



Choose Ohio First – IMProving RETention and Student Success in Computing (COF-IMPRESS-C) – Second Year Progress Report

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Abstract:

Recognizing the State of Ohio and regional need for a highly trained computing workforce with 4-year degrees, the Choose Ohio First – IMProving Retention and Student Success in Computing (COF-IMPRESS-C) project provides financial support and an ecosystem of high-impact curricular and co-curricular activities to increase the success of academically talented students.

The COF-IMPRESS-C team will leverage student-centered strategies and academic support, such as undergraduate research, faculty/peer mentoring, and academic success sessions to enhance academic and personal success. The project will facilitate the recruitment, retention, and matriculation of scholarship recipients, provide them with access to a continuum of student support services, resources, and opportunities for professional growth, and prepare scholarship recipients for graduate school or careers in computing. COF-IMPRESS-C will facilitate dual-enrollment of students in the Honors College, allowing an additional focus on developing leadership, entrepreneurial skills, and a success mindset. The goals of the project are to (1) increase the number and diversity of students pursuing degrees in computing; and (2) Add to the body of knowledge regarding best practices in computing education and promote the employment of computing graduates to meet the local and regional workforce needs.

The project team is led by the College of Engineering and includes THE Community College. The project brings together computing academic programs that are offered through the College of Engineering and programs in the Honors College, an inclusive and unique college designed around high-impact educational practices

The paper will address second year project activities including the COF-IMPRESS-C recruitment, and advertisement plan to first-year and community college transfer students. The paper will also address the student eligibility and selection process, the recruitment of the second cohort scholars, and finally the orientation program.

I. Research Background:

Research shows that the impact of financial aid on retention is more significant in STEM programs than in other degrees because STEM degrees often take longer to complete [1]. Financial concerns and issues can erode the self-confidence of students and their willingness to remain in STEM [2]. To reform STEM education, financial support is provided by a variety of external organizations, including disciplinary societies, education associations, resource networks, foundations, and governmental agencies [3]. For underrepresented minorities in STEM programs, financial support comes from a range of programs, including general programs supporting underrepresented minorities, financial aid that targets students in STEM, and need-based aid programs. Research has shown that financial incentives are correlated with reduced attrition among low-income and minority students when provided in conjunction with academic support and campus integration programs. Colleges can also achieve better outcomes by simplifying bureaucratic procedures for applying for financial aid [4]. For example, short reminders to first-year college students to fill out financial aid forms have been shown to improve persistence [5]. According the President's Council of Advisors on Science and Technology (PCAST) report [2], retention of students in STEM majors is the most effective way to expand the STEM pipeline.

Financial support that meets student need is strongly correlated with student attendance, persistence, and graduation [6]. Bowen and colleagues studied a possible relationship between college financing and baccalaureate completion. They defined the “net price” of tuition as tuition minus grant aid and found a positive relationship between lower net prices and higher graduation rates [7]. Others have suggested that financial incentives could be significant factors to improve student performance [8]. A third study suggested that the most beneficial effect of financial aid was to increase students’ freedom to become more engaged in the academic and social environments, which led to increased student persistence [9]. In the past decade, Florida and Pennsylvania policymakers provided financial incentives to schools that helped students clear milestones on their academic journeys or finish work toward degrees or credentials, which led to increasing rates of degree completion [10]. The existing student aid system was designed for college students who were financially dependent on their parents. However, students’ financial needs have changed. A significant number of today’s students (especially community college students) are older; many attend part-time due to family and work responsibilities. Additionally, financial aid combined with enhanced student support has been shown to be more effective in promoting persistence and completion than financial aid alone [11]. This project combines both financial aid and student support.

The Choose Ohio First (COF) scholarship program is a student-centered state of Ohio department of Higher Education funded program. The program was initially state in 2008 with a goal to recruit and retain students in State of Ohio institutions, strengthening Ohio’s competitiveness within Science Technology, Engineering, Mathematics, and Medicine (STEMM) education. The program offers scholarship to academically talented students in STEMM fields which will directly impact the ability of the state of Ohio to educate and train students to meet Ohio’s career and job opportunities. In 2019, the program has a special Choose Ohio First (COF) Request for Proposals (RFP) in Computer Science and Related disciplines to strengthen computing workforce in Ohio.

