

How NSF S-STEM Scholarship Students Experience College During COVID-19:

Lessons to Improve STEM Education

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Abstract

Everett Community College (EvCC) made numerous changes to retain and support students enrolled in science, technology, engineering, and mathematics (STEM) education during the coronavirus pandemic. Drawing on insights from EvCC faculty and staff affiliated with a National Science Foundation (NSF) S-STEM scholarship grant called the “EvCC STEM Scholar” program, as well as interview data gathered from 23 EvCC students, this article reports on curricular and co-curricular changes to better meet student needs during COVID-19. Results reveal efforts EvCC faculty and staff took to keep students on track to complete the STEM pathway and how students experienced those college during the peek of the pandemic. The article concludes with lessons learned and plans made by EvCC faculty and staff to improve STEM education in the future.

Located in the Puget Sound where the first official casualty of COVID-19 was reported in the United States in March 2020, Washington state's quarantine pre-empted life in ways unseen since the 1918 pandemic (Somodevilla, 2021). On March 23, 2020, Governor Jay Inslee issued the "Stay Home, Stay Healthy" mandate forcing the closure of all non-essential businesses, banning all gatherings for social, spiritual, and recreational purposes, and requiring every Washington resident stay home unless performing essential activities (Inslee, 2020). In response, community and technical colleges across the state, including Everett Community College (EvCC), made numerous changes to help keep students in college and on track to graduation.

This article describes changes EvCC faculty and staff made to support students in the science, technology, engineering, and mathematics (STEM) pathway. Drawing on data gathered from an evaluation of a National Science Foundation (NSF) S-STEM scholarship program called the "EvCC STEM Scholar" program, including qualitative data gathered on student experiences during the pandemic, this study shows how students stayed engaged in college, transferred and progressed in STEM education. The article concludes with lessons learned by EvCC faculty and staff about how to better meet student needs during and beyond COVID-19.

The Need to Improve STEM Education at EvCC

In 2017, EvCC was successful in securing an NSF S-STEM grant to improve access and success academically-talented, low-income domestic students in STEM education. The college's grant application presented concerning figures on student populations underrepresented in STEM occupations in the district, recognizing the need to improve the economic and social well being of the citizens who reside there (Washington STEM, 2017). According to EvCC's NSF proposal, the recruitment of underserved populations to STEM education would diversity viewpoints, approaches and skills that would, in turn, increase

innovation (Hewlett, S. et al, 2013) and enhance job performance in the STEM workforce (Bourke, 2016; Levine & Stark, 2015).

In the absence of a STEM-ready employees, local businesses tended to recruit trained employees from outside of the state, overlooking residents who desired and needed a chance to secure good jobs in the area. This problem was especially apparent in the city of Everett where 48 percent of households struggled to afford housing, child care, food, transportation, and health care, and where only 1 of 15 lived above the poverty level (The United Way, 2015), according to EvCC's NSF S-STEM grant application. About a third of Snohomish County families where EvCC is located experienced similar challenge (U.S. Census Bureau, 2015), creating the perfect storm for detrimental effects when the pandemic hit in 2020.

Cognizant of these serious concerns, EvCC sought to use NSF S-STEM grant funds to remove barriers that impede low-income students, including women and students of color, from accessing and succeeding in a STEM education in college. By making curricular and co-curricular changes to enhance the STEM pathway, EvCC could create more equitable access for a diverse group of learners who would be unlikely to enroll and prepare these students for living-wage employment jobs in the district's STEM workforce.

EvCC's Vision for Improving the STEM Pathway

From the start, EvCC saw the 5-year NSF S-STEM grant as a comprehensive financial, academic, and non-academic program to improve the STEM pathway. Aligned to NSF's requirements, the S-STEM grant requires scholarships enable "low-income, talented domestic students to pursue successful careers in STEM... [and] contribute to the American innovation economy with their STEM knowledge" (NSF, 2021, para. 6-7). Consistent with this mandate, the EvCC STEM Scholar program targeted low-income, talented domestic students, with an

intentional focus on women and racially minoritized students who would be unlikely to attend college and major in STEM without scholarship funding. All students recruited to the EvCC STEM Scholar program experienced services designed to overcome barriers to college access and success required to prepare for and enter into a STEM career (James & Singer, 2016).

