PRACTICE

# Improving Retention of Commuter STEM Students through Undergraduate Research

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## Abstract

Student retention is important to any university, especially keeping commuter students who are traditionally less anchored in campus life. Even more at risk, given the leaky STEM pipeline, are STEM commuter students. In 2016, Valparaiso University launched the Establishing Practices Integrating Commuter Students (EPIC) program, centered around engaging students in undergraduate research. Students participate in a research laboratory for their four academic years, and take part in one summer of funded research. This program has achieved its goal of providing scholarships, research opportunities, and cohort support to over 30 commuter and residential students while preparing them for research-oriented careers. This article shares successes and lessons learned, along with data demonstrating the program's impact on broadening participation in STEM and increasing retention.

**Keywords:** *commuter students, retention, S-STEM, student cohorts, undergraduate research*

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Establishing Practices Integrating Commuter Students (EPIC) is a National Science Foundation Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM; NSF award #1564855) program at Valparaiso University (Valpo) with the following goals:

- Improve student retention in STEM, especially among commuter students
- Increase the number of STEM graduates prepared for research-intensive careers
- Increase the number of research-intensive majors within STEM departments
- Strengthen biology's existing program

Commuter students are a growing and welcome population at Valpo, but they often have a lower retention rate than residential students. In the years before EPIC began, Valpo had an average graduation rate of 60 percent for commuter students, compared to 71 percent for the overall student population. Jacoby and Garland (2004) identify the unique issues of commuter students as transportation, having multiple life roles, integration of support networks, and achieving a sense of belonging. Commuter students are likely to work more hours on and off campus than residential students (Burlison 2015). Other factors, such as students' socioeconomic or minority status, also are predictive of student success. Mayhew and colleagues (2016) report on reduced cognitive and intellectual gains for first-generation students compared to other students in relation to extracurricular activities and fewer hours of work per week; for low-income students compared to high-income students when provided with curricular opportunities (e.g., honor's work, research); and for students of color compared to white students as related to commuter status (along with other factors).

Of Valpo's 33 EPIC students, 14 were commuter students, 10 were underrepresented minorities, 14 were low income, and 15 were first-generation undergraduate students. Almost 80 percent of the students came to the university with at least one major risk factor for attrition from STEM; 64 percent with more than one. Among the EPIC students who were commuters, 79 percent had multiple major risk factors for attrition when they started

at Valpo. As EPIC seeks to increase commuter student retention and career preparedness, it also focuses on STEM students, particularly those in the following majors: biology, chemistry, biochemistry, computer science, mathematics, meteorology, physics, and astronomy. In the United States, less than 40 percent of students who enter an undergraduate institution in a STEM field complete a STEM degree (Olson and Riordan 2012). Indeed, at Valpo there has been a marked difference in the first-to-second year retention rate of non-STM students staying in their majors (85.3 percent) when compared to STM (students in science, technology, or mathematics, but not engineering) students (65 percent). The four-year rate for retention was 70.4 percent for the general student population, but only 44.1 percent for STM students. There was a need not just for attention to commuter students and STM students, but most particularly to STM commuters, who had the lowest four-year retention rate at 36.3 percent. These data inspired the development of the EPIC program.

Overall retention within the EPIC program was 27/33 (81.8 percent). Retention of the recruited EPIC scholars at the university, including two who switched to non-EPIC majors, was 29/33 (87.9 percent). Valpo's average first-to-second year retention rate for non-EPIC STM students of the three corresponding time periods (2017, 2018, 2019) was 63.5 percent. In contrast, the first-to-second year retention rate for EPIC STM majors over the same time period was 81.8 percent. The university's recent STM graduation rate was 46 percent. The 2017 EPIC cohort was on track for a four-year STM graduation rate of 81.8 percent. All EPIC scholars who stayed in STM to the second year will graduate in four years or less. Another of EPIC's goals was to increase the number of research-intensive majors on campus. With the addition of EPIC scholars, the number of research-intensive biology students increased by 25 percent. The EPIC program also has inspired the College of Arts and Sciences to explore a college-wide research-intensive option, opening the door to research-interested students in 38 departments.