The College of Engineering has responded to the RFP in partnership with The University Honors College (HC), to pilot a unique strategy for mentoring, advising, and engaging computing scholars. COF-IMPRESS-C scholars will participate in HC’s unique, high-impact educational programs in leadership, research, and community service. The HC will house the COF-IMPRESS-C project by creating a dynamic learning community, coordinating activities and events, providing community advising and peer mentoring, and monitoring/ supporting academic progress, in collaboration with the College of Engineering, department of Engineering Technology, and Department of Electrical Engineering and Computer Science. This project will award scholarships up to nine first-time students and community college transfer students in computer science and related fields. Each will be supported with scholarships for up to four years contingent upon continued funding from the State of Ohio. The project brings together the University programs in computing offered through its College of Engineering and Honors College, an inclusive college designed around high-impact educational practices. The program will target students majoring in Computer Science and Engineering (CSE), Computer Science and Engineering Technology (CSET), and Information Technology (ITCE). The five-year Choose Ohio First– IMPROVING Retention and Student Success in Computing (COF-IMPRESS-C) project provides financial support and an ecosystem of high-impact curricular and co-curricular activities to increase the success of academically talented students. Each scholarship amounts up to \$5,562 per funded year. COF-IMPRESS-C scholarships will provide computing scholars with a greater opportunity to concentrate on studies and

programming designed to improve retention and graduation rates.

II. State and Regional Needs:

The availability of a well-trained computer science and information technology workforce in Ohio can power the state’s economic vitality. According to the BLS, Ohio ranks No. 41, with an unemployment rate of 4%, higher than the national unemployment rate of 3.7%. However, the Ohio economy has rebounded, especially the manufacturing industry, creating a shortage of skilled computing workers. COF-IMPRESS-C will help to meet this need by working to improve persistence of computing scholars. Table 1 shows the computing occupational employment projections through 2026.

Table 1. Ohio Computing Occupational Employment Projection, 2016 - 2026

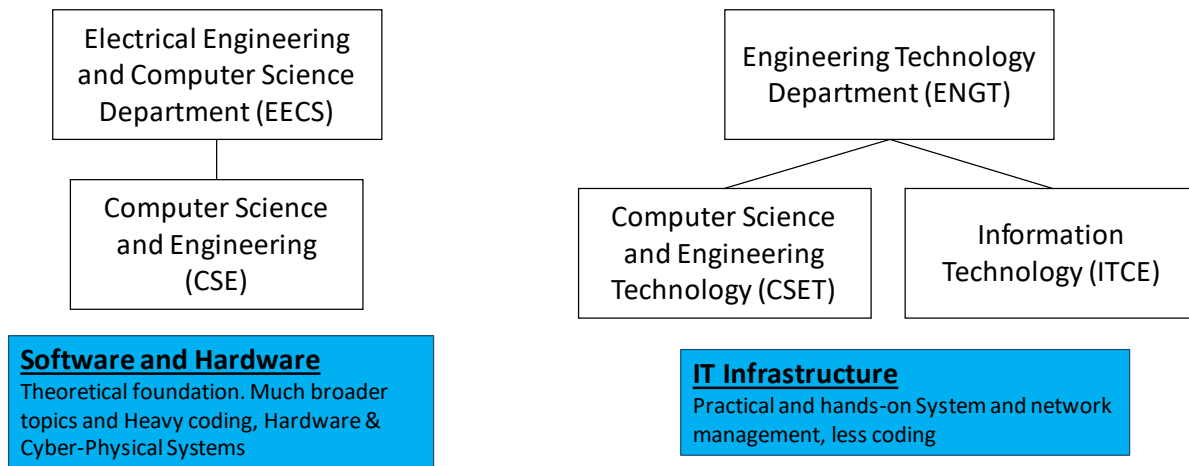
Code	Occupation Title	Employment		Change in Employment		Annual Opening		Median Wages May 2017
		2016 Annual	2026 Projected	2016-2026	Percent	Growth	Total	
15-0000	Computer & Mathematical Occupations	147,225	157,316	10,091	6.9%	1,009	10,854	\$36.89
15-1111	Computer & Information Research Scientists	173	190	17	9.8%	2	14	\$50.96
15-1121	Computer Systems Analysts	28,795	29,211	416	1.4%	42	1,867	\$40.67
15-1122	Information Security Analysts	2,890	3,637	747	25.8%	75	292	\$42.62
15-1131	Computer Programmers	5,847	4,919	-928	-15.9%	-93	241	\$33.21
15-1132	Software Developers, Applications	35,099	41,253	6,154	17.5%	615	3,011	\$42.89
15-1133	Software Developers, Systems Software	5,839	5,931	92	1.6%	9	378	\$45.64
15-1134	Web Developers	3,803	4,034	231	6.1%	23	294	\$27.30
15-1141	Database Admins	4,361	4,646	285	6.5%	28	309	\$40.03
15-1142	Network and Comp. Systems Architects and Admins	14,012	14,056	44	0.3%	4	861	\$35.21
15-1143	Computer Network Architects	5,501	5,433	-68	-1.2%	-7	339	\$45.80
15-1151	Computer User Support Specialists	18,737	19,441	704	3.8%	70	1,440	\$21.68
15-1152	Computer Network Support Specialists	9,960	10,413	453	4.5%	45	776	\$27.76
15-1199	Computer Occupations, All Other	6,435	6,930	495	7.7%	50	489	\$38.15
17-2061	Computer Hardware Engineers	1,074	1,118	44	4.1%	4	71	\$47.68

