislation was to develop a statewide partnership between industry and educational institutions for economic development particularly in high demand and high wage careers. To that end, all career themed courses within CAPE academies are required to yield an industry certification or college credit for students within that particular career cluster. The career academy model functions on three primary tenets, which include: (a) a smaller learning community; (b) an

## **The Impact of Florida Career Academy Legislation on In School and Postsecondary Student Outcomes**

integrative college preparatory coursework within a career theme; and (c) partnerships between schools and business and industry to increase students exposure to work through career development and work based learning opportunities (Kemple & Snipes, 2000).

As states such as Florida continually invest in and implement high school reform initiatives like career academies, it is increasingly critical that we evaluate the benefits of student participation in career academies in terms of in school performance as well as postsecondary outcomes which in turn should help shape future legislative efforts. The Florida Department of Education (FLDOE) provides researchers with opportunities to access longitudinal student level data in the P-20 educational system throughout the state to respond to critical questions such as the effectiveness of CTE programs such as career academies on students' in school, postsecondary education, and labor market outcomes. The FLDOE data includes student assessment results, course taking patterns, and teacher certification results. In partnership with FLDOE, the Department of Economic Opportunity also provides longitudinal workforce data on students in the FLDOE data set. All data requests from researchers should support the research agenda of the FLDOE.

### **Research Questions**

- a. What student characteristics are associated with participation in Florida CAPE academies;
- b. Which factors contribute to persistence in Florida CAPE academies from ninth to twelfth grades; and
- c. What factors explain postsecondary degree attainment of Florida CAPE academy graduates?

## Review of Literature

MDRC (formerly Manpower Demonstration Research Corporation) has studied the career academy model beginning in 1993. Their experimental research study design involves an economically, racially, and ethnically diverse set of high schools across the country. Their research has focused on the effectiveness of the school reform model in relation to student performance in high school as well as transitions to further education and the labor market. In terms of student in school performance benefits as it relates to participation in career academies, research findings point to positive student experiences for career academy students in comparison to non career academy students on factors such as increased interpersonal relationships among their teachers and peers, higher expectations from teachers, increased levels of student intrinsic motivation and stronger perceptions of relevance and meaningfulness of course content, and higher levels of engagement in school (Kemple, 1997). Kemple and Snipes (2000) noticed differential outcomes for students which were more likely to drop out of high school in comparison to those who were not, with career academies having a more robust and positive impact on those likely to drop out. Additionally, career academy students had higher attendance rates, and credits earned toward graduation. Despite positive findings for career academy students, Kemple and Snipes studies reported mere averages and did not include statistical significance. For those students with lower probabilities of dropping out of high school, career academy students were significantly more likely to graduate on time (Kemple & Snipes, 2000). In terms of performance on math and reading standardized assessments, Kemple and Snipes found no statistically significant differences among career academy and non career academy students.

In terms of postsecondary education and labor market outcomes, MDRC completed another experimental study from 1993 to 2006. In this study, Kemper and Willner (2008) found

## The Impact of Florida Career Academy Legislation on In School and Postsecondary Student Outcomes

no statistically significant difference between career academy and non career academy students in regard to postsecondary education attainment. They also found career academy male graduates, who were more likely to drop out of high school, benefitted from higher average monthly earnings over a four year time span. And, there were no statistically significant differences in earnings among female graduates as well as graduates which were less likely of dropping out of high school.

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## The Impact of Florida Career Academy Legislation on In School and Postsecondary Student Outcomes

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## **PathTech: Developing Partnerships between ATE Centers and Universities to Conduct Targeted Research on Student Outcomes**

### **Track 5: Advancing Innovation through STEM Research**

Examples of content in this category may include:

- strategies for conducting institutional and educational research;
- partnering with four-year colleges on student learning outcomes;

A. Submitting center(s) or project(s):

Successful Academic and Employment Pathways in Advanced Technologies (NSF DUE #1104214) (PathTech)

<http://sociology.usf.edu/pathtech/>

Florida Advanced Technological Education Center (FLATE)

<http://www.fl-ate.org/>

<http://madeinflorida.org/>

B. Contact information for all presenters/moderators:

Moderator:

Marilyn Barger, PhD, PE (FLATE Executive Director, Principal Investigator) [mbarger@hccfl.edu](mailto:mbarger@hccfl.edu)

Presenters:

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Brad Jenkins, MEd (FLATE Principal Investigator; Associate Dean of Engineering Technology, St. Petersburg College) [jenkins.bradley@spcollege.edu](mailto:jenkins.bradley@spcollege.edu)

Lakshmi Jayaram, PhD (PathTech Co-Principal Investigator; Research Assistant Professor, Department of Sociology, University of South Florida) [ljayaram@usf.edu](mailto:ljayaram@usf.edu)

C. Session Title:

PathTech: Developing Partnerships between ATE Centers and Universities to Conduct Targeted Research on Student Outcomes

D. Session Description/Program Abstract:

PathTech research model builds on the history of collaboration between the ATE, FLATE, and the University of South Florida. FLATE and community college technician education personnel link USF researchers to school district personnel, high school teachers and administrators, and local industry leaders. Panelists describe the integration of USF researchers into ATE Center programs and activities and the quantitative and qualitative mixed method research design. Workshop Activity I models the integration of targeted research into the missions of ATE Centers and Projects. Workshop Activity II develops strategies to recruit high school students into technician education programs based on early research findings.

E. Discussion Questions:

- 1) How is the PathTech model appropriate for conducting pathways research and how can this model be adapted to promote research partnerships in other areas of the country?
- 2) Early findings suggest high school teachers are key to recruiting high school students into AS degree technician education programs. How can these findings be developed into an effective recruiting strategy for ATE Centers and Projects to implement?

## F. Session Outline:

### I. FLATE-USF Partnership

The FLATE-USF PathTech model is based on partnerships with community college technician education faculty and administrators, school district personnel and high school teachers and administrators, and local industry leaders. These partnerships are necessary to gain a fuller understanding of the diverse pathways through which students and incumbent workers enroll in technician education programs and enter into the local manufacturing workforce.

#### A. USF Legacy of ATE Funding

USF likely has a longer and stronger funding record with NSF-ATE than any other Research I university. USF faculty have partnered with Hillsborough Community College and FLATE to receive contiguous NSF-ATE funding since 1999. This funding includes two ATE Projects awarded in 1999 and 2002 led by Richard Gilbert and Andrew Hoff from USF Chemical Engineering and the current PathTech Targeted Research in Technician Education grant awarded in 2011 through 2015. This also includes FLATE, an NSF-ATE Regional Center of Excellence originally funded in 2004 that has received a third round of funding that runs through 2016.

#### B. Collaboration and Activities

PathTech has established legitimacy in the Tampa Bay area with educators and employers in order to break down the walls between research and practice. FLATE invites USF researchers to participate in local STEM education boards and advisory councils to generate formal and informal dialogue between practitioners, employers, and researchers. In turn, university researchers regularly share findings with FLATE and other partners in order to generate positive social change.

### II. Importance of Pathways Research

*Pathways* research acknowledges that individuals transitioning from school to work often simultaneously experience other life transitions as well. Studies that focus solely on training, job experience, or work-life balance, cannot fully examine the complex interactions between school, work, family, and the economy and individual decisions that influence enrollment, coursetaking, degree attainment, and success in the workforce.

#### A. Application of Pathways Research

The PathTech model includes a holistic examination of *pathways* within Tampa Bay to reveal a variety of routes individuals take to enroll in technician degrees, earn industry certification and degrees, get and keep a job, and provide for their families. Pathway models are especially important in today's society as fewer and fewer students experience a linear progression from school to work, or a "pipeline". Instead individuals "re-skill" by cycling between school and work to meet current economic demands for a highly skilled workforce that keeps up with changes and innovations in technology.

#### B. Social Factors

Furthermore, social class, race/ethnicity, gender, geography, and societal norms influence expectations for educational and occupational attainment. Understanding the confluence of pathways and social forces gives leaders and policymakers the tools to support education and employment, improve the life chances and well-being of the citizenry, and foster progress as an educated and skilled nation.