Also according to NSF grant requirements, S-STEM grants must be split between student scholarships and programming, with up to 60 percent going to student financial awards and 40 percent to curricular and co-curricular programs and services. The theory of change undergirding S-STEM is that needs-based student scholarships coupled to education-focused strategies will enhance college success for students who would otherwise be unlikely to begin and finish a STEM education (Herbaut & Geven, 2020). The strategies that grantees are encouraged use to retain students and promote their success include mentoring, student cohorts, undergraduate research, and student travel to professional conferences (August, Rollins, Tymann, & Pauley, 2020).

Though limited research exists, a recent study conducted by Rodriguez, Espino, Le and Cunningham (2021) showed S-STEM scholarship recipients achieved “financial freedom and an ability to focus on engineering identity” (p. 1). These outcomes were associated with increased student and faculty engagement that was encouraged by the S-STEM program. Rodriguez et al. concluded S-STEM programs offer lessons for community colleges to broaden student access and improve student success in STEM pathways.

Instrumental to EvCC’s implementation of S-STEM was an institution-wide effort to address systemic inequities in five areas: 1) access, 2) aspiration, 3) engagement, 4) achievement, and 5) economic progress (Everett Community College, 2020) (see Table 1). Known as the five dimensions of equity, this framework is applied to EvCC policy and practice

to facilitate access and success for low-income, racially minoritized, and other historically underserved student populations. These five dimensions were intentionally and strategically integrated into the EVCC STEM Scholar program to help ensure that the college will provide more equitable access and outcomes for underserved students in the STEM pathway.

Insert Table 1 about here

Also, college-wide implementation of guided pathways (Bailey, Jaggars, & Jenkins, 2015) began in fall 2016 when the college applied for the NSF S-STEM grant. As one of five early adopter colleges of guided pathways in Washington state (Washington SBCTC, n.d.), EvCC aligned the S-STEM scholarship to the equity framework as well as guided pathways to address systemic inequities affecting racially minoritized and other historically underserved populations and improve the STEM pathway.

Key Components of the EVCC STEM Scholar Program

A summer bridge program is foundational to the EVCC STEM Scholar program. The bridge recruits high school students matriculating to the community college into preparatory curriculum and co-curricular supports designed to ready students to begin college-level classes in the fall term. Co-curricular services include non-cognitive skill training; TRiO and MESA supports, including consistent check-ins, early warning for academic performance, and transfer and career planning; and experiential learning, including field trips, guest speakers, and travel for students to attend professional conferences.

By integrating exploratory learning and academic curriculum, including developmental mathematics, with TRiO and Washington Mathematics, Engineering, Science Achievement (MESA) (see Meza, 2019; Washington MESA, 2020, para. 3-4), students were encouraged and supported in their preparation to be successful learners. An important feature of the bridge for

many students was the support they received to be academically ready for college-level course work; the development of greater understanding of college norms and expectations, coming from faculty and fellow students; and the start-up of professional networks that they could draw on through their STEM education and early careers.

Consistent with the NSF S-STEM guidelines, approximately 60 percent of NSF S-STEM funds are awarded in scholarships of \$1,250 per quarter and up to \$5,000 per year to students who meet the following criteria:

- U.S. citizen, national, permanent resident, or other eligible to receive a Pell grant,
- A compelling personal statement of career plans and commitment to graduating in a STEM major,
- A letter of support from a teacher and/or community member who speaks to the student's motivation, time and other resource management skills; and
- A 3.0 minimum GPA.

Students who participate in the summer bridge who meet the GPA requirement are encouraged to apply but students are not required to participate in the bridge to be eligible to apply. Students who complete a College in the High School STEM course, the Accuplacer test for math and English, or alternative math placement using high school transcripts are considered for the S-STEM scholarship, as are students who enroll in STEM classes at EvCC and meet the criteria. Consistently in all S-STEM scholarship decisions by EvCC, priority points are awarded to students of color and women.