## Program Components

### *Academic Integration*

The fundamental component of the EPIC program is academic integration, which is promoted through engagement in long-term research projects and the guided development of relevant supporting skills. Students who engage in undergraduate research report gains in independence, motivation to learn, and active participation in subsequent coursework (Lopatto 2007). These improvements are significantly stronger for students from traditionally underrepresented groups (Jones, Barlow, and Villarejo 2010; Lopatto 2007; Russell, Hancock, and McCullough 2007). Tinto (2012) emphasizes that the early years are critical to supporting and involving students. The National Academy of Sciences recommends that "All students should be encouraged to pursue independent research as early as is practical in their education" (National Research Council 2003, 9). Therefore EPIC students were encouraged to join research groups during their first year at Valpo.

All EPIC students participated in academic-year research, at least by their second year. For most students, this involved joining a research group as a first-year student, attending lab meetings, and participating in data collection. Students registered for one research course credit per semester. This gave students six to eight research credits by graduation. All members of the EPIC leadership team also were research advisers, and there were additional faculty members who had EPIC research students. Faculty members outside of the advisory board were provided a summer stipend to incentivize participation. As students progressed through the program, they became mentors for the younger students in the lab. The older students in the lab groups offered not only research guidance but also tips on studying and navigating the university. At times, EPIC faculty took advantage of this natural peer mentoring structure to encourage study groups for courses in which multiple EPIC students were enrolled, such as introductory chemistry or biology.

EPIC provided students four academic years and one summer of research opportunities. Most students did their summer research between their second and third years. Three students chose to do two paid summers of research. The benefits of extended research experiences and the postgraduation effects of undergraduate research also are documented in the literature. Science students participating in long-term, faculty-led undergraduate research have higher graduation rates and success in the STM pipeline (Hernandez et al. 2018). After graduation, students who have engaged in research are more likely to pursue a PhD in a STEM discipline (Bauer and Bennett 2003; Carter, Mandell, and Maton 2009; Eagan et al. 2011). Additionally, they perform better in STEM graduate programs across multiple measures, including duration, autonomy, motivation, and collaboration (Gilmore et al. 2015).

Students who participate in summer research are involved in the broader summer undergraduate research program at Valpo. This includes multiple initiatives, such as improving communication and presentation skills, professional ethics, career exploration, and building the cohort. Valpo's summer research program incorporates social outings such as a baseball game, a cookout at the Indiana Dunes National Park, and pizza lunches. Students present their research, even in the early stages, at weekly brown-bag lunches. The summer culminates with a poster symposium on campus. EPIC students attended these activities along with other students involved in the summer research program.

**TABLE 1. Summary of EPIC Program Components**

| Activity | Frequency | Primary objective focus |
|---|---|---|
| Research immersion | Ongoing | Retention/Career prep |
| Faculty mentoring | Ongoing | Retention |
| Cohort meals | Monthly | Retention |
| Field trips | Twice yearly | Retention/Career prep |
| Fall retreat | Yearly in fall | Retention |
| Summer research | At least once per student | Career preparation |

One of the most immersive academic and social experiences for EPIC students is the opportunity to present their research findings at scientific conferences. The Indiana Academy of Science annual meeting gives EPIC students the chance to experience a professional scientific meeting. In addition to poster presentations of their own work, students attend lunch seminars and oral presentations and are given networking opportunities. Students attend group dinners and engage with faculty in an off-campus, casual atmosphere.

### *Social Integration*

Social interactions are important to retention efforts, and evidence indicates that faculty-student interactions should begin early in a student's undergraduate experience (Grant-Vallone et al. 2003; Krause 2007; Levin and Levin 1991). Tinto (1987, 2012) described the importance of peer group interactions and extracurricular activities as crucial components of the academic experience. Krause (2007) found that commuter students viewed small groups and out-of-class settings as better environments for peer socialization. She also found that commuters underutilized on-campus opportunities for socialization. The study reiterated the importance of social involvement for first-year retention. EPIC paid special attention to developing students' sense of community and purposefully integrated both commuter and residential students into the program. Social and academic integration activities began in the first weeks of the first semester. Table 1 highlights the academic and social integration activities the program has offered.

