2020

**Gateway Scholarships in Biological Sciences: Year 3 Annual Report**

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This report summarizes grant activities, progress toward goals, and broader impacts of the Gateway Scholars Program in the Boise State Department of Biological Sciences during the 2019-20 academic year.
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SUMMARY
The Gateway Scholars Program (GSP) has provided meaningful support for students in the biological sciences through 40 scholarships, mentorship for scholars, a focus on evidence-based teaching practices, encouraging undergraduate research opportunities, risk-based advising, and co-curricular activities designed to support greater understanding of opportunities for biology graduates. These efforts have been described as beneficial by the students surveyed and interviewed for this project.

The grant activities have helped the department identify areas for improvement and to leverage the grant with the university leadership and partners. The major accomplishments and broader impacts of the grant thus far are:

- Increased advising support for biology students through the College of Arts and Sciences (COAS) where biology majors and transfer students with fewer than 14 credit hours are served by the professional advisor Maribel Saucedo-Gonzalez
- Additional Biology advisor, Alex Urquhart (lecturer) provides an extra half-time advisor for majors
- Centralized support for STEM departments to provide outreach to students through early alert (as described in objective 2)
- Created a “student group” to track undergraduate research participation in the student information system
- Established the benefit of an introductory course for Gateway biology majors and subsequently for any biology student
- Collaboration between the GSP leadership team and the biology club has strengthened the co-curricular offerings of the department
- Established mentor training, student engagement, and diversity/inclusion discussion topics as a regular feature of faculty meetings
- The DFW rates in core biology courses are inversely related to the increased use of evidence-based instructional practices (EBIPs) by biology faculty members. This finding is consistent with the scholarship on the use of EBIPs as effective pedagogy for all students (objectives 3 and 5)
- Developed a self-efficacy and professional identity scale specific to the biological sciences (objective 5)

A primary objective of our grant activities was to shift the culture of the Department of Biological Sciences (DBS) to increase learning-centeredness and focus on engaging students. The activities included in this project, in addition to efforts in the department resulting from other funded work, are positively impacting GSP students and other biology majors.
Objective 1: Faculty-Mentored Cohort Program

Objective 1 focuses on establishing and managing a faculty-mentored cohort program that provides scholarships and a coherent ecosystem of support for low-income, academically talented Department of Biological Sciences (DBS) students.

We created the following goals to support objective 1:

1.a. Annually recruit students so that we can maintain 20-25 scholars in our cohort
1.b. Each student will meet with a mentor twice per year
1.c. Provide structures and supports for student-mentor program including:
   1.c.i. Shared focus on SMART\(^1\) goals
   1.c.ii. Mentor readings (e.g., helping students get the most out of college)
   1.c.iii. Hold professionally facilitated mentor training annually
1.d. We will measure performance on this objective through student self-report forms documenting meetings with their mentor

Objective 1 Activities in 2019-20

Student recruitment to maintain 20-25 scholars in the cohort [1.a]

We have recruited and retained a cohort of low-income, academically talented students in each year of the grant to maintain 20-25 students active in the program (see Table 1). Our cumulative retention rate (including students who have graduated) of the Gateway Scholars students is 82.5%, with five students taking a leave of absence and two changing to non-STEM majors. We note that one student’s status remains inactive though they are enrolled part-time in biology. A total of 11 students graduated with DBS degrees, and we recruited eight more students to the program for the 2019 academic year for a total of 40 awards.

Historically, our award was capped at $5,000 for the academic year (two installments of $2,500). In spring 2020, we identified $119,738 of unmet need among the active scholars (N=26). Responding to the financial hardships that increased due to the COVID-19 pandemic (student and family unemployment, moving expenses, changes in educational expenses), we worked with our Financial Aid Office to address students’ unmet financial need. As illustrated in Table 2, for students with unmet needs below $5,000, we met all their needs (N=5). For students with unmet needs above $5,000, we increased their awards up to $10,000 (N=17). We dispersed funds on April 1, 2020, to meet $69,500 of additional existing need for our scholars, resulting in satisfying 85% of the unmet financial need in the cohort (see Table 3).

\(^1\)SMART is an acronym to describe goals that are specific, measured, achievable, realistic, and time-bound.
NSF S-STEM GATEWAY SCHOLARSHIPS IN BIOLOGICAL SCIENCES  7

Table 1 Current Status of Recruited Students

<table>
<thead>
<tr>
<th></th>
<th>2017fa</th>
<th>2018sp</th>
<th>2018fa</th>
<th>2019sp</th>
<th>2019fa</th>
<th>2020sp</th>
</tr>
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<tbody>
<tr>
<td>Active</td>
<td>20</td>
<td>20</td>
<td>27</td>
<td>24</td>
<td>27</td>
<td>22</td>
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<tr>
<td>Changed major to other STEM</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Changed major to non-STEM</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Leave of absence</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Graduated</td>
<td>0</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Senior</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Junior</td>
<td>6</td>
<td>7</td>
<td>10</td>
<td>8</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Sophomore</td>
<td>7</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Freshman</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Total awards</td>
<td>20</td>
<td>20</td>
<td>32</td>
<td>32</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

While our grant does not specify a focus on underrepresented groups in STEM, we are concentrating carefully on ensuring student diversity in our cohort.