In the NSF S-STEM grant application, EVCC set a target of 60 unduplicated students to receive an S-STEM scholarship, with at least 75 percent of these being women and students of color. Of the 60 scholarship recipients, 75 percent would persist from year one to year two at

EvCC, and 20 percent or higher would complete an associate's degree and/or transfer. To date, EvCC has exceeded the number of S-STEM scholarship recipients by 14, awarding a total of 74 S-STEM scholarships through the fourth year of the grant. EvCC has also increased the proportion students of color from 32 percent to 41 percent in overall STEM enrollments and female participation has grown by an even more impressive margin, from 16 percent to 51 percent. Evaluation of the outcomes of STEM scholarship recipients shows year-to-year retention of 84 percent, and a 2-year graduation rate of 41 percent, with many students still enrolled and on track to graduate or transfer. These positive outcomes suggest the STEM pathway at EvCC represents a valuable site for exploring student experiences under any circumstances but especially during 2020 when college education was challenged during the coronavirus pandemic.

Research Questions and Methods

This study examined the EvCC S-STEM program from its launch in January 2017 through the year four of the grant ending in December 2020. As part of the 5-year S-STEM grant, EvCC employed an external evaluator who worked closely with the college's faculty and staff to gather formative and summative data to inform the implementation process, as well as student enrollment and outcomes (i.e., retention, completion and transfer). During 2020, the evaluation included questions on COVID-19 because of the potential impact of the pandemic on students. It was important to understand how students experiences in college in 2020 may be different from what would have happened during a typical academic year.

With this background, research questions that guiding the study during year four of the grant, in 2020, were:

- What changes were made to the EvCC STEM Scholar program during COVID-19?

- How did students experience college during COVID-19, and more specifically, how did they experience the EvCC S-STEM Scholar program?
- What challenges and successes did students experience during COVID-19, and how did they plan to progress toward completing their education and securing a STEM career?

The study included five students who were enrolled in the bridge program in fall 2020; 15 students who had received a S-STEM scholarship at EvCC in spring or fall 2020, with and without participation in the bridge program; and five students who had received a S-STEM scholarship and transferred to a university to continued their STEM education through spring or fall 2020.

This article focuses on qualitative data derived from a triangulated mixed-methods design (Creswell & Clark, 2007) to evaluate the EvCC STEM Scholar program. Using personal interviews with EvCC STEM Scholar students, the study examined aspects of the EvCC STEM Scholar program that changed during the pandemic from the perspective of students. Twenty of the 23 total students were participated in one interview in either spring 2020 (May and June) or fall 2020 (October and November), and three students participated in multiple interviews over the course of the grant, including one or two interviews in spring and fall 2020. Altogether, the students attributed a diversity of experiences and perspectives to their STEM education at EvCC, with the three students who were interviewed multiple times giving the most comprehensive account of the STEM pathway before and during COVID-19.

The interview protocols were customized for each of the three groups, with all protocols beginning with the following open-ended question: “How are you doing during COVID?” This big question allowed students to talk about their lived experience without imposing assumptions,

judgment, or structure (Seidman, 2006). Depending on the response, probing questions were applied to delve more deeply, such as, “How has attending college changed for you?”, and “What aspects of the EvCC STEM Scholar program are similar or different now, during COVID-19, from before the pandemic?”. Two questions asked students to reflect on themselves as students including during the pandemic, and they were, “How have you changed as a student during COVID-19?” and “How do you plan to progress in your STEM education and career goals during and after COVID-19?”

To gather these qualitative data, the interviewer spoke with the students using a telephone or online format. The students’ verbal comments were recorded by the interviewer because of the sensitive nature of health issues associated with COVID-19, with the interview typing notes as the students spoke. This approach was taken to re-assure students that their actual verbal comments could not be shared and while the typed notes provided a record associated with a de-identified transcript, the notes were destroyed after coding and data analysis were conducted, in compliance with EvCC human subject requirements for the grant. Hand coding was used to identify categories and patterns in the data (Creswell, 2014), and a synthesis of findings was shared with faculty, staff and students on the S-STEM grant during 2020 for purposes of member checking (Lincoln & Guba, 1985). A version of these results first appeared in the fourth-year annual report to the NSF (author, 2020) and provided a basis for the expanded analysis and appearing in this article.

Results

The findings reveal student experiences and perspectives on the EvCC STEM Scholar program. The challenges of pursuing a college education in STEM during the pandemic were prominent in the student interviews, and many also described experiences achieving successes

despite changes to their education. Many students who lingered on concerns experienced academic challenges, and some had experienced financial hardship having lost employment on campus or in other jobs. Together, education and employment were often central to the students' experiences persisting through the STEM pathway during COVID-19.