Cohort building began early in the first-year fall semester with an overnight retreat and continued organically through research experiences and also planned monthly gatherings, field trips, and a spring cookout. The retreat proved to be an important introductory activity that was well-received by students, with returning students continuing to attend in later years. Students were taken to an off-campus location that had dormitory-style rooms, a kitchen and dining area, and a nice outdoor space. Icebreaker activities and, with older cohorts, Q&A sessions encouraged peer relationships and mentoring. Faculty who were involved in the grant or serving as research advisers also attended.

After the retreat, cohort building continued through monthly gatherings. Some months a meal was provided and on other occasions an activity was planned, such as pumpkin or ornament decorating during the holidays. These gatherings occurred on campus to encourage commuter participants to spend more time on campus and engage in a way they might not otherwise. There also were off-campus activities such as field trips and picnics. With one or two gatherings per month, students were not overwhelmed but still had frequent interactions with each other. Finally, EPIC students were matched with faculty mentors (someone other than their research adviser) in their first semester, encouraging student-faculty relationships from the beginning. Students and their mentors had regular meetings (at least once a semester) as long as they remained in the program.

## Method and Analysis

Over three years, three cohorts of undergraduate STEM students were enrolled in EPIC, for a total of 33 scholarship participants. Methods used to evaluate program objectives included EPIC recruiting and retention data, focus groups conducted with EPIC students, and student surveys administered to all STEM majors (EPIC and non-EPIC) in 2019.

### *Recruitment and Retention*

EPIC exceeded its enrollment goal of providing scholarships to 30 students over three years. According to EPIC students, the admissions staff was their number one source of information about the program. The EPIC leadership team intentionally built relationships with undergraduate enrollment leadership during the first year of the program, while recruiting the first cohort. EPIC leadership team members met with the staff who supervised admission counselors, managed recruitment communication, and planned visit days multiple times throughout the year.

University leadership that supervised admission counselors helped counselors identify and spread the word about the EPIC opportunity to prospective students. The admissions communication manager offered assistance and tips for communication with prospective students about EPIC.

**TABLE 2. EPIC Applicants and Participants**

| EPIC demographics | EPIC applicants | EPIC participants |
|---|---|---|
| Gender | 58.0% female | 48.5% female |
| First-generation undergraduate | 25.2% | 45.5% |
| Underrepresented minority | 21.0% | 30.3% |
| Commuter | 31.9% | 42.4% |

**TABLE 3. EPIC Program Retention Comparison**

| Student cohort | Valpo retention rate |
|---|---|
| General student population (four years) | 70.4% |
| All STM majors (four years) | 44.1% |
| All STM majors who commute (four years) | 36.3% |
| EPIC STM majors (over three years) | 81.8% |

The EPIC leadership team also worked with the admissions visit day team to work EPIC interviews into an already planned visit day. EPIC leadership maintained these admissions staff relationships for the duration of the grant period, and the program was able to reach prospective students from targeted recruitment categories.

Applicants to the EPIC program included the targeted categories of first-generation students, underrepresented minorities, and commuters. The selected participants who accepted EPIC scholarships reflected this diversity (see Table 2). The acceptance rate for EPIC applicants ranged from 24 percent to 28 percent over three years. Almost two-thirds of all EPIC students entered Valpo with multiple risk factors for attrition, not only from STEM, but from the university as a whole. The percentage of EPIC students who had multiple major risk factors for attrition jumped to 79 percent when including only the commuter population.