### III. Mixed Methods (or Multiple Methods) Research Design

PathTech aims to better understand pathways into technician education in high schools and community colleges and occupational trajectories into the manufacturing and technology industries by using quantitative and qualitative methods:

#### A. Quantitative

We analyze education and employment administrative data from the Florida Department of Education and public and private national data sources in order to determine factors that promote (1) transition from high school and the workforce into engineering technology and other advanced technology industry certification and degree programs and (2) short-term and long-term trajectories into the workforce or other schooling after the completion of advanced technology coursework, certification, or degrees.

#### B. Qualitative

We interview students, faculty, and administrators within engineering technology programs at Hillsborough Community College, St. Petersburg College, Polk State College, and State College of Florida. We also interview students, teachers, and administrators at local high schools and employers and employees from local industries in the corresponding Hillsborough, Pinellas, Polk, and Sarasota/Manatee counties. This approach allows us to identify common themes across ET pathways in the region and account for differences among educational institutions and industries.

#### C. Advantages of Mixed Methods Approach

Using multiple methodologies and data sources allows PathTech to develop depth and breadth of understanding for the experiences of students and workers in technician fields. As the need for a skilled technology workforce continues to grow, understanding pathways to and from technician education programs and the technology workforce is vital to sustain workforce development, improve student/worker life chances, and stabilize local economies

### **IV. Challenges in Integrating Research Into the ATE Center Mission**

ATE held the Targeted Research Design Challenge Workshop in 2008 in order to synthesize ATE targeted research needs from the perspectives of key stakeholders (researchers, ATE PI's, business/industry, and NSF personnel). The white paper from this workshop describes factors that made it difficult for ATE PIs to pursue research on student outcomes (Ritchie 2008).

#### A. Conflation Between Evaluation and Research

"ATE PIs tend not to distinguish between evaluation and research and use these terms interchangeably."

The direct quote from the above white paper (Ritchie 2008:18) sums up the conflation between evaluation and research and why this distinction is a source of confusion and conflict for ATE Centers and Projects. ATE emphasizes evaluation criteria as a key component of success for funded projects and EvaluATE is devoted specifically to providing evaluation support for ATE grantees. ATE also expects each proposal to have an evaluation plan; however, educators and practitioners at the helm of ATE projects express concerns that these evaluation requirements take grant funds, time, and resources away from their project work and, as structured, do not directly assist in the execution of the grants mission. For this reason, ATE grantees are unlikely to "propose their own research efforts or agree to engage with others who solicit their involvement" (18).

#### B. Lack of Student Outcomes Research Expertise

ATE Centers and ATE Projects are typically led by educators and practitioners with expertise on program development, curricular development, and professional development within their area of technical expertise and technician education. Ritchie (2008:19) quotes an ATE PI saying that possible research topics are "very broad and often over-imposing" for them meaning the biggest challenge may be the "daunting notion" of research.

#### C. Lack of Infrastructure for Longitudinal Research

A key structural concern is that like all NSF efforts, ATE Centers and ATE Projects are extremely competitive. Successful NSF-ATE proposals are funded for 3 or 4 years with clear NSF expectations to achieve a specific set of ambitious outcomes in that time period as well as an indication of the long term impact of the grant effort. ATE Principal Investigators also note that

time and resources for research are “limited and insufficient” and that it is “difficult to focus on general issues that extend beyond the life of an individual project.” For this reason, “longitudinal studies beyond the life of project or center funding are generally not feasible” (Ritchie 2008:15).

## **V. Benefits of ATE Center Partnerships with University Researchers**

### **A. Distinguish Research From Evaluation**

Effective university partnerships can complement evaluation efforts and reinforce the difference between evaluation and research. A targeted research agenda can provide insight into the factors that effectively optimize entry into technician education programs and related careers. By employing the PathTech model, university research partners can develop research standards for ATE Centers and build an infrastructure by which ATE Center personnel and affiliated programs can devote resources toward meeting research standards without sacrificing time and effort from completing Center objectives. The PathTech model focus on uncovering student pathways and short-term and long-term outcomes differs dramatically from ATE Center evaluation and accountability missions, yet complements ATE’s need for evidence of the quality and impact of an ATE funded efforts.