Table 2 Additional Grant Funding Distributed in Spring 2020 to Address Unmet Need

<table>
<thead>
<tr>
<th></th>
<th>Count of Awards</th>
<th>Sum of Additional Awards</th>
</tr>
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<tbody>
<tr>
<td>5000</td>
<td>12*</td>
<td>$60,000.00</td>
</tr>
<tr>
<td>3895</td>
<td>1</td>
<td>$3,895.00</td>
</tr>
<tr>
<td>3096</td>
<td>1</td>
<td>$3,096.00</td>
</tr>
<tr>
<td>1645</td>
<td>1</td>
<td>$1,645.00</td>
</tr>
<tr>
<td>816</td>
<td>1</td>
<td>$816.00</td>
</tr>
<tr>
<td>48</td>
<td>1</td>
<td>$48.00</td>
</tr>
<tr>
<td>0</td>
<td>9</td>
<td>$-</td>
</tr>
<tr>
<td>Grand Total</td>
<td>26</td>
<td>$69,500.00</td>
</tr>
</tbody>
</table>

*Includes three students enrolled in 10 credits for the spring semester, which is less than a full-time load, however, extenuating circumstances were taken into consideration in the decision to address their unmet financial need and facilitate continuation in the program.

Table 3 Gateway Scholars Students by First-Generation, Gender, and Underrepresented Status

<table>
<thead>
<tr>
<th></th>
<th>2017 Y1</th>
<th>2018 Y2</th>
<th>2019 Y3</th>
</tr>
</thead>
<tbody>
<tr>
<td>First in family</td>
<td>13 (65%)</td>
<td>15 (47%)</td>
<td>19 (48%)</td>
</tr>
<tr>
<td>Female</td>
<td>15 (75%)</td>
<td>23 (72%)</td>
<td>27 (68%)</td>
</tr>
<tr>
<td>URM</td>
<td>9 (45%)</td>
<td>11 (34%)</td>
<td>13 (33%)</td>
</tr>
<tr>
<td>% Need met</td>
<td>25%</td>
<td>23%</td>
<td>85%</td>
</tr>
</tbody>
</table>

Note: These data are cumulative regardless of active S-STEM status. % need met is based on data reported to FAFSA (% Need met by NSF S-STEM Scholarship = NSF Scholarship award/(COA - EFC))

*Cost of Attendance (COA); Expected Family Contribution (EFC)
Our plan for recruiting calls for us to draw from the students who apply for a scholarship through Boise State’s general pool. The students must have Biological Sciences as their declared major, meet financial need requirements (PELL eligible) based on data reported in their FAFSA form, and have a GPA of 3.0 or greater. For our Fall 2020 recruiting, we are focusing on our goal to assist students who are currently biology majors that have unmet financial support needed to complete their degree; all of our 2020 awardees are continuing students in the GSP.

We have offered a $5,000 award to each of 24 eligible students (based on academic merit and financial need according to their application and FAFSA information). We anticipate awarding $120,000 if all students accept and if their eligibility has not changed. All the potential awardees are continuing GSP scholars.

As we were unable to conduct a focus group interview given the COVID-19 crisis, we used a brief survey with open-ended questions. One question asked how students would characterize the financial impact of the Gateway Scholars financial support. Their responses highlighted the way this funding is helping them to focus on their studies, participate in supportive learning environments, reduce the amount of tuition they need to cover through employment, and work toward their career goals (see text box below).

“The financial impact of the scholarship was transformative. My career at Boise State University would not have happened without it.”

“The money I have received is only one of many great aspects of the program and it has significantly helped reduce the financial stress of attending college.”

“This scholarship is essential in allowing me to continue my education, and work towards achieving my academic goals. Without this scholarship I would not be able to pursue the wide range of opportunities that I have, such as participating in research. This scholarship allows me to focus on my education, and provides me financial support to gain the most out of my academic career. Without this scholarship, I would be required to spend a lot more time working and would not be able to be involved in as many campus functions, just to be financial [sic] stable.”

Student-Mentor Pairings and Support Materials [1.b. and 1.c.]

Last year (year 2), all of our students were paired with a mentor upon entering the program and encouraged to meet with their mentor once a semester. To increase the number of
mentee/mentor pair meetings, we implemented several new changes. We provided the students with training in creating SMART goals for the year with the intent of reviewing them with their mentors. We also gave students examples of how to email their faculty mentor and told them the mentors were expecting to be contacted. Both of these methods were designed to decrease barriers to talk with mentors and provide a topic for the meeting. Additionally, faculty were trained on how to use the SMART goals to facilitate a conversation with mentees. They attended a training about the importance of mentors for undergraduates (led by Catherine Bates – Institute for STEM and Diversity Initiatives).

In our year 3 work, we continued the successful practices that were developed in Fall 2018. The program’s eight new students were prepared for their faculty meeting in BIOL 198. Students who were not enrolled in BIOL 198 received email reminders instead. In BIOL 198, new students developed SMART goals for the year and learned how to write an effective email to their mentor. Returning students and mentors were sent email messages encouraging them to set up meetings with each other. We have found that reminding mentors and mentees to schedule meetings is important (see September 19 and March 20 email reminders in Appendix B). Rather than rely upon faculty to report back to us about mentoring meetings, we continued the use of an online form for students to log meetings with their mentors.

Measuring Student-Faculty Mentorship [1.d.]

Between August 2019 to May 2020, 12 different students have documented at least one meeting with their mentor, and 3 have documented additional meetings. Meetings lasted on average one hour, and we have documented a total of 13.5 hours in student-mentor interaction (see Table 4). We sent a reminder to faculty and students at the start of March in the spring semester to have mentor meetings. However, we suspect the disruption from the university moving to remote interaction due to COVID-19 resulted in many students not meeting with their mentors. Still, feedback about the mentor meetings from students were positive and included discussions of undergraduate research opportunities, course planning and strategies for success. A few examples are below:

- “My mentor was able to help me prepare for things I need to be doing once I graduate (and before then as well). We talked about me taking the GRE, my grades, and how to be successful in working and obtaining a full-time job. We also talked about the requirements for graduate school which was very helpful.”
- “She helped lead me in the direction for getting involved with research, as well as put me in contact with some of her graduate students so that I could ask them what grad school is like.”
- “Meeting with my mentor helped me get to know her and find some resources that might be really useful for me in my goals.”
“This was really challenging semester for me mentally, so it was nice to meet with [mentor name] and talk about my progress in both classes and extracurricular activities. We mostly talked about things that I have done which will help me get into medical school, as well as things I still need to work on. It really helped me take a step back and realize exactly what I need to do from this point on in order to get into medical school. In this way, it really helped relieve some of the stress and pressure I've been feeling this semester.”