STEM Bridge Students

Numerous curricular and co-curricular changes were made during the pandemic, beginning with the bridge program that was used to on-board high school students during the summer term between high school and college. However, disruptions linked to the pandemic led faculty and staff to delay the bridge from summer to fall 2020 and prompted the faculty to convert the courses to an entirely online format. Another substantial change was to recruit adult learners in addition to traditional-age students while maintaining a focus on females and students of color who were the primary target group for the NSF S-STEM grant. The expansion of student recruitment to students of all ages also recognized the potential impact of COVID-19 on older students who represented a range of challenging circumstances, including experiencing unemployment or low-wage essential jobs, as well as heightened caregiving responsibilities.

Because all of these circumstances were anticipated to try students in ways unforeseen before COVID-19, the faculty and staff decided to develop the concept of "peer tutor-mentors" to integrated into the bridge program. Peer tutor-mentors were selected from more advanced EvCC STEM Scholar students who had participated in previous bridge programs and/or received an S-STEM scholarship. These students were paid at the EvCC student-worker wage rate to engage incoming students to the STEM pathway in peer tutoring, student-to-student advisement, and formal and informal communications to help the bridge students feel comfortable in their new student role and ready to begin college-level enrollment.

Recognizing the abrupt shift to online format, the bridge students tended to express optimism about their performance in the course, with some recognition that the online format was not their preferred learning modality. However, two students explained that they had struggled with online learning during their first term in college, with one student saying,

Yeah, it's kinda like having to teach yourself a lot in the circumstances that we're in.

Learning online isn't my learning style. That messes everything up for me. I tried to do online in high school, and it messed everything up. It's a super rocky path to start [college] on.

The second student commented,

I'm definitely struggling with the online format. I learn better in a format where I can talk to teachers and get answers to my questions. It's unfortunate that the pandemic has disrupted study.

Despite struggles of these two students in online courses, all five students praised the lead instructor in the EvCC STEM Scholar program for her “great support” and for “always trying to help” them overcome challenges. Commenting on the complexity of college-going due to their own or family members’ illness or job loss, the students commended the instructor for helping them solve problems that could have derailed their grades and persistence during the pandemic. They also saw the lead instructor as someone who was eager to help them to make plans for the future and anticipate challenges that could get in the way of their pursuing the STEM pathway.

An especially important aspect of the EvCC STEM Scholar program that differed from the past, due to closures caused by COVID-19 was support services. During 2020, students had far more limited opportunity to participate in TRiO and MESA than prior to the pandemic. This reduced access to student supports affected students’ ability to secure tutoring and academic

services, as well as advising. This is an important finding because these services were identified by prior EvCC STEM Scholar students has a contributing factor to their persistence (author, 2018, 2019). Illustrating the absence of MESA during COVID-19, when the evaluator asked one student in the program program how she experienced MESA, she responded, “What is MESA?” Though not a complete substitute, the students who had access to peer tutor-mentors in the bridge program said they valued their support. These students were appreciative of various academic supports provided by the peer tutor-mentors, including tutoring in mathematics and advising on course scheduling in the next term. Some peer tutor-mentors were mentioned by name as helping the bridge students to complete their first term with good enough grades to feel well prepared for future course work in the STEM pathway.

The S-STEM Scholarship Recipients

All 15 S-STEM scholarship recipients spoke about the importance of various forms of financial awards to support their advancing in STEM, with some saying they would not have been able to stay enrolled during COVID-19 without the NSF S-STEM scholarship or other financial awards. Most students received S-STEM scholarships in addition to Pell grants and other state or institutional scholarships, and they used these combined grants to pay for tuition and fees, books, and supplies, as well as housing, food and other living costs. Illustrative of the relief that many students felt is this comment about the S-STEM scholarship, “I am getting the most financial aid I’ve gotten, and I’m not worrying about paying for college this term. I’m just going to classes and thinking about transferring.” Being able to focus on school without the added pressure of paying the bills was a major contributor to students not only continuing in college but feeling as though they were achieving academically.

To facilitate their ability to complete EvCC and transfer, several students spoke about creating a savings plan with some of their S-STEM scholarship dollars so that they would have money to help pay the higher cost of tuition and fees at a university. This comment was heard by the evaluator prior to the pandemic, but especially prevalent in 2020. Illustrative of this point, one student said,

I try to not to waste my money. If I go to [public university] where it's much more expensive, I'm going to need to budget. It won't be easy but at EvCC I don't have to worry about financial aspects. That's not a factor, and I can focus on the academics."