III. College of Engineering academic computing degrees

The University College of Engineering offered the following four primary computing disciplines, and recognized a category of computing disciplines that highlights the increasing number of hybrid or interdisciplinary courses of study:

- Computer Science and Engineering (CSE)
- Information Technology (ITCE)
- Computer Science and Engineering Technology (CSET)

CS spans a wide range of topics from theoretical and algorithmic foundations to cutting-edge applications such as Artificial Intelligence and Cybersecurity. CSE is typically require heavy coding, software and hardware development and cyber-physical systems. CSET and ITCE is the application of computer technologies with a strong focus on practical and hands-on expertise to take care of computer systems and IT infrastructure. CSET and ITCE typically require less coding. We believe it is of significant value that our existing computing programs on campus are designed to produce well-rounded students with a balance between strong theoretical foundations as well as practical and hands-on technical skills.



IV. Student Selection, Orientation Program, Advertising and Recruitment Plan

A. Advertising and Recruitment Plan:

An aggressive recruiting strategy were used to attract academically talented, and low-income students to College of Engineering computing programs. Our recruitment strategy took advantage of existing The University recruiting initiatives. COF-IMPRESS-C scholarship program recruitment materials were developed and advertised to the partner community colleges, and other community colleges in the state of Ohio through reaching out to individual who can help encourage transfer students to consider applying for the COF-IMPRESS-C scholarship. Additionally, the recruitment material was shared also with the University K-12 partners science and math teachers within the school districts in the region. COF-IMPRESS-C scholarship information was also posted on social media venues, including Facebook, LinkedIn, Twitter, and Instagram to advertise the program. Two targeted email pushes and a text message reminder were sent to all qualified direct from high school students and transfer students in the University admission system. Another set of targeted email pushes were sent to all inquiries encouraging them to submit their application for admission, so that they have the opportunity to apply for this scholarship

B. Student Eligibility and Selection Process:

Each applicant must be a US citizen, or permanent resident alien, and a resident of Ohio. First-year students applying for admission must have:

- A high school GPA of 3.5 or higher, an ACT Composite score of 25 for CSET and ITCE programs.
- A high school GPA of 3.75 or higher, an ACT Composite score of 28 for CSE program.
- Community college transfer students must have a minimum GPA of 3.0.

Both first-year and transfer students will be required to submit an essay to describe their career goals and why they should be considered for the COF-IMPRESS-C scholarship. The COF-IMPRESS-C management team will review the applicants' materials and rank them using a selection criteria rubric that includes 10 points for each of the following (for a total of 50 points): 1) *high school GPA, ACT score, class ranking for first-year and college GPA for transfer students,* 2) *letters of recommendation,* 3) *honors/awards,* 4) *personal statement,* and 5) *extracurricular activities.*

Students must maintain a minimum GPA of 3.0 and participate regularly in COF-IMPRESS-C activities to remain eligible for scholarship continuation. If a student fails to maintain the requirements, the student will be put on probation with no scholarship and the project team will continue student support activities to allow the student to re-apply. Scholarship awardees must also continue to enroll in the College of Engineering respective computing's four-year programs and remain enrolled in the HC Learning Community. For HC Honors eligibility, students enrolled on the HC must earn a minimum GPA of 3.3; if a student's GPA falls below 3.3 and still above 3.0, the student will be eligible to maintain her/his scholarship. To maintain honors status, COF-IMPRESS-C scholars will be required to maintain a 3.3 average GPA.