Thirty-three total students participated in the EPIC program. Three EPIC students left the university prior to graduation. Another three left the EPIC program due to a change of major but remained at the university. Two EPIC students graduated early. The remaining students were on track to graduate in four years. All EPIC participants were STM majors while in the program. The retention rate after three years was 81.8 percent. Although the university tracks retention rates at the four-year mark, EPIC program participants at three years were exceeding four-year retention rates for the general population of students, as well as the higher-risk categories of STM majors and STM majors who also commuted. Table 3 lists the retention rates at Valpo for these populations.

### *Focus Groups*

Focus groups were conducted with each cohort of EPIC students during spring semester each year. Guides for group moderators were developed each year to reflect changing concerns, to explore differences between EPIC and other STEM survey respondents, and to discuss program outcomes.

The focus groups had six to twelve participants. Discussions ranged from 60 to 90 minutes in length. Students convened in a central conference room, where food was provided. Focus groups were conducted via Zoom by the external evaluator. Discussions were recorded, transcribed, and analyzed to explore themes, with special attention to extensiveness, intensity, and specificity of comments. Qualitative analysis included axial coding to identify themes, level of agreement and disagreement between participants, and frequency of opinion change among the students.

### *STEM Surveys*

In fall 2019, a survey was developed and administered to all Valpo STEM majors. The survey addressed decision factors for choosing STEM majors and opinions about the importance of professional and research skills to STEM career success. Students rated current abilities, research experience and interest, Valpo experiences, career goals, and their growth mindset. Demographics were collected. The survey was administered to 1,023 students, and 328 completed it, for a response rate of 32.1 percent. Comparisons of STEM student experiences and attitudes with those of EPIC participants ($n$ = 17) were conducted to explore the impact of the EPIC program on social and academic integration and other variables.

**TABLE 4. STEM Survey Demographics by Respondent Group**

| Demographics | All STEM majors | EPIC participants |
|---|---|---|
| Gender (female) | 49.3% | 62.5% |
| Race (white) | 89.9% | 81.3% |
| Ethnicity (Hispanic) | 6.6% | 12.5% |
| First-generation undergraduate | 22.2% | 37.5% |
| Commuter | 19.9% | 37.5% |

The demographics of the survey responders can be found in Table 4. Nearly a quarter of respondents reported that they were first-generation undergraduate students (22.2 percent). About 20 percent of respondents reported that they lived off-campus and were commuters. Seventeen survey respondents (6 percent) reported that they were EPIC scholarship recipients. EPIC respondents were more likely to be female, underrepresented minorities, Hispanic, first-generation undergraduates, and commuters than other STEM respondents. It is interesting to note that 44 percent of EPIC respondents said that the EPIC scholarships enabled them to live on-campus.

Overall STEM survey responses were compared to EPIC responses. Mean scores, frequencies, and percentages were calculated. Analysis was performed with two-tailed independent samples *t*-tests (95 percent confidence interval) to determine the significance of rating differences between EPIC and STEM respondents. STEM attitude surveys were reviewed (Graham and Caso, 2002; Hoegh and Moskal, 2009) to determine whether validated instruments existed that could succinctly capture the unique constructs of interest to the EPIC program without significantly increasing the evaluation burden. Researchers were interested in STEM experiences and attitudes and the importance of skills like teamwork and research experiences to STEM careers. The authors did not develop and validate a new scale for the STEM survey because of a limited evaluation budget. However, to ensure that the items used addressed the goals of the project, internal consistency of the constructs was reviewed using SPSS to calculate Cronbach's alpha.

A Cronbach's alpha of 0.673 on the importance of STEM skills and experiences showed that the items used did not have good internal consistency. The authors also explored internal consistency by examining individual item responses to confirm that they agreed with each other. It is interesting to note that teamwork skills had a corrected item-total correlation of just 0.195.

When this item was removed, Cronbach's alpha improved to 0.689. Future study of the items with factor analysis or principal components analysis should be undertaken to ensure unidimensionality. A Cronbach's alpha of 0.766 was achieved on ratings of STEM abilities, showing good internal consistency. The authors again checked internal consistency by examining individual item responses to confirm that they agreed with each other.