Similar to this point, several S-STEM scholarship recipients worried about affording college at the university level, a concern that seemed even more acute during COVID-19 than prior to the pandemic though students expressed this concern throughout the NSF S-STEM grant (author, 2018, 2019). Part of this concern was associated with paying for housing, which was moderated by students living at home during COVID-19, but most students were hoping to live on campus once the pandemic was over. To address this concern, some students (especially those interviewed in November 2020) were contemplating transferring to a university located close enough to home that they could continue to reside with their families. Describing this decision as regrettable, some students saw it as their only option to pursuing a bachelor's degree.

Despite their commitment to continuing their education at EvCC or a university, most students said COVID-19 had made college more difficult for them. Looking back over their time at EvCC, the students said they learned how to study and they had worked hard to get good grades in their advanced STEM courses. Taking online courses during COVID-19 had made getting good enough grades to finish and transfer even harder. Advanced mathematics was

prominent in their concerns, though advanced mathematics courses were a consistent worry for EvCC STEM Scholar program students (author, 2018, 2019).

Concerning online learning during the pandemic, some students talked about having to “teach themselves” though they recognized actions the lead instructor of the EvCC STEM Scholar program had made to help them secure tutors. However, a few students used their S-STEM scholarship funds for pay for online tutoring services outside of EvCC, and these services were expensive. One student said she had spent a considerable portion of her scholarship dollars on online tutoring that she estimated at about ~\$100 per hour. Lamenting the loss of on-campus tutoring, one student said,

The tutoring centers are the hardest ones [to lose]... Not having the tutoring center makes me worry about math in the future, if it’s going to be available. I think they have some zoom tutoring sessions but I didn’t take zoom classes. I’m not really sure how it works. I don’t want to have to be in tutoring sessions, but I need help with certain things. I don’t know how it works yet.

Despite these struggles, a few students said they liked online learning even better than in-person instruction, noting they had done well in online courses in the spring and expected to do so in the fall term as well. These students appreciated the flexibility online learning provided, saying they were able to learn on their own schedule while living at home with parents and siblings during the pandemic. A few students said online learning had forced them to improve their time management, which improved their academic performance. Thus, they appreciated not only what they learned but how they learned over the course of 2020. A comment illustrative of this perspective follows:

[COVID] was a big change. I would have never taken an online class before this. I wouldn't do it, but I had to do it. Like the first quarter was more of a change. Even the teachers had a hard time knowing what to do. At the beginning it was even more stressful than now. The library was closed down, the printer was unavailable, but I've gotten more adjusted to it. I have more of a schedule. I'm using my planner more, and I have set reminders on when to do assignments. I'm figuring it out. In the end, it may be helpful...

Reflecting on learning during the pandemic, the S-STEM scholarship students were asked about ways they may have changed as college students. Several thought they were different now, describing themselves as more mature and responsible, and better attuned to their preferred learning modalities. Most recognized how EvCC faculty and staff had helped them stay enrolled in college, describing their S-STEM scholarship as a “down payment” on future success in a STEM major and career. The perspective is apparent in the reflection of one S-STEM scholarship recipient who saw herself as more capable of achieving on her own, saying,

The S-STEM scholarship changed me a lot. The most is really like taking care of my own education and future because before, like in high school, it depended on the counselors and teachers to bail you out. In college it's all about you. You have to seek out your own opportunities. Nobody told me about computer science, but after this year, I know how to take care of myself more, I guess.

The S-STEM Scholarship Transfer Students

A handful of S-STEM scholarship students had transferred by the fourth year of the NSF S-STEM grant, after finishing their STEM course work at EvCC. Three of the five students who were interviewed during 2020 had been part of earlier interviews for the evaluation, providing valuable insights into the STEM pathway throughout but especially during COVID-19. All

transfer students spoke about their experiences as STEM majors at a university and how their learning at EvCC had helped shape learning in their upper-division courses. Despite being successful in their STEM majors at EvCC, all five expressed concerns about instructional approaches, class sizes, and academic supports that made classes more challenging at the university. Some of these differences existed prior to the pandemic, but some seemed to be exacerbated by online learning during COVID-19. Specifically, online instruction at an even quicker pace than EvCC required increased time for studying outside of class, adding pressure to completing assignments on time. Larger amounts of homework were also common at the university level, with some students saying they struggled to get the support they needed to do assignments in small windows of time. Combined with having more limited tutoring and supplemental instruction, some students thought their stress levels had increased at the university compared to EvCC.