### **B. Bringing Student Outcomes Research Experience to ATE Centers**

When discussing PathTech research with ATE grantees and other stakeholders in K-12 education, community colleges, and local industry we get the same revealing responses: “NSF always wants to know about student outcomes, but we don’t really know how to do the research” and “We didn’t know there were people like you out there who did this research”. There is a large network of scholars interested in conducting research on student outcomes and career pathways who are not aware of opportunities to collaborate with ATE Centers. Identifying these scholars and introducing them to ATE would pay off greatly with respect to our knowledge about technician education and employment outcomes.

### **C. Longitudinal Research Across Sites**

University research partners can help ATE Centers overcome the “daunting notion” of research by developing a research agenda in line with the Center mission and objectives, thus making the research process easier for Center personnel. As university research partnerships grow, researchers can identify common issues and themes across ATE Centers and ATE Projects in order to build sustainable longitudinal targeted research plans across sites. Research collaborations across sites would meet the goal of contributing to national and global debate about effective and optimal workforce development. Such a framework would produce high-impact, socially relevant research to aid in developing the highly skilled technician workforce Congress expects ATE to deliver.

## **VI. Workshop Activity I: Developing University Partnerships for Targeted Research**

Give session attendees 10 minutes to discuss the following questions at their tables or in small groups. Inform them that there will be 10 minutes of discussion afterwards.

A. How is the PathTech model appropriate for conducting pathways research?

B. How can this model be adapted to promote research partnerships at other ATE Centers? How do Center characteristics such as location, area of expertise, existing community college, high school, and industry partnerships affect the potential efficacy of research partnerships?

## **VII. Case Study - How Research Can Inform High School Student Recruitment**

Improving the recruitment of high school students into community college ET and other advanced technology degree programs continually piques the interest of and vexes the technician education community.

A. Preliminary Findings

PathTech completed a pilot study in which we interviewed high school students enrolled in a local STEM themed career academy and community college students in Engineering Technology (ET) AS degree programs. High school students across the board agree that the best aspect of their program is their instructor and explain how much he has taught them and nurtured their interests. ET students describe how they just keep taking classes with the same group of instructors, that it does not even matter what the course is anymore, but that they would take any class offered by this group.

B. Themes

Findings reveal the importance of instructors in attracting students into this field of study as well as motivating them to continue on the ET pathway. Such saturated themes illustrate the transformative educational experiences instructors and classroom learning provide. Through these themes, we can explore the potential role of high school educators in supporting and improving pathways into engineering technology fields.

C. Possible Strategy

Findings indicate that educators can play a vital role in facilitating student development in technical fields. As a result, we recommend targeting high school teachers by developing a professional network for technician educators across educational institutions, spanning secondary and post-secondary programs, to connect and develop an infrastructure to "send" students from high school CTE classes into ET associate's degree programs.

### **VIII. Workshop Activity II: Implementing Programs to Improve Recruiting**

Give session attendees 10 minutes to discuss the following questions at their tables or in small groups. Inform them that there will be 10 minutes of discussion afterwards.

- A. What are some challenges to developing a professional network for technician educators across high schools and community colleges?
- B. What are some potential ways to overcome the identified challenges?
- C. What would be necessary to support and sustain such a professional network for technician educators?

### **IX. Conclusion**

**NSF-ATE P.I. Conference**  
**Workshop Session Proposal**

**Track 5: Advancing Innovation through STEM Research**

A. Submitting center(s) or project(s)

L. Allen Phelps and Patricia Frohrib, PI and co-PI, METTE Project

<http://mette.wceruw.org/>

Will Tyson and Edward Fletcher, PI and Researcher, PathTech Project

<http://www.sociology.usf.edu/pathtech/>

B. Contact information for all presenters/moderators:

Moderator: Dr. Allen Phelps ([laphelps@wisc.edu](mailto:laphelps@wisc.edu))

Presenters: Dr. Will Tyson ([wtyson@usf.edu](mailto:wtyson@usf.edu)), Dr. Edward Fletcher,  
([ecfletcher@usf.edu](mailto:ecfletcher@usf.edu)), Dr. Patricia Frohrib ([frohrib@fvtc.edu](mailto:frohrib@fvtc.edu))