Table 4 Gateway Scholar Student-Faculty Mentor Meetings (2019-2020)

<table>
<thead>
<tr>
<th>Student self-report of mentor meetings 2019-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student-Mentor Meetings</td>
</tr>
<tr>
<td>Unique Students</td>
</tr>
<tr>
<td>&gt;1 meeting with mentor</td>
</tr>
<tr>
<td>Total hours of mentor meetings</td>
</tr>
</tbody>
</table>

Plans for Year 4:
It is important to make sure students and mentors reconnect when the fall semester begins. Because the university and world will be readjusting to the impact of COVID-19, it is especially important for students to be and feel supported. Many of our scholars are nearing the last year of their degree, so a focus on future goals and how to prepare for careers after college (including getting feedback from mentors on resumes or cover letters) may be a beneficial way to spend time. Several of our scholars have indicated that these kinds of conversations have already been valuable with mentors so some targeted expectations in this area may increase this type of positive interaction. Co-PI Amy Ulappa will be reaching out to mentors with guidance for their student check-ins for the fall.

Objective 1 Insights
The financial need demonstrated by our students, which was exacerbated by the COVID-19 crisis, will be an ongoing concern. As we address the students who are included in “leave of absence” numbers, we need to consider our definition of students being “active” when they are enrolled in ten credit or fewer hours per semester. It may be that, particularly during these unprecedented times, part-time enrollment is the best decision for our students with financial need.

We are heartened by the impact that students report financial and emotional support they are receiving through Gateway Scholars. We continue to seek ways to increase the number of students who are benefitting in these ways within the DBS. Given findings in literature that point to the importance of community support to underrepresented students in STEM majors (Dell, Verhoeven, Christman, & Garrick, 2018; Hrabowski, Freeman, & Henderson, 2017), we are keenly aware of the need to remove barriers outside of the classroom as well as inside the classroom.
OBJECTIVE 2: RISK-BASED ADVISING SYSTEM WITH PROACTIVE ADVISING FOR GATEWAY SCHOLARS

Objective 2 focuses on advising the Gateway Scholars cohort while working to apply best practices to all DBS students, as feasible. Our work on objective 2 in 2019-20 focused on the following goals and measures:

2.a. Monitor on/off track students using the advising dashboard, reach out to students, and document via advising notes

2.b. Hold advisor meetings with all Gateway Scholars each semester

2.c. The advisor or their designee will update advising notes documenting advisee meetings, including annotations about outreach to at-risk students

2.d. Include discussions about advising related issues with faculty at department faculty/committee meetings

Objective 2 Activities in 2018-19

Monitoring on/off track students [2.a.]

Originally, our grant specified using a home-grown Boise State system called “Degree Tracker” to monitor students who were off track. The platform has not been updated and, as noted in our 2018-19 report, is not valued by students, who report the tool confusing. While DBS advisors continue to monitor at-risk patterns using an at-risk report generated by the Boise State College of Arts and Sciences, we are also using the advising notes system to document advisor-student conversations that might reveal patterns of at-risk behaviors that are not captured in institutional data (e.g., students’ comments about financial or academic concerns).

The DBS advisors created an email request for DBS faculty teaching core courses (BIOL 191, BIOL 192, and BIOL 304) to send a grade roster at midterm to initiate intervention. In Spring 2019, the Synergies for Success group (a departmental collaboration of representative from three grant-funded, student success focused programs) designed a check-in system for students struggling in the biology major core classes. Coordinators of the labs for these courses developed a method for training graduate Teaching Assistants (TA) to check for students struggling in these courses and provided TAs an email template to use while reaching out to students (see Appendix B for Early Detection plan and email to the student).

Between weeks six and seven during Spring 2020, TAs in BIOL 191, 192, and 304 reached out to students with missing assignments to check-in. Nearly half of these check-ins resulted in the students completing work or making a plan to succeed in the course.
Please note- in our 2018-19 report for year 2 of the GSP, objectives 2.e and 2.f pertained to gathering midterm grades for Gateway Scholars. We have replaced this effort with our off-track monitoring activities discussed above and in 3.d. relative to learning assistance. Additionally, with the increase in advisor full-time equivalent (FTE) for DBS majors, we are confident we have more capacity to identify and address students’ at-risk patterns (as discussed in the following section).

**Advising meetings with Gateway Scholars [2.b. and 2.c.]**

Goals 2.b. and 2.c. require frequent advising (at least one meeting per semester) with Gateway Scholar students. In our 2018-19 report, we noted that the overall advising load was making it difficult for the single Biological Sciences advisor to meet these goals for both biology and GSP students. In 2019, the university administration supported the department to add advising FTE to the department. Maribel Saucedo-Gonzalez, in the College of Arts and Sciences advising office, meets with all first-year Biology advisees (under 30 credit hours). Alex Urquhart, Special Lecturer in the DBS, was given a new role as Advisor-Lecturer and is assigned to sophomore and junior majors (up to 90 credit hours). Clay Cox is the department’s full-time professional advisor.

Together, the three advisors held 1,208 meetings with advisees in the past year (Summer 2019-Spring 2020). As of Spring 2020 (using census date data), the three advisors met with 580 advisees (unduplicated count); thus, 1,208 meetings indicate that many students met with the advisors more than once. Table 5 shows the total and the distinct number of advising meetings that each of the advisors held with biology majors in Summer 2019, Fall 2019, and Spring 2020.

