

**1<sup>st</sup> Year Formative Evaluation Report for  
Strengthening the Teaching and Learning of Electro-Mechanical  
Technology (STLET)  
NSF ATE DUE 1600744 - Delaware County Community College**

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**Submitted to:**

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## **Project Background**

The “Strengthening the Teaching and Learning of Electro-Mechanical Technology” (STLET) is a National Science Foundation’s Advanced Technological Education (ATE) funded project that addresses the critical demand for highly skilled advanced manufacturing technicians in southeastern Pennsylvania. This project uses an early college to university career preparation pathway to train electro-mechanical technicians to meet industry demands.

**Goal:** Through curricula improvements and professional development activities, technician education in the Electro-mechanical Technologies will be strengthened and expanded to address the regional need for a skilled advanced manufacturing workforce.

The three-year project addresses four key objectives:

- Strengthen the curriculum and expand access to an industry-aligned, early college-to-university pathway that offers entry-level, advanced skill career opportunities
- Equip area employers to provide industry apprenticeships that support student learning and creates opportunities for students to earn as they learn
- Develop and implement a technical teacher-educator professional development program to improve the teaching competencies of technical education faculty, many of whom are adjunct instructors whose full-time employment is in industry
- Conduct a comprehensive program evaluation to ensure continuous program improvement and industry alignment

### **Intellectual Merit and Broader Impact of the Project:**

The intellectual merit of the STLET design and approach is comprehensive, innovative and replicable. It is comprehensive because it addresses both teaching and learning outcomes. STLET is innovative in integrating two proven educational programs (early college programs and community college-university transfer agreements) and a competency-based apprenticeship into a career preparation pathway. These programs, which improve outcomes at both high school and college/university levels, are usually offered independent of one another. In STLET, however, they are interwoven to provide a structured career preparation pathway. This pathway is replicable and can be adopted by other community colleges seeking to assist in the economic development of their regions. This demonstrates STLET’s broader impact to the larger advanced technological community.

## **Evaluation Background**

Formative evaluation methods being utilized in the project include: Document review of the project’s enrollment and attendance records, general project records, minutes of work session and project meetings, actual work products, collateral materials and communications, contracts and agreements, DCCC course assessments and student evaluations, interviews with employers, interview with students, workshop evaluations, and DCCC faculty administration evaluation results.

Reviews of the Project's Monthly Management Report and Milestone Schedule are conducted and shared within the Project Team. Monthly face-to-face meetings with the PI and when necessary Co-PIs, take place in a collegiate manner where accomplishments and achievements are highlighted and frank discussion of issues, problems and challenges occurs in a problem solving/process improvement atmosphere. Additionally observations of project meetings and activities by the evaluator are scheduled. Going forward, we are planning quarterly meetings with the Project Internal Evaluator.

ATE requires its grantees to focus on the use of evaluation to increase the intellectual merits of the grant work completed; that is, looking at the evaluation's usefulness. "Evaluation usefulness, or utility, is routinely identified as the most important attribute of evaluation. As stated in The Program Evaluation Standards (JCSEE, 1994), evaluation utility refers to evaluations that are informative, timely, and influential. "\*"

To determine whether grantees view their evaluations as useful, NSF ATE developed the following five criteria related to key purposes of evaluations. PIs and project teams are encouraged to ask: Which of these criteria do you believe to be important (rank order) and what does it provide to you for your project?

- **Project planning** (e.g., input at regular staff meetings based on feedback regarding project needs, process, and outcomes)
- **Project improvement** (formative feedback to guide project implementation)
- **Project output** (determination of who has been served and in what ways)
- **Project accountability** (confirmation that project work and products are being accomplished)
- **Project effectiveness** (evidence of quality of work and quality of products, improvement)\*

*\*Adapted from: ADVANCED TECHNOLOGICAL EDUCATION PROGRAM EVALUATION PROJECT LEVEL EVALUATION PRACTICES Briefing Paper #1: Program Evaluation PERCEPTIONS OF EVALUATION'S USEFULNESS [accessed June 2017].*

The formative and summative evaluation plan of the Strengthening the Teaching and Learning of Electro-Mechanical Technology (STLET) NSF ATE DUE 1600744 - Delaware County Community College includes discussing and monitoring the above criteria with the Project's PI, Co-PIs and staff to increase the utility of our collaborative evaluation work during this project.