C. Year-2 Cohort:

A total of 36 students applied for acceptance into the COF-IMPRES-C program. There were 26 students deemed eligible, with 9 students awarded program entrance based upon average ratings of multiple application reviewers using an evaluation rubric. The COF-IMPRESS-C management team reviewed the applicants' materials and ranked them using a selection rubric. The average ACT scores for all applicants was 27.67 and the average GPA for all applicants was 3.91. The 50-point selection criteria rubric used by the committee also ranked high school ACT scores for the first-year applicants or a relevant associate's degree for transfer students; honors and awards; a personal statement; and letters of recommendation. Eight students were selected for the scholarship, four in Computer Science and Engineering, and five in Computer Science and Engineering Technology, and one in Information Technology. Selected scholars include three female students. A small collection of COF-IMPRES-C awardees' quotes are shown below:

“The COF-IMPRESS-C scholarship helps me to create my future to fuel tomorrow by enrolling me in an intense curriculum that challenges me and helps my problem-solving abilities. The COF-IMPRESS-C scholarship also broadens my horizons by its enrollment in the Honors College.” Will Kaufman – Computer Science & Engineering.

“The money given to me by the COF-IMPRESS-C helps to give me peace of mind to focus on my studies. I'm very thankful for the opportunity to give my all learning here at the University to do the very best that I can.” Jackson Baird – Computer Science & Engineering.

“The COF-IMPRESS-C scholarship will help create my future to fuel tomorrow by motivating me to keep my grades high in order to keep the scholarship. This fuels my tomorrow as in staying motivated and graduating with good grades, I will graduate on time and likely with low debt.” Logan Gallmeier– Computer Science & Engineering Technology

D. Orientation Program and Professional Development training sessions:

Orientation kick-off meeting: During the first-year, a networking event for all COF-IMPRESS-C students was held in fall 2021, the networking event was an opportunity to meet fellow highly motivated first-year students. In this networking event, all the students were introduced to a variety of campus resources, including Shah Center for Engineering career development, Library, Learning Enhancement Center, Writing Center,



and Counseling Services. Students thus had the opportunity to learn more about campus resources, connect with their peers, and faculty and staff from the HC as well as the College of Engineering, and upper-class students from their programs. As the semester progressed, COF-IMPRESS-C scholars were encouraged to attend several other professional development opportunity and virtual community event held by HC.

Dale Carnegie Training: COF-IMPRESS-C scholars were also invited to participate in Dale Carnegie training sessions, a program initiated by the college of engineering and in collaboration with Dale Carnegie. The program focuses on improving students' skills in building Self Confidence, Enhancing Communication Skills, Strengthening People Skills, Developing Leadership Skills, and Reducing Stress and Improve Attitude. These modules are designed to help students master the key human relation skills demanded in today's academia and business environments.

COF Scholar Annual Showcase: COF-IMPRESS-C scholars were also invited to participate in the 14th Annual Choose Ohio First (COF) Scholar Showcase, an annual event for COF program participants to highlight accomplishment and students' success. This year, the showcase is virtual will focus on student opportunities to contribute to Ohio's STEM-based technology and economic development through entrepreneurship and education.

V. Conclusion

New and more diverse computing graduates are needed to meet workforce needs in the State of Ohio. Research shows that financial support is key for student success, especially for academically talented but financially disadvantaged students. The Choose Ohio First – IMProving Retention and

Student Success in Computing (COF-IMPRESS-C) project provides financial support and an ecosystem of high-impact curricular and co-curricular activities to increase the success of academically talented students. The project focuses on expanding the number of academically talented individuals entering and completing degrees in computing programs at the University. While the project is in its first year, a total of eight students were awarded the COF-IMPRESS-C scholarship in the program. The project brings together The University computing programs that are offered through the College of Engineering and programs in the Honors College, an inclusive and unique college designed around high-impact educational practices.

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