



Project COMPLETE
Controlling, Operating, and Measuring:
Pathways for Learners to Engineering Technology Employment
NSF Award #1801177

External Evaluation Report, Year 4
2021-2022

External Reviewers

Matthew Johnson (mbj013@latech.edu)

Project Manager, AROS Consulting

Harry Kohn (hik008@latech.edu)

Project Associate, AROS Consulting

Mitzi Desselles, Ph.D. (mdessell@latech.edu)

Project Supervisor, AROS Consulting

Contents

Introduction	2
Method	2
Results	3
Conclusion	10

Introduction

This document reports the results of the external evaluation for July 2021 to June 2022, a portion of year four of the grant titled “*Controlling, Operating, and Measuring: Pathways for Learners to Engineering Technology Employment*,” under the National Science Foundation (NSF) Scholarships in the Advanced Technological Education program (ATE).

Evaluation Objectives

As the time frame covered by this evaluation covers only seven months of year four of Project COMPLETE, the evaluation objectives for this period focus on the activities and evidence pertaining to the following project elements: Project planning and timeline adherence, industry-based certifications and pathways, curriculum implementation, project dissemination, and enrollment in partner higher education institutions.

Our evaluation of implementation fidelity included ensuring that all program aspects were created and maintained as outlined in the NSF grant application. Year four of the grant is a result of a no-cost one-year extension approved by NSF, thus some objectives and goals have been added to the original grant application.

Method

The following section includes information about the team of evaluators, materials, and methodology used in this evaluation.

Reviewer Background

AROS is a faculty-supervised and student-led consulting group within Louisiana Tech University’s Industrial-Organizational Psychology doctoral program, leveraging the energy, expertise, and creativity of its graduate students. These students are well-versed in the theory and practice of program evaluation and have been through intensive courses on qualitative and quantitative research methods.

Reviewer Staffing

The AROS Coordinator (**Tilman Sheets**) and faculty project supervisor (**Mitzi Desselles**) have appointed two doctoral graduate students (**Matthew Brady Johnson**) and (**Harry Kohn**) to the project.

Process

Materials were evaluated using in-person meetings, online correspondence, survey results, management meeting records, and Project COMPLETE’s website.

Meeting and Communication

The evaluation team maintained regular communication with program manager Alicia Kiremire, program coordinator Rebekah Long, principal investigators Gerry Caskey and Michael Swanbom through email correspondence and online (via Zoom) meetings. Bi-weekly meetings

allowed the grant team to provide information on developments regarding the following: acquisition of partner schools, partnerships with non-profits, industry-based certifications, marketing, and dissemination. The information was verified by extensive meeting minutes from meetings between the grant team and relevant entities. A shared cloud storage folder containing records of the grant team's information was also used to assess progress during this evaluation period.

Results of the External Evaluation for July 2021 to June 2022

In this section, information collected from records of grant team activities during the period between July 2021 and June 2022 of Project COMPLETE is presented. Each section focuses on an aspect of the program outlined in the original grant proposal. For each section description, observations and records made during the 2021-2022 period of Project COMPLETE are given; this is followed by the evaluation of the program's components.

Overall Planning and Timeline

Between June 2021 and June 2022, the grant team held bi-weekly management meetings focused on planning and coordinating project aspects. These bi-weekly meetings included the principal investigators, program manager, and program coordinator. Meetings were primarily conducted through Zoom and bi-weekly email correspondence, with some in-person meetings dispersed throughout the year. These forms of communication were not preferred over face-to-face meetings but were reported to be effective. The external evaluator, AROS, was invited to all meetings and online correspondence to maintain an awareness of project developments. The meetings allowed all parties to coordinate on achieving overall timeline objectives.

In what is now year four of the project, the project's team was approved for a no-cost grant extension. The foci of the grant extension were to make an additional effort to disseminate and evaluate the project while creating sustainable partners. These objectives were to submit a paper for peer-review at a 2022 academic conference, increase partnership with LDCC Workforce Division and a non-profit organization to increase outreach to underrepresented student populations, make any final changes to the curriculum and course materials, and upload all final changes and additions to the website.