## Formative Evaluation Results by Project Objectives (#1 to #4)

Objective	Activities	Deliverables
<b>Objective 1:</b> Strengthen curriculum and expand access to an industry-aligned, early college-to-university electro-mechanical technologies career preparation pathway.	Align curricula outcomes with industry validated skill sets and competencies, as well as embed curricula with industry credentials and certifications	<ul style="list-style-type: none"> <li>• Updated industry validated, college approved certificate program</li> <li>• Industry certifications recommended by advisory committee</li> </ul>
	Expand access to Early College program: increase number of participating school districts	<ul style="list-style-type: none"> <li>• 4-5 Participating School Districts in Early College</li> <li>• 80% completers (58 graduates)</li> </ul>
	Formalize articulation and partnership agreements for Applied Associate of Science to Bachelor of Science.	<ul style="list-style-type: none"> <li>• Agreements with at least 2 to 3 four-year colleges and universities</li> </ul>

### Review of Progress toward Achievement of Objectives, Project Activities, and Project Deliverables.

#### Curriculum Review and Alignment

The Faculty Curriculum team has completed an initial review and alignment of the College's Electro-mechanical certificate curriculum including an analysis and crosswalk between curriculum competencies and the Pennsylvania Department of Education Program of Study Task-list. Additionally, the project identified potential industry certification that will influence the curriculum.

Work still needs to be completed in addressing the identified gaps, and plans are in place to achieve this outcome. For example, the Manufacturing and Advanced Technology Program Advisory Committee members are currently reviewing the curriculum to provide their input. After the updated and revised curriculum is reviewed, it will align to business and industry needs. The project might consider developing an ongoing process to ensure that the college's curriculum is aligned to industry-required competencies. Work will need to be done to socialize and communication the results of this accomplishment to key stakeholders.

The project have successful completed it goal of expanding access to the Early College program. The pilot Early College program students, from two local school districts, completed their program of study. A second cohort of students (from the same schools) is registered for the 2017-2018 academic year.

During this first year of the grant, DCCC internal administration leadership successfully led the planning to engage three additional school districts in the Early College Program. The Dean of Workforce Development and Community Education, the Vice President of Branch Campuses, as well as the Vice President of Enrollment Management, collaborated and worked together to align their efforts in achieving this project goal demonstrating significant institutional commitment to the project.

Early steps are underway to build articulation agreement with four-year colleges and universities as students are just beginning their journey through the emerging educational pipeline. DCCC 's long history of successfully developing and negotiating transfer arrangements and the College's existing administrative processes will ensure the achievement of this project outcome.

Objective	Activities	Deliverables
<b>Objective 2:</b> Enhance the electro-Mechanical technician education through industry apprenticeships	Develop and implement a registered apprenticeship program	<ul style="list-style-type: none"> <li>• DOL registered apprenticeship in Electro-Mechanical technologies</li> </ul>
	Create Electro-Mechanical apprenticeship opportunities for students	<ul style="list-style-type: none"> <li>• 10 students participating in registered apprenticeships</li> <li>• 5 employer/sponsors participating in registered apprenticeships</li> </ul>
	Place students in Registered apprenticeship program	<ul style="list-style-type: none"> <li>• 10 students participating in registered apprenticeships</li> <li>• 5 employer/sponsors participating in registered apprenticeships</li> </ul>

**Review of Progress toward Achievement of Objectives, Project Activities, and Project Deliverables.**

A key achievement this year was increased business and industry engagement that led to the expansion of the Manufacturing and Advanced Technology Advisory Committee. This bring additional business leaders with extensive backgrounds in electromechanical and mechatronics industries and apprenticeship programs to the project. Advisory Committee members are reviewing the current Electromechanical Program curriculum and courses, to determine how well aligned it is with industry-required competencies and needs.

The State of Pennsylvania (with direct support from the US DOL) is actively promoting collaborative approaches to apprenticeship programs and encouraging the development of economy of scale on a regional basis. Recognize this new public policy trend, DCCC put in place a change in approach: The Project will collaborate with Philadelphia/Delaware Valley Chapter of NTMA (National Tooling and Machining Association) and the Manufacturing Alliance of Delaware and Chester Counties to implement the Tri State Apprenticeship Program.