<table>
<thead>
<tr>
<th>Advisor</th>
<th>Advising Appointments (distinct count)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alex (0.25 FTE)</td>
<td>61</td>
</tr>
<tr>
<td>Clay (1.0 FTE)</td>
<td>439</td>
</tr>
<tr>
<td>Maribel (0.6 FTE to BIOL)</td>
<td>196</td>
</tr>
<tr>
<td>Total 1.85 FTE</td>
<td>580</td>
</tr>
</tbody>
</table>

Of the 40 Gateway Scholars since the inception of the program, 36 met with an advisor at least one time (see Figure 1). Most have had multiple appointments. Keeping in mind that some students joined the program later in their undergraduate career, most of the students in the program have been meeting consistently with an advisor. Of the four students with no advising appointments:
- One took a leave of absence in their first term as a scholar
- Two graduated within two semesters of their first semester as a scholar
- One had a second advisor in honors with whom they met and the student graduated in Summer 2019.

Figure 1 Count of Advising Appointments per GSP Scholar (Cumulative)

One of the goals of this grant is to create supports for more intrusive advising using proactive approaches. In 2018, we redesigned the advising notes subcategory to allow advisors to record categories such as “Academic Coaching” or “Coaching” so that we could query report fields and gain a better sense of increases in those outreach activities. We see these subcodes being used, although minimally. The pressure on advisors to spend time with students rather than paperwork is a variable that we cannot eliminate. It is quite possible that outreach appointments are being coded as regular advising or general advising rather than being caught in these subcodes. While we cannot satisfactorily document proactive advising, we maintain that the most important measures of success supporting students are retention and student performance figures.
Table 6 Advising Appointment Topics

<table>
<thead>
<tr>
<th>Meeting Topic</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acad. Coaching</td>
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</tr>
<tr>
<td>Adjustment</td>
<td>14</td>
</tr>
<tr>
<td>Appeal</td>
<td>4</td>
</tr>
<tr>
<td>Coaching</td>
<td>1</td>
</tr>
<tr>
<td>Financial</td>
<td>2</td>
</tr>
<tr>
<td>Major Change</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
</tr>
<tr>
<td>Grand Total</td>
<td>25</td>
</tr>
</tbody>
</table>

Discussing advising related issues with faculty [2.d.]

Interim Department Chair Pete Koetsier integrated discussions in faculty meetings about the GSP’s new and continuing S-STEM mentees requesting meetings with mentors. Faculty meeting discussions also included the topic of inclusive classrooms and courses. Importantly, these topics were integrated into conversations about a faculty search as well as in the annual mentor training, which comprised two entire meetings (October 21 and 28). With the transition from face-to-face classes to online remote teaching, faculty members met for weekly faculty meetings via Zoom to discuss effective ways to maintain presence in the online classroom, best ways to carry out assessments, and identify students that may be struggling with the transition and additional stress. (See Objective 1.c.ii.).

Members of the GSP leadership team serve on the departmental curriculum committee. They provide input and share findings related to this grant with faculty so that action can be taken to minimize potential barriers to student success. This year, in addition to the typical work of addressing course requirements that change periodically, the committee deliberated about synergies between programs with shared missions and how each program could leverage the strengths of the others to benefit students.

Objective 2 Insights

- The GSP and its associated research helped us create a convincing case to administration to increase our advising capacity. With the addition of a part-time faculty advisor (0.25 FTE) and a portion of a professional advisor’s time (0.60 FTE), we have increased the FTE for undergraduate biology major advising from 1.0 to 1.85, thereby reducing the advising ratio from 1:760 to 1:409.
BROADER IMPACT

The Synergies group developed a “check-in” system designed to provide an early alert when students were struggling in the core courses for biology majors by engaging lab coordinators and graduate teaching assistants through collaborative outreach.

The GSP has lowered the advisor to student ratio from 1 to 760 to 1 to 409, thereby expanding opportunities for students to meet with a well-informed advisor about their academic program.
Objective 3: Integrate evidence-based instructional practices (EBIPs) in the DBS Core

Objective 3 focuses on the program elements designed to support faculty integration of evidence-based practices in core biology courses.

The goals and measures designed for objective 3 are:

3.a. Encourage EBIP usage in core courses and labs and measure these efforts using the Classroom Observation Protocol for Undergraduate STEM (COPUS) instrument and faculty self-report
3.b. Measure impact of EBIPs in core courses
   3.b.i. Student sense of self-efficacy and biology self-identity
   3.b.ii. Rapport scale
   3.b.iii. COPUS observations
3.c. Close the loop through data sharing meetings with faculty
3.d. Foster greater success in BIOL courses and measure these efforts through analysis of grades (previously focused on learning assistance)

Objective 3 Activities in 2018-19

Encourage EBIP usage in core courses and labs [3.a.]

During year 2, our work on objective 3 centered on effectively engaging faculty and students in tools to measure EBIP usage in core biology courses and labs. Having demonstrated that our approach was working, our attention this year shifted to focus on methods that increase a sense of belonging in the department. Thus, this year’s work has focused largely on inclusive teaching practices, which encompass EBIP usage and emphasize universal design for learning principles. A significant step included coordinating the work of several sponsored programs in the department through a working group: Synergies for Student Success (Synergies). Synergies include coordinated efforts of the Bridges to Baccalaureate Program and EPSCoR grants focusing on student success for undergraduate and graduate students in the department.