To maintain accountability, the grant team used various software such as shared cloud storage and a project role definition agreement – a document that specifies each project member's responsibilities during year four of Project COMPLETE. In combination with the bi-weekly management meetings, this system has assisted the grant team with staying on the scheduled timeline. Additionally, it has allowed the team to correct any deviations from the original timeline.

Evaluation:

The grant team has consistently met all but one of the objectives established at the beginning of year four. To meet the primary goals set forth at the beginning of year four, the team submitted a paper to the American Society for Engineering Education (ASEE) and presented the material in person in Minneapolis, Minnesota in June 2022. They have also utilized their primary teaching partner's (Bossier Parish School for Technology & Innovative Learning, or *BPSTIL*) adjustments

to the curriculum, has uploaded to the website. Finally, it is worth noting that the grant team exhibited proactive and forward-thinking behaviors with respect to planning out their meeting agenda up to five weeks in advance.

Industry Certifications & Pathways

In year three of the grant project, the team shifted its focus from dual enrollment to “industry-based certifications” (IBCs) because the team has found that IBCs are more fitting to the Louisiana Department of Education’s strategic plan and funding incentive program for high schools. The team has continued to work toward this goal by supporting its partner schools as they offer these IBCs. BPSTIL switched to using the Electrical Training Alliance (etA) Interim Credential during the Spring 2022 semester. Assistance for implementing NCCER I and etA can be found in the curriculum section of the project’s website.

Non-Profit Partner Sponsorship

Through a partnership with the LDCC’s Workforce Division and the non-profit, Propel America, the team supported more paths to gain certification, credit at LDCC, and opportunities to be interviewed. Propel America works to recruit and coach low-income students to career paths in high need. The grant team funded a two-day boot camp in the summer of 2021 and a 12-week pilot program for a cohort of 10 students. In the program, the students receive training, coaching, and an opportunity to earn industry-based certifications.

Without Project COMPLETE, there would not have been a fall cohort, as Propel does not have a budget allocated for that time. Because of the grant’s funding of this cohort, the non-profit now has experience dealing with community colleges and hopes to work with more and offer school credit in conjunction with their workforce programs. Effective communication between the three entities involved, Propel America, LDCC Workforce Division, and Project COMPLETE, was an integral part of the success associated with the pilot program in 2021. The top reported improvements were effective marketing to students for technical career pathways, student transportation, and coaches that are representative of student populations.

Four students from the 12-week pilot program cohort have completed certifications. Students have been able to create and update their resumes, practice being interviewed for jobs, and participate in job fairs at LDCC. The students have continued to meet with Propel coaches after completing the fall pilot 12-week program. COVID-19 restrictions have prevented some cohort members from securing employment, but there is at least one graduate who is currently employed full-time at a local manufacturing company.

Propel America recently announced that they are, at the national level, shifting focus away from instrumentation technology and solely focusing on healthcare. Thus, the partnership with Project COMPLETE will be discontinued, but the grant team was able to learn what a partnership with an outside party could function like in the future.

Evaluation:

The grant team prepared instructions for educators to integrate Project COMPLETE into their existing IBC programs. Based on the education partner's interest in the curriculum, it is expected that participation in IBCs and dual-enrollment will increase as COVID-19 social-distancing

protocols are relaxed at schools. Project COMPLETE's financial support of the Propel America students in LDCC's workforce program demonstrates the team's efforts to have a meaningful impact on students' lives and the region's economy. The grant team's external project manager was especially conscientious throughout the partnership with Propel. She arranged a full debriefing interview with Propel after the Fall 2021 cohort was complete.

Implementation

Current Utilization

There were several fronts by which the Project COMPLETE team could be evaluated regarding implementation of the curriculum from Winter to Summer of 2022. First, the grant team was prompt with curriculum kit pick-up and delivery to teachers. This was verified through meeting minutes and interviews conducted with participating schools. Second, while one participating school (Bossier Parish high school) administration has not approved a full instrumentation course for next year, one primary implementing teacher plans to use curricula materials in a basic electronics/instrumentation course in the Fall and Spring. Challenges regarding recruitment of students and competition with other newer PLTW courses were identified as reasons full instrumentation has not been approved by Bossier Parish. Third, while another partnered high school (Red River high school) was only able to offer partial implementation of the project COMPLETE curriculum this past academic year, they will have a new learning center on campus that will allow for full implementation in future academic calendars.