C. Session Title: Using State and Local Longitudinal Student Data to Improve STEM/ATE Student Success: Case Studies of Promising Practices

D. Session Description/Program Abstract – 100-word session description including a statement on how this session will engage participants

Integrated longitudinal K-16 data systems have become vital resources for enhancing college and career readiness. In this session, two ATE Research projects will describe how longitudinal administrative and student performance databases are being used to strengthen partnerships between high schools and two-year colleges in Wisconsin and Florida. Findings are informing state and local policymaker discussions about performance funding. Equally important, research- and evidence-guided innovations are being launched to: tighten the alignment

academic and technical courses, foster teacher professional development communities, and enhance student supports.

E. Discussion Questions – 2-3 discussion questions that the session will address

- How can longitudinal data be used to evaluate ATE projects, program improvements, and/or innovations, or to track student progress?
- What are the challenges, limitations, and lessons learned in linking and using databases at the local and state levels?

F. Session Outline - An outline can include a session agenda, participant learning outcomes, list of activities, and any handouts or materials to be distributed.

Background:

In partnership with the University of Wisconsin-Madison, the Fox Valley Technical College leadership team is documenting and sharing the performance of incoming students from 33 high schools. Using 2005-2012 student assessment and transcript data, each high school is receiving a METTE Student Success profile. For a three-year cohort of incoming students, the Profile illustrates the program selection patterns (for Manufacturing and Engineering Technician and Technology Education programs) and success rates of students from each high school. The success rates are calculated for students who had different experiences in high school, e.g., those who completed dual credit courses, those who scored at the Proficient and Advanced level on statewide 10th grade assessment, as well as student characteristics (e.g., men vs. women, students from low income, ESL and disability backgrounds). This data set is used as a baseline measure for several new innovations being launched by high schools to improve students' career and college readiness (e.g., increasing access to and completion of dual credit course offerings, completing programs of study that include technical and academic courses, etc.)

In partnership with the University of South Florida and the Florida Advanced Technological Education (FLATE) Center, PathTech is a collaborative endeavor with Tampa Bay area high schools, community colleges, and local businesses in the technology sector. PathTech seeks to examine the progression of students from high school STEM themed career academies into advanced technology programs at Tampa Bay community colleges, four-year universities, and into the local workforce. PathTech researchers use data from Florida Department of Education's (FLDOE's) PK-20 longitudinal student data system which tracks students across the state for the purpose of analyzing student participation in career academies, in school academic performance, course taking patterns both at the high school and postsecondary level, industry certification, postsecondary participation and degree attainment, and labor market outcomes. With recent Florida legislation mandating that school districts implement at least one career academy by the



2008-09 academic school year, it is critical that research studies pinpoint the benefits, effectiveness, and value - or lack thereof - of student participation in career academies. In relation to FLDOE's research agenda of determining the differential effect of enrollment in Florida career academies on in-school, postsecondary participation and workforce outcomes, findings from research of this sort could assist in responding to FLDOE's research interests and help to shape school reform policy aimed at enhancing efforts to support student preparation for college and careers.

Agenda: Overview and Presenter Introductions; METTE Overview (Al), FVTC High School Student Success Profile (Patti); PathTech Overview and Major Findings (Will, Ed); Questions and Discussion; Summary of the Resources Handout

Learning Outcomes:

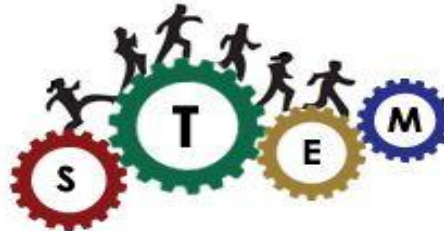
Activities: Mini-talks supported with PPT slides, Questions and Discussion, Brainstorming solutions to local data use challenges.