Inclusive Teaching Focus. The Synergies group facilitated two days of faculty training (October 21 and 28) led by Catherine Bates (Institute for STEM and Diversity Initiatives) and Sarah Dalrymple (Center for Teaching and Learning (CTL) and DBS). Fifteen faculty members attended both workshops, and 17 attended at least one. In preparation for the first meeting, the faculty completed an inclusive teaching checklist (see Appendix C). Faculty had a chance to reflect on their inclusive teaching checklist and identify the dimensions of inclusive teaching for which they had the most or fewest checked items. They also explored ways to make their syllabi more welcoming, strategies for learning more about their students, and inclusive course policies.
Measuring EBIP Adoption via Observation [3.b.ii and 3.b.iii]

We continued employing the Classroom Observation Protocol for Undergraduate STEM (COPUS) (Smith, Jones, Gilbert, & Wieman, 2013) during the Fall 2019 semester to document EBIP usage in the core BIOL courses (191, 192, 304, 310) according to the plans established in the Gateway Scholars proposal. BIOL 191 and 310 lecture sections were observed three times each in fall 2019. BIOL 192 and 304 lecture sections were observed four times each, as these courses are taught by faculty pairs that split the content from weeks 1-8 and 9-16. We did not observe labs this year as prior observations found very little variation across lab sections of a particular course, and no changes have taken place in the way the department trains lab instructors.

Our analysis of the COPUS data has centered on the intersection of teaching practices and rapport in the classroom. Because the self-determination theory (SDT) is a measure of thriving and has been associated with belonging in academic settings (Jones, Osborne, Paretti, & Matusovich; 2014; Ryan & Deci, 2000; Vanasupa, Stolk, & Herter, 2009), we operationalize thriving by measuring the constructs identified using SDT including students’ perception of their:

- Competence in a course
- Relationship with their professor
- Relationships with their peers
- Effort in the course

We have plotted students’ reported perception of professor relatedness by students’ reported perceived competence in the course. Each point represents a BIOL core course section (BIOL 191-001, BIOL 191-002, BIOL 192 part 1, BIOL 192 part 2, BIOL 304 part 1, BIOL 304 part 2, BIOL 310). There is a significant difference (p<.001) between the scores in groups A and B. We have also identified the COPUS teaching cluster code in the callout (1-7) for each of the course sections plotted. Because each observation generates a unique cluster code, we have added each code [X = the professor relatedness score is higher among males than females (p>.05); Y = the students’ perceived self-competence scores are higher among males than females (p>.05)].
The data in figure 2 (above) are being shared with faculty along with a description of the observed COPUS interactions. The data review meetings intend to understand the faculty members’ intentions during their teaching. We will also share descriptions of teaching-learning interactions by COPUS cluster code so that faculty members can consider potential strategies that may be effective in their courses. Note: these meetings also support objective 3.a. and dissemination as part of our research activities.

**Measuring EBIPs as Related to Rapport [3.b.ii.]**

As we have previously written, the use of EBIPs should be related to rapport as EBIPs, which generally reduce barriers between faculty and students and increase interaction in the classroom. Although we began this project using the Professor-Student Rapport Scale–Brief (BPSRS) (Ryan, 2014; Wilson & Ryan, 2013), when we presented these data to faculty, the brevity and wording of the questions were off-putting to them. Their response to the negatively worded questions (e.g., “my professor’s body language says ‘Don’t bother me’”). Additionally, an analysis of the BPSRS data showed minimal spread in the responses and lacked enough nuance to provide actionable data. Having tested questions from another rapport related instrument based on self-determination theory (SDT) (Ryan & Deci, 2000), we opted to add these questions to the instrument and then analyze the subsequent data to see how the SDT scale would align with the BPSRS. A factor analysis conducted after collecting Fall 2019 data with the revised instrument demonstrates that the BPSRS and the student-professor relatedness construct on the SDT scale are measuring the same factor (see Appendix C). Further, the constructs of the SDT scale are semantically consistent with teaching practices that can be observed and measured using the COPUS protocol. Thus, we determined that
future work on this project will focus on the combination of SDT and COPUS data and to remove the BPSRS items.

In Spring 2020, as we prepared to launch the rapport survey, we were engulfed with the rapidly changing environment brought about by COVID-19. We surveyed the four core courses only at the end of the term and added a few questions focusing on the ways the students experienced course methods for remote teaching.

The response rate for the rapport survey in the fall semester ranged from a low of 45% to a high of 87%. Students were given a QR code and URL during their lab class (or lecture for BIOL 310) and time to complete the brief instrument during class. The site collected their anonymous responses immediately (via Qualtrics). This method yielded a slightly lower rate of completion than in 2018, but we did not have to manually key in data, thereby saving a tremendous number of work hours. Given the number of responses, however, the rate of response is quite strong and provides us a solid sample for our analysis.

Our original intention was that we were not going to collect rapport data in the spring. The occasion of moving to remote instruction due to the COVID-19 outbreak presented a unique opportunity to see how that variable was impacting our students. We opted to collect data late in the semester through an emailed link. DBS faculty offered extra credit based on the percentage of students who completed the survey link. Given the circumstances of the Spring 2020 teaching and learning experience, most of our analysis focuses on the Fall 2019 data.