Moreover, some students perceived university instructors as having unreasonable expectations with the amount of homework they assigned, possibly believing their online classes would be more rigorous if they increased offline assignments. Though not universal for all five, two students said their university faculty had been less accessible than EvCC faculty, offering that university faculty seemed to find time to meet with graduate students but not undergraduates. Establishing personal relationships with university faculty had been more challenging than with EvCC faculty. Speaking directly to this concern, one transfer student said,

The university is not as personal. I had good mentors at the community college that I adored and who shaped my life and gave me positive encouragement and resources. [The university] professors aren't mentors. If you're a graduate student, they are, but if you are an undergraduate student, they're not. It's a big change. It's very competitive, and I knew

that. I like to do well, but I'm not as competitive [as other university students] so those things caught me off guard.

Universally, the S-STEM scholarship recipients who had transferred had found their education more challenging but they were performing at a satisfactory level to complete their baccalaureate degrees, with some saying their grades were improving as time went on. Some believed having saved S-STEM scholarship money available while attending the university helped them focus on their studies, including playing an important role during COVID-19. The following quote from one S-STEM scholarship recipient who said he had benefited from starting college in EvCC's bridge program by enrolling with other students coming from low-income background. He especially valued the foundational experiences EvCC provided to preparing him for all aspects of college-going, including transferring to a university, saying.

I really liked how I got to start out with a group of kids [in the bridge program] who came from a similar place as me. We're all first generation [college] and lower income so you started out with a group that you belong with. You don't have to be alone. It really helps to have peer support. That's one of the tough parts about being here [at the university]. It's hard to make friends. Students keep to themselves. You feel a little alone a lot of the time.

Later in the interview, this student compared EvCC to the university, saying,

Also at EvCC the classes seemed less intimidating. If we needed help there was a familiar face that we could go to... [But] I feel like I'm more resilient [now]. At EvCC my first hard class -- and I did bad on that class -- I thought 'I'm going to fail and maybe I can't be a science major' but we go through that more and more because the material is hard... If you mess up a few times, you have to get back up and keep studying, keep asking

questions, keep doing your best. I see that in myself a lot more now. I struggle every day, and I still want to do well.

Importantly, all five transfer students thought they were making good progress at a university. They saw the pandemic as a challenge, but something they could take in stride and overcome to complete their degrees. In fact, three of the students were planning to advance to the graduate level, with two students already accepted in graduate school and considering PhD programs in their STEM majors, something completely unknown when they began college in the bridge program. Saying they never anticipated such achievements, they said EvCC faculty and staff had helped pave the way for them by advising them about differences between EvCC and the university, which strengthened their confidence in being able to attain a baccalaureate in their chosen STEM major. These students were also envisioning themselves as successful in STEM careers, noting no one in their families had ever held jobs as engineers or scientists before. They took pride in themselves and gratitude to EvCC faculty and staff who helped them achieve.

Lessons Learned

The EvCC STEM Scholarship program has more than met its goal of enrolling underserved population students (exceeding the target number of S-STEM scholarship recipients by 15; reaching 75 rather than the initial goal of 60). Interviews with students during COVID-19 revealed numerous ways students felt prepared to complete their STEM pathway at EvCC and transfer to the university, including ways faculty and staff rallied together to meet their needs. Despite challenges, the students benefited from EvCC faculty and staff who responded to their concerns during the pandemic, and ensured them that they were prepared and capable of persisting in the STEM pathway. Plans for building a collaborative campus culture was an even higher priority to helping historically underserved students succeed in the STEM pathway

beyond the pandemic.

When COVID-19 hit, the EvCC STEM Scholar program was no longer able to develop a cohort of S-STEM scholars using the summer bridge format so faculty and staff created the concept of “peer tutor-mentors” to support students in the bridge program. Using lessons learned from the evaluation to establish this peer-mentor strategy, EvCC faculty and staff were able to work together with S-STEM scholarship students to support bridge students who were new to college in fall 2020 during the peak months of the pandemic. In response, EvCC faculty and staff were reflecting on what had worked well and what needed improvement to be even more intentional in supporting students navigating the STEM pathway in the future.