These partners are establishing a register apprenticeship in Industrial Maintenance and have approached the College to be its educational partner. Since there is significant overlap between the proposed Industrial Maintenance Apprenticeship and the Project's Electromechanical Apprenticeship it made sense to collaborate.

In this collaboration, DCCC will serve as the lead school offering curriculum, textbooks and Credit for Prior Learning to apprentices (agreement to be finalized Summer 2017). This development is a major step forward in serving regional manufacturers and provides the Project with greater reach in the Southeast PA Region and the region.

Additional outreach and public education to regional stakeholders (companies, guidance counselors, students and parents) regarding the value of ***an apprenticeship program*** that is also a **college degree track** educational development program that leads to an advanced manufacturing technology career must be highlighted. Public information dissemination needs to be undertaken to support the project’s recruitment and education outcome goals, and to set the stage for future projects that address the similar educational need in other technological areas.

Objective	Activities	Deliverables
<b>Objective 3:</b> Develop and implement a technical educator professional development program to improve the teaching competencies of technical education faculty.	Develop and implement Technical Education Competency Assessment Program	<ul style="list-style-type: none"> <li>6-7 advanced technology faculty (community college) with teaching portfolios</li> </ul>
	Develop and implement Technical Education Pedagogy Workshops	<ul style="list-style-type: none"> <li>6-14 faculty (community college &amp; K12) participating in pedagogy workshops</li> </ul>
	Develop and implement Technical Education Community of Practice	<ul style="list-style-type: none"> <li>6-14 faculty (community college &amp; K12) participating in community of practice</li> </ul>

### Review of Progress toward Achievement of Objectives, Project Activities, and Project Deliverables.

One of the most important issues facing advanced manufacturing technical education programs is a lack of qualified technical instructors. The ATE DUE 1600744 Project is leading the way in addressing this issue by focusing on and providing Faculty Professional Development: Technical Competency Assessment and Pedagogy Training Workshops.

Nine (9) faculty completed key components of the faculty development objective of the ATE DUE 1600744 Project: Technical Competency Assessment and Pedagogy Training Workshop. This is a great start and the lessons learned and approach developed needs to be disseminated across the ATE Program.

By working with Temple University’s Center for Professional Development in Career & Technical Education, the project team determined that the written on-line tests developed by the National Occupational Competency Testing Institute (NOCTI) was an appropriate formative assessment tool. Using the assessments, Temple University Facilitators, coached faculty in developing Professional Improvement Plans (PIPs) that address individual pedagogical and/or technical competency needs. The faculty also participated in ~ thirty (30) hours of workshop sessions.

While the Community of Practice needs to be formally launched, the collaboration with Temple University is already demonstrating significant value. The project might consider an increasing the amount of personal coaching and mentoring that might be provided to the ATE DUE Project Faculty.

Objective	Activities	Deliverables
<b>Objective 4:</b> Design and implement a comprehensive assessment/evaluation process that ensures continuous program improvement and industry alignment.	Conduct Students' End-of-Class Evaluations	<ul style="list-style-type: none"> <li>• Summary Reports of students' Class Evaluations</li> </ul>
	Complete DCCC's college-wide program assessment	<ul style="list-style-type: none"> <li>• Academic Program Assessment Report</li> </ul>
	Conduct employer satisfaction with apprentices survey	<ul style="list-style-type: none"> <li>• Report on Employer/Sponsor Satisfaction</li> </ul>
	Final Project review and reporting	<ul style="list-style-type: none"> <li>• Final Project Report</li> </ul>

**Review of Progress toward Achievement of Objectives, Project Activities, and Project Deliverables.**

The College's original external evaluator was unable to assume the role of Independent Evaluator/Consultant for the Project. After researching and evaluating alternative evaluators, Mr. Michael Pahides was selected to serve in that role for the ATE DUE 1600744 Project. Mr. Pahides started as of January 1, 2017 - this change in evaluators did not have any impact on the project.

An evaluation plan was put into place (as detailed earlier in this report). Over this coming summer, additional summative evaluation activities will start and continue through out the project. As project elements are enacted, certain evaluation methods and approaches will be put into place that track those activities (for example, tracking student and company satisfaction as it relates to the Apprenticeship Program).