Handouts: All PPT Slides and a Resources Handout (Brief Descriptions and URLs for useful websites for ATE Leaders, Researchers, and Practitioners)

# PathTech: Building Partnerships with Community Colleges to Study Pathways to Advanced Technology Degrees

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## PathTech



Successful Academic & Employment Pathways  
in Advanced Technologies



# Project Collaboration

“Successful Academic and Employment Pathways in Advanced Technologies” (NSF #1104214) or **PathTech**

- \$1.2 million over 4 years
- Funded by National Science Foundation (NSF) Advanced Technological Education (ATE) program
- Florida Advanced Technological Education Center (FLATE) at Hillsborough Community College
- Interdisciplinary research team from Sociology, Anthropology, and Education



# PathTech Senior Leadership

- **Will Tyson, PhD** (Principal Investigator, Lead Quantitative Investigator, USF Sociology Associate Professor)
- **Kathy Borman, PhD** (Co-Principal Investigator, USF Anthropology Professor)
- **Marie Boyette, PhD** (Co-Principal Investigator, FLATE Associate Director)
- **Lakshmi Jayaram, PhD** (Lead Qualitative Investigator, USF Sociology Research Assistant Professor)
- **Chrystal Smith, PhD** (Project Manager, USF Anthropology Graduate)
- **Eddie Fletcher, PhD** (Quantitative Investigator, USF ACHE Career & Workforce Education Assistant Professor)

# PathTech Qualitative Team

- **Lakshmi Jayaram, PhD** (Lead Qualitative Investigator, USF Sociology Research Assistant Professor)
- **Margaret Cooper, PhD** (Qualitative Post-Doctoral Scholar, USF Sociology Visiting Instructor)
- **Marc Hebert, PhD** (Qualitative Consultant, USF Anthropology Graduate)
- **Rebekah Heppner, MBA, PhD** (Qualitative Consultant, USF Anthropology Graduate)
- **Pangri Mehta, MA** (Graduate Assistant, Sociology)
- **David Zeller, MA** (Graduate Assistant, Sociology)
- **Michael DiCicco, MA** (Graduate Assistant, Secondary Education)

# Project Aims

- To examine the progression of students from high schools and the local workforce into engineering technology (ET) community college programs and careers

## Engineering vs Engineering Technology

<u>Engineering</u>	<u>Engineering Technology</u>
Planning	Doing
Researching new ideas	Applying existing "state of the art"
Innovating	Implementing
Concept-oriented	Application-oriented
Theoretical	Practical and "hands-on"
Calculus based	Algebra based
Develop new processes	Apply new processes
Open-ended and futuristic	Specific and current
Required for registration as P.E. in all states	Required for registration as P.E. in most states
Can require period of internship due to emphasis on fundamentals and theory	Usually ready to work due to emphasis on current practice in industry
Graduate studies widely available	Graduate studies increasing
Jobs in engineering design	Jobs in applied engineering and production

## Project Objectives

- understanding of recruitment and pathways into engineering technology
- providing information to improve ET education
- increasing the visibility of ET programs
- providing information to help meet workforce demands

## Mixed Methods Design

- **Quantitative**: Education and employment data from FLDOE PK-20 Education Data Warehouse
- **Qualitative**: Interviews with students and key personnel from Tampa Bay high schools, districts, community colleges, and local businesses

# Quantitative Goals

- Identify a profile of HS students who enroll in ET and comparable AS/AAS programs.
- Compare educational and employment outcomes among these students who:
  - Enroll in Community College AS/AAS programs
  - Enroll in other Community College programs
  - Enter into the workforce out of high school
  - Enter into a university to pursue bachelor's degree
- Compare outcomes among people who enter ET programs from the workforce and complete some courses vs. earn AS degree



## Qualitative Goals

- Develop narratives of ET pathways through interviews with high school students, community college students, employers and employees in the industry.
- In-depth interviews will focus on developing understanding for background factors, current experiences, and future trajectories expected.