Finally, though pulled from a small sample, student reactions to curriculum partial implementation are discussed below. The following includes some evaluative paraphrases and verbatim responses from student recaps of curriculum video materials under a module for professional development. Data was collected from eleven students in total. Each paraphrase or verbatim response represents a different student's reaction to curriculum materials; some reactions were dropped from this report for parsimony. All reactions were positive in nature. From one student, the Project Complete videos captivate student interests in ICET major opportunities through hands-on learning and concrete insights into what employers are looking for in potential employees. From another student, through examples, students are able to identify pathways from new entrants into the workforce to senior positions as an ICET major. From a third student, the materials offered insights into industry trends for those entering the workforce. Additional verbatim responses:

1. This video was very informative, and it felt like an episode from Modern Marvel on the History channel.
2. I actually really think this needs to be a required video for classes just because of how much information it gives you about what [employers] in manufacturing are looking for in [potential employees].
3. These two videos that I watched give insight into [what] I would do as an ICET major.

Visibility and Dissemination

Throughout the evaluation period, the team has promoted and maintained awareness of Project COMPLETE per the specified year four objectives. The website offers a variety of workshops (dissemination, curriculum development, and training) and curriculum videos, slides, documents,

activities, and supplemental materials openly available to educators. The primary high school partner for Project COMPLETE, BPSTIL, has submitted new changes to the curriculum, graphic organizers for notetaking, and tweaks to tests and quizzes that have been uploaded to the website.

In July 2021, the grant team held a professional development workshop for teachers and counselors in the state at the Louisiana Ag Teachers Association (LATA)'s summer conference. The team was able to talk through the curriculum with participating schools and assist them with the accompanying kits. Stakeholders suggested the team do more in direct marketing for Project COMPLETE. In response, flyers were mailed to seven schools for Spring 2022.

The team attended the ribbon cutting of the new Louisiana Delta Community College campus in Ruston, Louisiana, furthering their commitment to the partner institution and the local community. Local industry contacts were surveyed to better understand their awareness, understanding, support, and effectiveness of the project, as well as the likelihood of future partnership with similar projects. Only two respondents showed a moderate to high level of agreement on understanding, support, and effectiveness.

The team has attempted to reach out to partner schools to offer final assistance before the project timeline is over. They could not hold a live online Q&A panel due to low or no communication from partner high schools. Due to scheduling conflicts with state testing, the grant team was unable to secure a guest speaker role at one of the implementing high schools during this last year of the grant; there are plans in place to secure a talk about instrumentation in the forthcoming academic year.

The website is being converted into a format that reflects the finished product. In addition to curriculum updates, videos and links have been checked for function and there have been updates to sections such as *About* and *Our Goal*. Post-project contacts have been updated for future assistance in implementation, information about LDCC, and classroom talks about careers in instrumentation.

Underrepresented Populations

In a previous evaluation period, the team also took proactive steps to target schools composed of underrepresented students in the STEM field. These students have not historically matched their population ratio in the STEM workforce; typically, women, racial, ethnic, and other minority groups are underrepresented. The team continued this by renewing the contract with the individual who serves as their partner and liaison to schools comprised of underrepresented students.

Thus far, he has reached seven schools, and six have shown interest in joining because of his outreach and relationship building. He has also presented information about Project COMPLETE to two non-traditional (homeschool) groups, which are currently considering the curriculum. He was met with enthusiasm for the concept of the curriculum but following through with implementation was more difficult; no schools said “no”, but many eventually stopped answering. After two academic years of coping with a pandemic, “Most schools are just trying to survive... something new seems too hard when everything feels new right now.” Contacts from

the liaison have been turned over to the grant team for one last round of follow-up communication.

Given the specificity of the industry and the intricacy of the curriculum, the liaison suggests more face-to-face meetings, with administrators, teachers, and students in the room, for similar initiatives. The more the idea gets passed down by non-stakeholders, the more the message gets watered down or distorted. A related suggestion by another stakeholder is to reconsider the name of the course for better layperson understanding and marketing, though the suggestion has been met with resistance due to the broad goal of raising awareness about the instrumentation vocation.