The pandemic also reinforced the importance of supporting student learning using many different modalities, including online learning. Students valued virtual instruction that integrated active learning and realistic level of homework to accompany synchronous sessions. To replace field trips and guest speakers that were once a mainstay of the EvCC STEM Scholar program but absent during COVID-19, the faculty focused their attention ensuring students were progressing in their course work and utilizing the S-STEM scholarship to support their persisting in college. They also committed to inviting guest speakers who represent the diversity of EvCC STEM. Again, efforts to enhance collaboration among EvCC faculty and staff was seen as an important way to improve and promote more equitable outcomes in the STEM pathway.

Given the challenges that many community colleges faced during the pandemic, including the faculty and staff at EvCC, lessons on using data to improve programs and services in the STEM pathway emerged during the pandemic. EvCC faculty and staff benefited from information gathered on how students were doing to persist and succeed academically and personally during COVID-19, peaking their interest in finding ways to increase the college’s

capacity to gather and use real-time data. These individuals were particularly attune to gathering data on the kinds of problems students were facing in attempting to stay in college and perform academically in challenging STEM course work. Ensuring students had adequate supports to navigate their academic, social, and personal lives was important during the pandemic, with lessons on how peer tutor-mentors could support new students being valuable when the MESA and TRiO programs ramp up post-pandemic. Finding ways to extend the services of MESA and TRiO to students who face challenges with online instruction and other barriers to on-campus learning, EvCC faculty and staff recognized lasting changes that should be made to address the needs of underserved student populations beyond COVID-19.

Finally, lessons learned from students in the EvCC STEM Scholar program about transfer are useful to enhancing the alignment of EvCC's STEM pathway to STEM majors at universities. Transfer students shared worries about financial challenges, the absence of peers and friends, the lack of interest among university faculty in supporting their success, all raising their appreciation for EvCC. To address these many concerns EvCC and universities need to work together to enhance alignment, articulation and partnerships to improve the STEM pathway all the way from students' entry into college to their baccalaureate completion. Doing so will ensure more underserved students can complete a baccalaureate degree and pursue a STEM career during and beyond the pandemic.

References

- August, S. E., Rollins, S., Tymann, P., & Pauley, M.A. (2020). NSF program officer's views: Overview of changes to the S-STEM and IUSE programs. *ACM Inroads*, 11(3), 15-15.
<https://doi-org.proxy.libraries.rutgers.edu/10.1145/3410479>
- Bailey, T. R., Jaggars, S. S., & Jenkins, D. (2015). *Redesigning America's community colleges: A clearer path to student success*. Harvard University Press.
- Bourke, J. (2016). *Which two heads are better than one? How diverse teams create breakthrough ideas and make smarter decisions*. Australian Institute of Company Directors.
- Cahalan, M., Perna, L. W., Yamashita, M., Wright-Kim, J. & Jiang, N. (2019). *2019 indicators of higher education equity in the United States: Historical trend report*. The Pell Institute for the Study of Opportunity in Higher Education, Council for Opportunity in Education (COE), and Alliance for Higher Education and Democracy of the University of Pennsylvania (PennAHEAD). http://pellinstitute.org/downloads/publications-Indicators_of_Higher_Education_Equity_in_the_US_2019_Historical_Trend_Report.pdf
- Cameron, M., Lacy, T.A., Siegel, P., Wu, J., Wilson, A., Johnson, R., Burns, R., and Wine, J. (2021). *2019–20 National Postsecondary Student Aid Study (NPSAS:20): First Look at the Impact of the Coronavirus (COVID-19) Pandemic on Undergraduate Student Enrollment, Housing, and Finances (Preliminary Data)* (NCES 2021-456). National Center for Education Statistics. Retrieved [date] from <https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2021456>.
- Creswell, J. W. (2014). *Research design, 4th ed.* Sage Publications.

Creswell, J., & Clark, V. L. P. (2007). *Designing and conducting mixed methods research*. Sage Publications.

Cronon, W. (1998). Only connect... The goals of a liberal education. *American Scholar*, 67(4), 73-80.

Everett Community College. (2020). *EvCC's five dimensions of equity*.