# Community College Partnerships

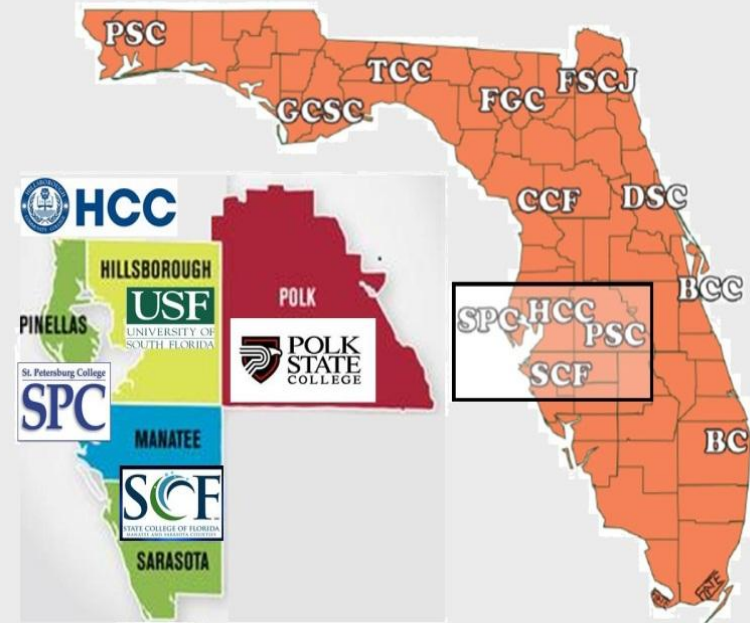
- Partnerships with ET program faculty and administrators are central to the study:
  - **Hillsborough Community College** (Tampa) – Advanced Manufacturing
  - **St. Petersburg College** (Clearwater) – Biomedical Systems, Digital Design & Modeling, Quality
  - **Polk State College** (Airside Center, Lakeland) – Advanced Manufacturing
  - **State College of Florida** (Venice) – Electronics, Digital Design & Modeling

# Community College Partnerships

- ET personnel link PathTech to Tampa Bay technology education and workforce:
  - ET students
  - ET graduates
  - High schools
  - Industry partners



## 2012 FLATE Engineering Technology College Network



# Preliminary Analysis

PathTech Community College Pilot Study

# Introduction

- Engineering Technology (ET) is an emerging educational and occupational field that applies advanced technologies to industrial processes.
- It is a growing field in the Florida economy, in particular, and four partner community colleges offer associate's degrees in ET.
- The purpose of this pilot study is to talk with students in these programs to determine the educational and occupational pathways that brought them to this field of study as well as future opportunities they see for themselves in the ET field.
- The findings from this report will add to our knowledge of these programs as well as inform research instruments and questionnaires for a larger study on the same topic.

# Methodology

- Data collection was facilitated by community college faculty who invited us to their classes.
- Interviews were conducted by the PathTech qualitative team including faculty, post docs, and graduate research assistants.
- Interviews occurred on the community college campus just before and during the respondents' class.
- Data were collected from (10) community college students, eight male and two female students.
- Though specific sociodemographic information was not collected, the information shared in the interviews indicates that students were not entering the program directly from high school, but were older, and many had work experience and families.
- Each interview lasted 20-30 minutes.
- Nine of the ten interviews were transcribed, coded, and thematically analyzed.

# Interview Questions

- How did you learn about the Engineering Technology (ET) program?
- At what point in your education or career did you enter the ET program? What factors influenced your decision to enroll?
- What did you know about the ET program when you were in high school?
- Did you participate in a career academy in high school? If so, how did the career academy prepare you for the ET program?
- What is your perception of the ET job market? What are your career plans after graduating?