## Results

### *Focus Groups*

Annual focus groups revealed that the EPIC experience has had an impact on participants. It has helped them apply their classroom learning, increase confidence, build a social group for support, bond with faculty, understand research, explore career options, and prepare for future educational opportunities.

> I know a lot of people who want to do research but then there isn't enough advisors for them, they don't have enough time for it, so . . . having the opportunity to do research is an advantage.

> For me, the biggest thing was just the research exposure. Having, earlier on, the training from professors that have been doing this for 10, 15, 20 years to say, 'These are the books you go to, these are the websites you go to, this is how you tell if it's a credible source.'

EPIC students acknowledged the advantages of getting to know faculty and upper-class students well through research projects and mentoring. They acknowledged additional perks of research experiences like the use of equipment at national laboratories, having a place to work while on campus, and traveling to present at conferences. Students expressed some surprise at the discovery that instructors were approachable and helpful.

> I've gained info compared to other students that I otherwise would have not had, just because I had that one-on-one experience with the professor outside of just asking questions about class or something like that. I'm kind of working with them almost as a colleague, to some degree. So, it's definitely a good experience in that regard.

The simplicity of the EPIC model that allowed students to engage in research early and throughout their

undergraduate experiences also had some cascading effects on the general population of STEM students. EPIC students modeled the benefits and importance of research experiences.

> I would say it gave me a head start. A lot of the time when I was working on assignments in classes, I would find myself not really struggling with it, and I would find myself helping other students that I would work with on the project. That's how I started being a TA, just because I was able to excel in them. It felt like I just had a one-year advantage on them.

Three students from one cohort reported that they were able to present at a conference held at Valpo during their first year. This was perceived as an exceptional experience for first-year students. Another student talked about other students asking questions about research experiences. There is some status given to first-year students participating on research teams.

> I think for me, especially with chemistry, it helped me build a lot more confidence, especially with doing lab work. A lot of the professors complain that students don't really get enough practice actually doing lab procedures. With research, that's all we do. So, it's nice to have that confidence and a lot more experience in lab. I also like that we kind of get to work a lot on scientific writing. Especially getting things like posters and presentations, we learn how to actually write what your research is about, and you learn how to explain it to people who aren't experts in the field.

Three students said they didn't have substantial interest in research experiences before EPIC. For some, the EPIC program increased their interest. For two students interest in research was a motivating factor for EPIC participation from the beginning. EPIC students also reported that an unintended consequence of research experiences was finding out what they do not want to study.

> Yeah, for me it was the experiences to help . . . just guide me in what I wanted to do so I wasn't graduating college and then hating the job or hating the grad program that I was going to be going into. It gave me an opportunity early on to say, 'Hey, you thought you wanted to do meteorology research for the rest of your life, and now you did it when you were 18 and you didn't like it. You should maybe find something else to do.'

> Mine is the opposite . . . being able to research confirmed what I wanted to do. It was after last summer where I did the summer of research through EPIC where I was like, 'Yeah, I want to do research as a career.' I actually read several articles at the time, who I didn't know, but now will be my adviser for grad school.

Students acknowledged the value of early research experiences, but also commented on the added value of having a cohort and structured activities. This gave students a peer group that many first-year students lack or must create themselves.

> It's pretty nice having a sort of social group that you can go to. It definitely helps keep you more engaged on campus, especially for us commuters. As soon as you're done with class, you pretty much just want to go home, but I've definitely gained friends and a social group that I can hang out with and we can talk about classes and actually engage with one another.

Six students said that EPIC met their expectations, although most agreed that they did not know what to expect at first. Every student agreed that the program had increased their confidence. Five students agreed that EPIC had increased their professional skills. When asked what it meant to be an EPIC student at Valpo, one focus group participant said, "I think being an EPIC student you get opportunities and real-world experiences. And you also have a support group that is going through it all with you, which is nice." Another summarized it this way, "I'll have more opportunities to become involved and one of those opportunities of course is research, but not just that, but also become more involved in campus life in general."