<https://www.everettcc.edu/administration/president/5-dimensions-equity>

Herbaut, E., & Geven, K. (2020). What works to reduce inequalities in higher education? A systematic review of the (quasi-)experimental literature on outreach and financial aid. *Research in Social Stratification and Mobility*, 65.

<https://doi.org/10.1016/j.rssm.2019.100442>

Hewlett, S., Marshall, M., Sherbin, L., & Gonsalves, T. (2013). *Innovation, diversity, and market growth*. Center for Talent Innovation

www.talentinnovation.org/publication.cfm?publication=1400

Inslee, J. (2020). *Inslee announces "Stay home, stay healthy" order*.

<https://www.governor.wa.gov/news-media/inslee-announces-stay-home-stay-healthy%C2%A0order>

James, S. M., & Singer, S. R. (2016). From the NSF: The National Science Foundation's investments in broadening participation in science, technology, engineering, and mathematics education through research and capacity building. *CBE—Life Sciences Education*, 15(7), 1-8.

Levine, S. S., Stark, D. (2015, Dec. 9). Diversity makes you brighter, *The New York Times*.

<http://www.nytimes.com/2015/12/09/opinion/diversity-makes-you-brighter.html>

Lincoln, YS. & Guba, EG. (1985). *Naturalistic inquiry*. Sage Publications.

- Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative research: A guide to design and implementation* (4th ed.). Jossey-Bass.
- Meza, E. A. (2019). *Underserved community college students and the complexity of STEM transfer. Data Note 1*. Seattle, WA: Community College Research Initiatives, University of Washington. https://www.washington.edu/ccri/stem_datanote1/
- Rodriguez, S. L., Espino, M. L., Le, B. D., & Cunningham, K. J. (2021). The influence of policy implementation in the Midwest: How an SSTEM program broadens participation and enhances engineering identity for community college students. *Education Policy Analysis Archives*, 29(29), 1-27.
- Seidman, I. (2006). *Interviewing as qualitative research: A guide for researchers in education and social sciences* (3rd edition). Teachers College Press.
- Somodevilla, C. (2021, January 19). First confirmed case of Covid-19 found in U.S. <https://www.history.com/this-day-in-history/first-confirmed-case-of-coronavirus-found-in-us-washington-state>
- U.S. Census Bureau. (2015). *QuickFacts, Snohomish County, Washington*. <https://www.census.gov/quickfacts/table/PST045215/53061>
- Washington Math, Engineering Science Achievement. (MESA). (2020), *Washington MESA about us*. (para. 3-4). <https://depts.washington.edu/wamesa/about-us/>
- Washington State Board of Community & Technical Colleges. (n.d.). History of Washington guided pathways. <http://www.dev.sbctc.edu/colleges-staff/programs-services/student-success-center/history-of-washington-guided-pathways.aspx>
- Washington STEM. (2017). *Consider the facts: Fact sheet*. <https://www.washingtonstem.org/wp-content/uploads/2018/05/Consider-the-Facts-Fact-Sheet.pdf>

Yosso, T. (2005). Whose culture has capital? A critical race theory discussion of community cultural wealth. *Race, Ethnicity and Education*, 8, 69-91.

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Table 1.

Definitions of the Five Dimensions of Equity at EvCC

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1. **Equitable aspiration** allows for students to continuously negotiate multiple contradictory voices to co-create a vision of possible dreams that build self-efficacy and contributes to a just society.
 2. **Equitable access** allows for students, especially historically underrepresented students, to experience a mutually beneficial relationship with the institution to create a true sense of ownership, belongingness, and familiarity.
 3. **Equitable achievement** allows for students to exercise, refine, and acquire capacities that nurture and grow their talent as individuals and as members of a collective. This dimension intends to challenge simplistic notions that achievement equates to individualistic accomplishments (Cronon, 1998).
 4. **Equitable economic progress** allows for students to be self-sufficient individuals and contributing members of society, understanding and negotiating the interdependent relationship between equitable aspiration, economic capital, and community cultural wealth. This dimension challenges the need to sacrifice any of the above for the sake of economic and social mobility (Yosso, 2005).
 5. **Equitable engagement** allows for students to exercise, refine, and acquire capacities that they can use to exert influence within their social, cultural and political contexts to further equity, social justice, and community well-being (Cronon, 1998).
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