# Findings

## Factors Influencing Engineering Technology Pathways

### Life Experiences:

- Inclinations
- Education
- Work

### Information Flows

#### "How" Information Flows

- Friends
- Colleagues
- Websites
- Recruiters

#### "What" Information Flows

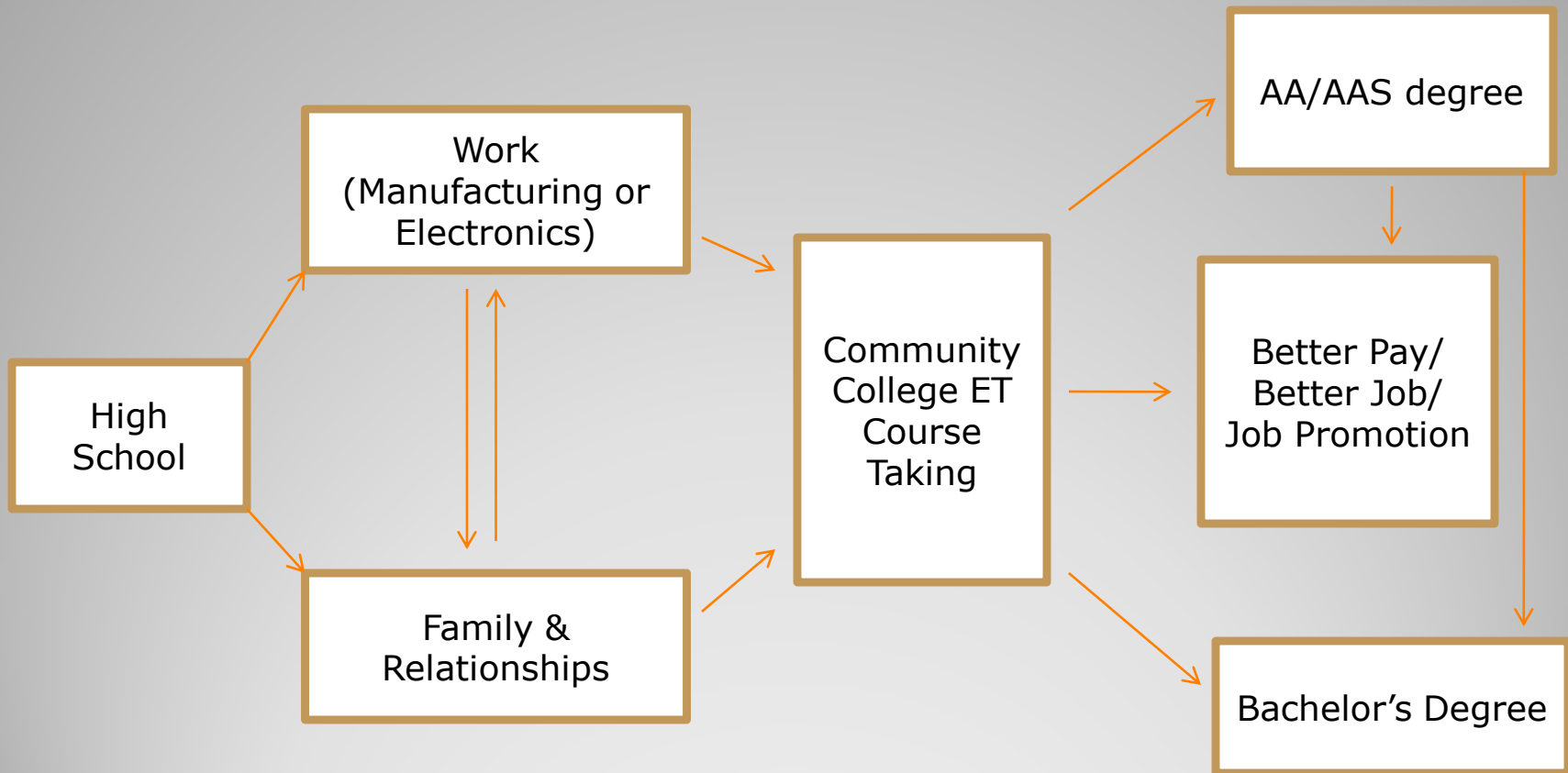
- Teachers
- HS Counselors
- Engineering/ET

### Motivations:

- Security & Stability
- Education
- Better Job & Higher Income



# Emerging Pathway



# Next Steps

- Protocol Revisions:
  - Terminology/jargon – e.g. career academies
  - Inclusion of Sociodemographic Questionnaire
  - Emerging Themes informing new interview protocol to include specific questions about pathways
    - In particular, ET pathways are not linear, nor are they sequential
- Expand community college sample to include faculty and administrators
- Merge high school pilot data analysis with community college pilot data analysis

## Follow Us

- Website: <http://sociology.usf.edu/pathtech>
- Facebook: USF PathTech
- Twitter: @USFPathTech