One school that the partner liaison introduced to the curriculum, Red River High School, gave 338 students the opportunity to sign up for partial implementation in the 2022 Spring semester as part of enrichment and physics classes. Physics classes at Red River High incorporated several instrumentation lessons from the COMPLETE curriculum in the Spring 2022 semester. Red River High School reported receiving thorough communication, their kits on time, and had a good experience with the grant team. They are looking forward to implementing more of the program next year. The school already offers NCCER certification with the electrical program, and they are planning to integrate the Project COMPLETE curriculum into their program. They received assistance from the grant team and a teacher at another partner high school but stated that they may need more training and guidance as they move toward full implementation.

Academic Conference

The grant team submitted an abstract to the American Society for Engineering Education's (ASEE) 2022 conference in Minneapolis, Minnesota, which was accepted. They subsequently submitted a full manuscript to ASEE that was fully accepted after blind peer-review. The paper detailed the past 3.5 years of the grant and was written to share the team's experiences and lessons learned with fellow educators who may attempt similar endeavors. Many members of the team flew to Minneapolis in late June to present the paper and field questions.

Media

The project was featured in the June 2022 edition of the ATE Central Connection, a newsletter that disseminates information about advanced technological education projects, news, events, and other resources. A description of Project COMPLETE, the project's website, <https://atecentral.net/msites/completenesspathways>, an interview with an industry partner, and a virtual field trip to the partner's local facility are all featured in the newsletter.

The grant team's project manager has written a press release about the completion and success of the project in an effort to be picked up by the local newspapers. All materials have been updated and uploaded, and the grant team plans to make any final update the website before the end of July. After the final adjustments are made, the team will announce updates and the finalization of the curriculum with a newsletter email in the late summer of 2022.

Evaluation:

The Project COMPLETE team met their goal of submitting to a peer-review academic conference in the fourth year of the grant. Exceeding their goal of submitting, the paper was accepted, and the team was invited to present at the conference. The grant team did exceedingly well at securing and fostering the relationship with a STEM-forward technical high school in a highly populated district, which brings broader attention to the curriculum. Additionally, the grant team made progress toward the year four goal of increasing outreach to underrepresented student populations through the liaison’s efforts with six schools receptive to the curriculum. While the website was well received and reported as a helpful resource by implementing teachers.

Enrollment in Partner Higher Education Institutions

LDCC Industrial Instrumentation Technology Enrollment

Enrollment has remained relatively steady at the LDCC campus closest to the partner university. For the entire LDCC system, enrollment spiked as the concentration was expanded to more campuses from the 2017-2018 to the 2018-2019 academic year. Since that time, enrollment remained has shown a 36%, 3%, and 15% decrease each year, respectively.

Academic Year	Total LDCC Enrollment	Instrumentation Technology All LDCC Campuses	Instrumentation Technology Ruston LDCC Campus
2021-2022	5,303	93	34
2020-2021	5,318	109	37
2019-2020	6,161	112	38
2018-2019	5,588	175	32
2017-2018	5,266	56	0

The decrease in students in Instrumentation Technology would be alarming, but when considering the overall number of students has decreased 14% since the 2019-2020 academic year, the numbers in the concentration of interest appear sufficiently strong.

Louisiana Tech University ICET/ELET Enrollment

Two years prior to the start of this project, Louisiana Tech University established its Instrumentation and Control Systems Engineering Technology (ICET) program. Graduate totals for both ICET and its precursor, the Electrical Engineering Technology (ELET) program, are reported here.

Year	All Engineering	ELET	ICET	Total % ELET/ICET
2021	328	2	7	2.8%
2020	376	8	12	5.3%
2019	398	15	n/a	3.8%
2018	355	14	n/a	3.9%

Over the project's duration, overall graduation rates for the college of engineering show an increase over 2018-2019 and then a decrease in 2020 and 2021 to its lowest of all four years. The graduation rate for those in related programs rose 43% from 2018 to 2020, that is, 14 to 20 graduates. This positive trend dropped to 9 in 2021. The number of first-year students that declared majors in the ELET/ICET programs was 5 in 2018 and then dropped to 1 in 2019. In 2020, the number of students jumped to 4, and in 2021 6 students declared an ELET or ICET major.