<table>
<thead>
<tr>
<th></th>
<th>Enrolled</th>
<th>Response</th>
<th>Response rate</th>
<th>Enrolled</th>
<th>Response</th>
<th>Response rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F19</td>
<td>F19</td>
<td>F19</td>
<td>SP20</td>
<td>SP20</td>
<td>SP20</td>
</tr>
<tr>
<td>191</td>
<td>370</td>
<td>216</td>
<td>58%</td>
<td>183</td>
<td>95</td>
<td>52%</td>
</tr>
<tr>
<td>192 pt 1</td>
<td>158</td>
<td>138</td>
<td>87%</td>
<td>167</td>
<td>NA*</td>
<td>NA</td>
</tr>
<tr>
<td>192 pt 2</td>
<td>158</td>
<td>120</td>
<td>76%</td>
<td>167</td>
<td>150</td>
<td>90%</td>
</tr>
<tr>
<td>304 pt 1</td>
<td>90</td>
<td>59</td>
<td>66%</td>
<td>87</td>
<td>NA*</td>
<td>NA</td>
</tr>
<tr>
<td>304 pt 2</td>
<td>90</td>
<td>66</td>
<td>73%</td>
<td>87</td>
<td>61</td>
<td>70%</td>
</tr>
<tr>
<td>310</td>
<td>121</td>
<td>54</td>
<td>45%</td>
<td>122</td>
<td>46</td>
<td>38%</td>
</tr>
</tbody>
</table>

Students’ responses to the most helpful and least helpful methods are captured in the tables below. We have filtered responses that were mentioned only once or twice in the list to focus on those that were mentioned more often.
Table 8 Coded Open Comments from the Rapport Survey Regarding Most/Least Helpful Methods

<table>
<thead>
<tr>
<th>Most helpful</th>
<th>Least helpful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video lectures</td>
<td>Synchronous preferred</td>
</tr>
<tr>
<td>Assignments</td>
<td>Synchronous problematic</td>
</tr>
<tr>
<td>None or NA</td>
<td>Homework</td>
</tr>
<tr>
<td>Interactive website</td>
<td>Lack of information</td>
</tr>
<tr>
<td>Video lectures with assignments</td>
<td>Video quality</td>
</tr>
<tr>
<td>Note sheets</td>
<td>Exams</td>
</tr>
<tr>
<td>Video lectures</td>
<td>Being online in general</td>
</tr>
<tr>
<td>Video lectures (Panopto/Power Point)</td>
<td>Recorded lectures problematic (quality or technology)</td>
</tr>
<tr>
<td>Video lectures with notes</td>
<td></td>
</tr>
<tr>
<td>Zoom Meetings</td>
<td></td>
</tr>
<tr>
<td>Multiple</td>
<td></td>
</tr>
<tr>
<td>Responsive to questions</td>
<td></td>
</tr>
<tr>
<td>Videos (dissection)</td>
<td></td>
</tr>
</tbody>
</table>

A report with their students’ responses was sent to each of the instructors in June so they could consider this feedback while planning for the fall semester.

**Developing Science Identity and Self-Efficacy [3.b.i.]**

We continued to administer the Self-Efficacy and Biological Science Identity (SEBSI) instrument designed to help us better understand students’ growing sense of identity as a biologist.

As of 2020, the survey has been administered to the GSP students three times (2017-19) for a total of 65 complete responses (24 have responded once, 30 have responded twice, and 21 have responded three times). Considering that efficacy and identity can change as students experience the program, we are interested in the overall sense of self-efficacy and identity indicated by this group of students as a whole.

The self-efficacy questions included in the survey are included in Table 10 (below), and in Figure 3, we share the percentages of responses at the four confidence levels reported.
I can:

- Inform or teach fellow citizens about biological facts and theories related to everyday societal controversies.
- Contribute to a research team conducting original, biologically related research.
- Carefully observe people, the environment, and organisms to recognize patterns.
- Use quantitative and technical skills to collect, analyze, and graph data.
- Use technical science skills in a biology laboratory.
- Use scientific language and terminology to explain biologically related facts and theories.
- Critically assess data and ideas found in scientific research literature.
- Apply the scientific method of analysis.
- Relate results and explanations of one research study to another research study.

A set of science identity questions are included on the instrument as well. These items provide an additional indirect measure of the connection that students have with STEM generally, and with biology:

- In general, being a scientist is an important part of my self-image.
- I feel like I belong in the field of science.
- Being a scientist is an important reflection of who I am.
- I have a strong sense of belonging to the community of scientists.
- I am a scientist.

Students responded to these five items that pertain to science identity using a 5-point Likert-type scale from strongly disagree to strongly agree. **We note the strong agreement with a sense of belonging in the field of science, which is one of the stated goals of this grant.**

**Table 9 Self-efficacy and Biological Science Identity Scores of Gateway Scholars Students**

<table>
<thead>
<tr>
<th></th>
<th>Self-efficacy score</th>
<th>Science identity score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>25.57</td>
<td>20.28</td>
</tr>
<tr>
<td>Min</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Max</td>
<td>36</td>
<td>25</td>
</tr>
<tr>
<td>Mode</td>
<td>28</td>
<td>25</td>
</tr>
<tr>
<td>Std Deviation</td>
<td>4.631</td>
<td>3.341</td>
</tr>
</tbody>
</table>

Having administered the survey for three years, we can now detect a pattern of the average reported self-efficacy score increasing as students complete more of the identified core courses (see Figure 3).
Support for Learning in Core Biology Courses [3.d.]

Last year, our report concluded that the Learning Assistants (LA) were currently optimized for the courses that are within control of the DBS. Yet, students had difficulty attending LA sessions. Providing a flexible space to support students who wanted to be able to gather and work on their courses together (including BIOL, CHEM, and MATH) was identified as a step we could take. The DBS repurposed space in the mathematics building near the Biomolecular Research Center and promoted it for majors (see Appendix C).

While students struggle in chemistry courses, there are LA sessions for those as well. The need for more flexible LA sessions was, unexpectedly, addressed in the spring due to the shift to remote teaching and learning.

The LAs, as was the case for faculty, shifted their instruction online and used synchronous Zoom sessions to assist students. In the rapport survey collected during the spring, nine comments referenced LA sessions as “most helpful” even though LA sessions were not among the choices listed in the question.