### *STEM Surveys*

*Academic Integration*. EPIC students rated the importance of six professional experiences to successful STEM careers higher than other STEM majors and also commuters across all factors on a five-point Likert scale (Table 5). EPIC students had professional experiences as part of their undergraduate programs, including early research experiences, funding for summer research, participation in research teams, opportunities to present and to publish, and work with assigned mentors. To test the hypothesis that EPIC respondents rated professional experiences as important to successful STEM careers, two-tailed, independent samples *t*-tests were performed for each of the six experiences. Distributions were sufficiently normal for the comparisons. The assumption of homogeneity of variances was tested and satisfied with Levene's test. Research experiences ($p = 0.179$), professional publications ($p = 0.184$), and internship ($p = 0.133$) comparisons approached significance. When commuters who were STEM majors were compared to non-commuters, none of the ratings were significantly different ($p < 0.05$).

*Research Interest*. STEM majors were asked additional questions about research, including their interest in conducting research as a part of STEM programs at Valpo. Interest in conducting research was rated on a five-point Likert scale, from "not at all" interested to "extremely" interested. Interest of university STEM majors in conducting

**TABLE 5. Importance of Professional Experiences**

| Professional experiences | STEM majors | | EPIC students | | Commuters | |
|---|---|---|---|---|---|---|
| | $\bar{x}$ | s | $\bar{x}$ | s | $\bar{x}$ | s |
| Internships | 4.25 | .805 | 4.56 | .512 | 4.15 | .937 |
| Scientific writing | 4.03 | .752 | 4.25 | .805 | 4.12 | .732 |
| Professional publications | 3.22 | 1.008 | 3.56 | .892 | 3.40 | .141 |
| Professional presentations | 3.67 | .952 | 3.88 | .719 | 3.80 | .917 |
| Teamwork skills | 4.54 | .716 | 4.69 | .479 | 4.56 | .725 |
| Research experiences | 3.81 | .920 | 4.13 | .619 | 3.85 | 1.036 |

*Note:* $\bar{x}$ indicates average rating and s indicates the standard deviation. Numbers are based on a five-point Likert scale, with 1 being not important and 5 being extremely important.

research as a part of their STEM majors was substantial, with 63 percent of STEM students saying they were "very" or "extremely" interested in research experiences, compared to 94 percent of EPIC students with the same levels of interest. To test the hypothesis that EPIC respondents were significantly more interested in conducting research at Valpo, a two-tailed, independent samples *t*-test was performed. Distributions were sufficiently normal for the comparison. The assumption of homogeneity of variances was tested and satisfied using Levene's test. EPIC students were significantly more interested in conducting research ($M = 4.63$, $SD = 0.500$; $t(235) = 2.584$; $p = 0.010$) than other STEM majors ($M = 3.86$, $SD = 1.182$). Effect size was calculated with Cohen's *d*. The strength of the relationship was large ($d = –0.8484$). STEM commuters and non-commuters also were compared. Ratings were not significantly different ($p < 0.05$).

*Social Integration*. STEM majors were asked about three EPIC grant experiences that were implemented to increase commuter success and retention:

- How often have you had the opportunity to participate in activities that increased your feeling of community at Valpo?
- How often have you had the opportunity to spend additional time with STEM professors beyond the classroom?
- How often have you had the opportunity to stay on campus outside of class time?

STEM majors were asked to rate the frequency of these three experiences on a five-point scale, from "never" to "very often." STEM students had a mean score of 3.95 (often) on how frequently they were able to stay on campus outside of class time, compared to 3.88 for EPIC students. A two-tailed, independent samples *t*-test revealed no significant difference ($p = 0.998$). When the commuter status of STEM majors who may or may not have been EPIC students was evaluated, frequency of time on campus outside of class time was significantly different ($p < 0.01$). Commuter students spent significantly less time on campus outside of class ($M = 3.90$, $SD = 1.159$; $t(237) = 3.538$; $*p = 0.000$) than other STEM majors ($M = 4.44$, $SD = 0.916$), as expected. Effect size was calculated with Cohen's *d*. The strength of the relationship was medium ($d = –0.5169$).