Evaluation:

COVID-19 has affected enrollment in institutions, so determining the grant impact on enrollment is impossible. College student enrollment at the national level has declined since the onset of the pandemic and is currently still in decline during this evaluation period. Considering this trend, enrollment at Louisiana Tech is on par, and the steady numbers at LDCC are notable.

Future Viability of Project COMPLETE

Estimations on the future viability of the Project COMPLETE curriculum ranged from underwhelming in terms of buy-in from a desirable number of schools to tempered optimism in the prospect of the proliferation of curriculum materials (full implementation or otherwise) through word-of-mouth. Interview data indicates that this optimism stems from a high valuation of curriculum materials. However, it is worth noting that the near unanimous positive sentiment on curriculum materials comes with the caveat that Project COMPLETE may be too ambitious an undertaking for some high school teachers without ongoing support of the grant team after its dissolution. Relatedly, part of the success of the curriculum implementation at the two current partnered high schools seems to be related to special factors that were conducive to implementation.

In the case of Bossier Parish, their being a specialized STEM high school familiar with electronics/robotics curriculum was identified through interviews as a special factor that plays a part in the relative success of the curriculum implementation moving forward. Similarly, at Red River high school, the fact that it is a larger high school with district-wide resources and a new learning center was identified through interviews as an important factor in the ongoing implementation of the curriculum. Through these findings, it appears that the expressed fears that the curriculum may be too ambitious in some settings is a founded impediment to the future viability of the full curriculum. However, there are additional developments at Bossier Parish that bode well for the future viability of Project COMPLETE; this school is starting an eighth-grade academy that is expected to help in the recruitment of students into the curriculum. Though this development is something of a double-edged sword in that student recruitment efforts will come from other curricula pertaining to competing subjects (i.e., computerized manufacturing).

The primary high school partner, BPSTIL, will likely play a pivotal role in word-of-mouth dissemination to other schools. Continued implementation is contingent on the full course offerings there and at other STEM-focused schools due to the limited number of interested students. Red River High School's plans to move toward full implementation is promising due to their geographic demands for a greater instrumentation workforce that Project COMPLETE is designed to facilitate. Overall, the grant team and other interviewed stakeholders expressed

optimism about at least some parts of the curriculum being proliferated and increasing awareness of career paths in instrumentation- a superordinate goal of the project as a whole.

Conclusion

Overall, the July 2021 through June 2022 period of Project COMPLETE successfully pursued the goals outlined by the team when applying for their no-cost grant extension.

Based on educator interviews conducted by AROS, many more schools would have implemented or still intend to implement the curriculum. Schools identified the multiple waves of pandemic variant outbreaks as the cause for non-partnership. Student absences and short staffing at the schools create logistical obstacles that make implementing a new curriculum unfeasible. Beyond these exceptional difficulties that affected the project, the ever-shifting nature of what high schools are looking for in grant proposals was a difficult hurdle to overcome. This observed transitory nature of incentive structures at high schools led to the following axiom: by the time you write a high school grant and get it funded, you are dealing with a totally different animal.

Interviews of the grant team and its partners, high school partners, and qualitative data gathered from students reflect enthusiasm about the curriculum, but a sobering reality that the low number of fully implementing partners may have set a trajectory to limited future use of the curriculum in its full form. As the need for qualified technicians and awareness of the vocation continues to grow, the curriculum will be a resource to be picked from or integrated in the future.

The team has met the preestablished year four goals of submitting a paper for peer-review at a 2022 academic conference, increasing visibility of the curriculum in underrepresented student populations, increasing partnership with LDCC Workforce Division, and learning valuable takeaways regarding a partnership with a non-profit organization. Additionally, the project may be seen as a foundational collaboration between the two partnered schools as the two institutions had not previously pursued a grant project together despite their proximity. After this collaboration, the two partnered institutions, along with two others in the area, have successfully proposed a new federal grant project to build university Industrial Assessment Centers (IACs). The success of the project, despite its unavoidable pandemic-related setbacks, is primarily due to the grant team's mutual respect, recognition and deference to each other's skills, and their collective commitment to the mission and goals of the grant.