“I also love the online LA session option and would rather have those [online] even during regular semester! I was driving over on Sunday to make the only LA session I could, and I drive from Caldwell. Being able to attend from home has been sooo helpful, I’ve been to all of them this week.”
As discussed under objective 2 (see proactive outreach 2.f.), our team shifted proactive outreach from an advising effort to a faculty effort with the intent of leveraging the relationships of TAs and faculty to students in the core courses. The Synergies for Student Success team developed and implemented a check-in system for students struggling in BIOL 191, BIOL 192, and BIOL 304 (the first three core classes for BIOL majors) in Fall 2019 and continued in Spring 2020. Coordinators of the labs for these courses developed a system for training the graduate TAs to check for students struggling in these courses and provided a template email for the TAs to use while reaching out to students. It was determined that the following metrics would prompt an email from the TA:

- One or two missed labs
- One or two missed homework assignments
- Poor performance on quizzes or exams
- Missing lab assignment

In Spring 2020, the BIOL 304 TAs reached out to a total of nine students who showed signs of struggle in the course. Most of this outreach occurred before the transition to remote teaching because of the COVID-19 pandemic. Six of the nine students responded to the outreach email and, of those students, four went on to earn a passing or incomplete grade in the course. Of the three students who did not respond to the outreach email, only one earned a passing grade. This suggests that the outreach emails were effective at helping some students get back on track in the course. It is unclear how much of an impact COVID-19 had on these outcomes.

Objective 3 Insights

We note the following positive insights in this year’s data supporting objective 3:

- Faculty training relative to inclusive teaching practices (discussed in Objective 3.a.) and outreach to students via the check-in (discussed in Objective 2.a) helps us appreciate the importance of faculty interactions with students and early detection of struggling students. These interactions and early detection efforts will be especially important in Fall of 2020 as the university and world adjust to the impact of COVID-19. We plan to use the feedback from the survey completed in core classes at week 12 of the spring semester (during the university-wide remote learning period—see 3.b.ii, Table 9) to improve student success and support in online, remote, or hybrid teaching approaches in core classes moving forward.

- The serendipitous occasion of moving LA sessions to an online format provided support for learners that was valued and preferred, particularly for students who previously found attending sessions difficult due to work, family, or other obstacles.

- Last year, we identified the need to create greater support for DBS students in courses outside our department. We achieved the goal of creating a community place in the Mathematics Building near Biomolecular Research labs so that we could encourage peer-to-peer supports for learning.
Objective 4: Engage Students in Co-curricular Activities Representing Diverse Career Paths

Objective 4 focuses on developing a cohort experience for Gateway Scholars Program participants so that this group of students will engage in a variety of learning experiences exposing or immersing them in activities related to the diverse career paths that a biology major may pursue. Objective 4 is supported by the following goals and measures:

4.a. Continue offering BIOL 198 to GSP students
   4.a.1. Students will develop 4-year academic plans in the BIOL 198 course
   4.a.2. Continue evaluating BIOL 198 and disseminate findings (Goal for 2019-20) about the impact this course is having on participating students
4.b. The GSP program will provide six or more co-curricular events per year designed to help scholars explore diverse career paths
4.c. The GSP will provide two or more field trips per year designed to support career exploration and cohort building
4.d. Encourage and document student engagement in undergraduate research experiences (UREs) with a target of 25% of GSP students participating in a URE

Objective 4 Activities in 2018-19

Biology 198 to support cohort building a co-curricular engagement [4.a., 4.a.1.]

Summary from Year 3 (2019-20):

In Fall 2019, incoming freshman and sophomores were encouraged to sign up for BIOL 198 (Perspectives in the Biological Sciences), a course for Gateway Scholars. Feedback from the eight students in the course indicated it was a valuable experience to familiarize themselves with the university and frame their thinking about learning. Several of our monthly cohort events were held during the time of the class, so attendance was generally high for those events, but attendance dropped in the spring. (Spring events were also canceled and impacted by the COVID-19 campus response.) Students indicated that time with upper-division students in the program was beneficial, and exposure to campus resources was helpful during their first year on campus.

Changes implemented in Year 3:

Biology 198. The course was similar to the previous year. It included a class session dedicated to a discussion panel with Gateway Scholars juniors and seniors, the addition of an invited speaker to talk about Vertically Integrated Projects (VIP) undergraduate research, and a session on how to write a statement to apply for undergraduate research positions. We added a lesson on how to
write an email to a faculty member to express interest in undergraduate research and how to apply for various undergraduate research programs to improve the selection of incoming students into research. Students also develop their -year plan in the course (objective 4.a.1.). The course topics have been revised over the grant period to effectively support students as they are beginning their biology curriculum (See Appendix D).

*Figure 4 Faculty Lightning Talks (Dr. Julie Oxford)*

**Cohort Events.** In addition to monthly events for the Gateway Scholars, we worked with other members of the department on two broader events. Both of these events included Gateway Scholars but were targeted at the entire student population (~800 undergraduates) in the Biology Department. In November, ten undergraduates presented posters, and four faculty members gave lightning talks with a social hour following that was attended by ~75 people (faculty, graduate students, staff, and undergraduate – undergrad attendance in this folder). In January, 16 students (two scholars) attended an informational session about getting involved in undergraduate research; 16 total biology majors attended. In the 2019/2020 academic year, Gateway Scholars were invited to seven events planned by the program. In total, we recorded 34 hours of student engagement from these events (see Table 10).
Table 10 Gateway Scholar Fall 2019/Spring 2020 Semester Attendance by Event

<table>
<thead>
<tr>
<th>Event Title</th>
<th>Date</th>
<th># Attended</th>
<th>Event length (hrs)</th>
<th>Student hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guided Tour of the BSU Biomolecular Research Center</td>
<td>9/13/19</td>
<td>6</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Gateway Scholar Student Success Panel</td>
<td>10/4/19</td>
<td>12</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>DBS Faculty Lightning Talks and Social</td>
<td>11/27/19</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Undergrad Research Opportunities in STEM Info Session</td>
<td>1/28/20</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Coffee with S-STEM peers</td>
<td>2/14/20</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Peregrine Fund Guided Tour</td>
<td>2/29/20</td>
<td>4</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Linked-In training</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planned for 3/18/20 but canceled due to COVID-19</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>28</strong></td>
<td></td>
<td></td>
<td><strong>34</strong></td>
</tr>
</tbody>
</table>

Overall, feedback from the Gateways Scholars has been positive, but the timing of the events often conflicts with student’s busy work schedules. A few comments about the events are provided:

“We went on a tour through the birds of prey center and it was a really cool way to meet other members and to go explore something here in Idaho.”