STEM majors reported about the same level of access to faculty as EPIC students, with mean ratings of 3.53 for the former and 3.63 for the latter. A two-tailed, independent samples *t*-test was not significant ($p = 0.942$). When university STEM majors who did not commute ($M = 3.37$) were compared to STEM commuters ($M = 3.50$), differences again were not significant ($p = 0.446$) on a two-tailed independent sample *t*-test. It is interesting to note that commuters reported slightly more time on campus with instructors outside of class than their counterparts who lived on campus or within walking distance.

University STEM majors reported slightly more opportunities to participate in activities that increased feelings of community at Valpo than EPIC students, with mean ratings of 3.95 for STEM majors and 3.88 for EPIC students. The opportunities to participate in activities that increased feelings of community were not significantly different ($p = 0.715$) according to a two-tailed, independent samples *t*-test. When STEM students who did not commute ($M = 3.86$) were compared to STEM commuters ($M = 3.75$), the difference again was not significant ($p = 0.412$).

## Discussion

The authors were fortunate to receive a second NSF award (EPIC+; NSF award #2129206) to continue the program. Lessons learned during the first program will lead to some changes in the second iteration. The original EPIC grant provided a four-year research experience. EPIC+ moves from four years to six semesters, allowing first-year scholars time to acclimate to the university before taking on additional responsibilities. It also will allow student scholars to study abroad. Another change will be elimination of student writing circles. The concept of working on writing

in small pieces works well for faculty, but students did not find it helpful. This component was eliminated after the second year of the grant.

Trips to graduate schools and local industries in the first iteration of EPIC had mixed success. Given the diversity of scholars and majors, it was difficult to find a location with broad appeal. In contrast, EPIC+ will capitalize on offerings from the Valpo Career Center. Faculty will take small groups of second-year students to Valpo's annual on-campus career fair and show them how to engage with potential employers. In their third and fourth years, scholars will attend various Career Center seminars on mock interviews, resume building, and business etiquette and networking.

The off-campus retreat will focus on community-building activities that allow EPIC+ scholars to bond as a cohort without the usual campus distractions. This retreat has been a very successful part of the EPIC program, with an almost 100 percent attendance rate, even in older cohorts, and student satisfaction rated highly on post-retreat surveys. The retreat has been a nice way for the faculty and students to bond, and for students to engage with faculty off campus.

Students had two mentors in the program, a research adviser and an academic mentor. The mentors met with their mentees on a monthly basis to check on academic and social integration. Having two different faculty members gave students multiple points of contact from which help could be obtained when needed.

Selection for the EPIC program was done via an online application with an essay, followed by an invitation to participate in an on-campus scholarship day interview. A similar process is recommended for anyone considering implementation of a comparable project. The selection process gave students pride in being chosen as EPIC scholars, and that pride was reflected in high engagement and involvement in program activities. Other initiatives on campus that do not have a scholarship day interview do not see the same level of commitment to their programs.

## Conclusion

EPIC has been effective in supporting program participants financially, socially, and academically by targeting experiences and opportunities identified in the literature as key to retention. These opportunities were centered around four academic years and a summer of undergraduate research, supplemented with cohort-building activities and faculty mentoring. Despite carrying a number of risk factors for attrition, participants have had higher retention rates than other Valpo students and have indicated more positive responses to research and attitudes related to STEM. These gains have been achieved in a short period of time for traditionally high-risk categories of students, including commuters, first-generation undergraduates, underrepresented minorities, and female STM students. The EPIC program has demonstrated a leveling of the playing field and has given student participants advantages as many of them proceed on to research careers.

## IRB Statement

This research was approved by Valparaiso University's Institutional Review Board (IRB) #16-081.

## Conflict of Interest Statement

The authors have no conflict of interest to declare.

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