Formative evaluation activities will continue and will increase since the project is in full swing with project activities and deliverables producing significant outcomes, accomplishing project milestones, and achieving project objectives. The Project's PI is very responsive to advice and suggestions that support process and/or project improvement. One area deserves special acknowledgement and recognition; the evaluator shared a few project recordkeeping, file management, and project management tools with the PI, and they were fully implemented.

As the project matures, additional activities to support the involvement of DCCC project staff and key project stakeholders in the evaluation process and activities will be implemented with a particular focus on the utility of evaluation activities.

**Key Finding**

The late announcement of the ATE project awards hindered the active start of project activities such as the recruitment and enrollment of students for the Fall 2016 semester, hiring of Project staff (Apprenticeship Coordinator), as well as contracting with Temple University's Center for Professional Development in Career & Technical Education. The

Project has overcome these delays and is making substantial progress in achieving all objectives.

In fact, collaboration between the Project and the DCCC - Office of Enrollment Management, who is actively recruiting students for both Early College and traditional college tracks of the Project is producing excellent results in meeting and /or exceeding enrollment goals. The DCCC PI, Co-PIs and staff are doing an outstanding job implementing and managing the ATE DUE 1600744 STLET Project.

## Major Accomplishments

Accomplishment	Status
Curriculum Review and Alignment	Outstanding Achievement is in sight
Faculty Professional Development	Outstanding Achievement
Technical Competency Assessment and Pedagogy Training Workshops	Well planned solution for addressing critical issue
Formative Assessment Tool	Excellent accomplishment
Professional Improvement Plans	Outstanding Practice
Workshop	Great start
Increased Business and Industry Engagement	Outstanding Achievement
Expanded access to Early College Electromechanical Program	Soon to achieve the project's 3 <sup>rd</sup> year goal
Expanded access to Electro-mechanical technology career preparation pathway	Significant intra DCCC collaboration
Enhancement the Electro-mechanical technician education through industry apprenticeships	Logical and sustainable action that creates economy of scale

## Significant results

### 1. Student Completion in Early College Program

Ten (10) students in the first Early College cohort have successfully completed their program of study earning 29 college credits while in high school and a Delaware County Community College industry recognized Certificate.

## 2. Increased Declared Majors

The increases in enrollment clearly demonstrates the first year success of the ATE DUE 1600744 Project.

Semester/Year	Early College Track	Traditional College Track
Fall 2016	10 students	0 students
Spring 2017	10 students	7 students
Summer/Fall 2017	12 students	24 students

## Recommendations

1. Consider providing **increased communications** to all internal and external stakeholders that celebrate achievements and milestones. Producing and distributing the following might be useful:
  - a. Quarterly Newsletters
  - b. Monthly Updates
  - c. Student Recognition Program – success stories and profiles
  - d. Faculty Recognition - Profiles
  - e. Industry Partners Recognition – Profiles
  - f. Copies of Project Work Products
2. Work with Industry Partners and other Stakeholders to increase their level of understanding and involvement with the project by **conducting short training workshops/seminars/briefings/project team update meetings** for the stakeholders on topics such as:
  - Supporting work-based learning for students in order to shorter pathways to employment and increased their access to skilled workers
  - Working to enhance faculty professional development
  - Providing instructional support – for example: “How to sessions”: on conducting site tours, being a guest lecturer, doing a technology/production process demonstration, sponsoring project based learning activities, and providing real world problems or challenges for courses.
  - Working with faculty and program administrators on how to give effective advice for program and curriculum improvement

- Strengthening career development experiences for students by providing mentoring, internship and job placement opportunities
  - Using Apprenticeship Programs as a Talent Development Tool
  - The importance of Electro-Mechanical Technology for Manufacturing 4.0 (automation and robotic) and for the Future of our region's Economic Growth
3. Continue ***building coordinating mechanisms and processes*** focused on increasing collaboration between critical DCCC Internal Departments such as the:
- Office of Institutional Effectiveness
  - Division of Enrollment Management
    - Office of Dual Enrollment and Transfer Office
    - Office of Transfer
  - Division of Institutional Advancement
  - Virginia M. Carter Center of Teaching Excellence
4. Develop and ***launch short term communication and dissemination plans*** on a regional based to provide public information on the project and to build the groundwork for future replication of the project in other technology areas and to bring this emerging advanced manufacturing technology educational infrastructure to scale.