“I liked how guest speakers were brought in and talked about campus resources.”

The event attendance in Fall 2019 was lower than it has been in prior years. For example, the nature hike, which had previously attracted many students, had no participants this year. There were fewer lower-division students in the cohort, and students indicated that they were unable to attend events due to conflicts with other commitments. As the grant period winds to its end, our focus is to make the most of the events that are well attended and can help us support students’ sense of belonging and identification with the profession. Figure 5 displays the GSP Scholar events attendance over time, indicating that attendance in 2017 and 2018 when we had the most incoming lower-division students, is higher. The event attendance for 2020 was impacted by the COVID-19 pandemic. The annual participation by Gateway Scholars and other participants are detailed in Table 10.
BROADER IMPACT

The Faculty Lightning Talks and Undergraduate Research Poster session will continue beyond the end of this grant as a regular department event. They have been a popular forum for student-faculty interaction in the department.

Students will develop 4-year academic plans in the BIOL 198 course [4.a.i.]

In Fall 2017, during BIOL 198, Dr. Ulappa explained that students needed to create a 4-year academic plan by the end of the academic year and then go over that plan with DBS advisor Clay Cox.

During the focus group (2018), students discussed the challenges of academic planning and suggested creating the academic plan during the BIOL 198 course (for those enrolled) where students could ask questions and get suggestions from the instructor. This recommended change was adopted in the 2018-19 BIOL 198 class. The GSP students were also encouraged to talk to their program mentors about their 4-year plans, which fostered meaningful interactions and a starting point for developing the student-mentor relationship. We will continue to develop 4-year plans as part of the BIOL 198 curriculum.
GSP Co-curricular events to help scholars explore diverse career paths [4.b.]

At the end of the semester, students reported having both an increased awareness of campus resources and being more likely to use them. Importantly, they reported that their knowledge of biology careers and their professional network had expanded. Students also indicated that they thought about learning differently and focused more on a growth mindset approach.

Questions were scored on a 7-point scale from -3 to +3 with a neutral midpoint. The questions and score definitions are below with the average 2019 score in parentheses.

- **How aware are you of resources on campus related to student success (i.e., tutor sessions, undergraduate research opportunities, etc.)? (Less aware to more aware: 2.6)**
- **How likely are you to use those resources (from part A)? (Less likely to more likely 2.6)**
- **How often do you reflect on how you learn and make decisions based on the knowledge? (Less often to more often 1.8)**
- **How has your awareness of the types of careers that are possible in the field of biology changed? (Fewer than to More than 1.7)**
- **How has the network of people (fellow students, graduate students, faculty) that you know changed? (Gotten smaller to Expanded 2.4)**

Additionally, at the end of the Fall semester, we asked all of the Gateway Scholars to take an open-ended survey related to several aspects of the program (impact of mentors, events, financial support, BIOL 198, etc.) and had ten respondents. A few examples of the comments related to the BIOL 198 experience from students who took the course at any time in their undergraduate career were:

- “I have adapted my learning approach to prioritize personal and academic growth over academic success alone.”
- “This class helped me understand more about what the biology major has available for me and ways that I can use it in my future.”
- “I really liked talking about growth mindsets and how even if you don't understand something now you can still learn it.”
- “This class was very supportive in helping me gain access to resources on campus, including tutoring centers, undergraduate research experiences, etc.”
“This course definitely widened my awareness of campus resources. This class introduced me to the IDoTeach Program, which I am a proud member of now, and will graduate from next year. I would have liked to focus more on how to get involved in undergrad research in this class, since it can be a difficult process.”

The GSP will provide two or more field trips per year designed to support career exploration and cohort building [4.c.]

As noted above, the GSP students had opportunities to participate in two off-campus, co-curricular events and one on-campus co-curricular event: A visit to the Peregrine Foundation, a hike with Campus Recreation in the Boise Foothills, and an (on-campus) visit to the Biomolecular Research Center (see events list above).

Encourage and document student engagement in undergraduate research experiences (UREs) with a target of 25% of GSP students participating in a URE [4.d.]

Students in our program are introduced to research and faculty in several ways (e.g., BIOL 198, GSP and DBS events and curriculum, and the GSP mentor program), and they reach out on their own as well. Eleven of the 27 active scholars (40%) as of the beginning of 2019 participated formally in research in some way. DBS Student Research Program manager, Brittany Archuleta, collects information each semester on which students in the department participated in undergraduate research and has shared that data with us (summarized in the table below for our scholars). Last year, we expanded our documentation efforts to include research conducted outside of the DBS and have added participation in a Vertically Integrated Research Project in this report.

Additional data on the impact of undergraduate research is available to us through our SEBSI survey, which asks students if they have been involved in undergraduate research at any point during their matriculation at Boise State. These data were analyzed for a possible correlation between undergraduate research participation and the Biological Self-Efficacy (SE) Score. Eta was used to investigate the strength of the association between undergraduate research participation and the SE score (eta=.395) and the science identity score (eta=.231). The strength of the association for SE is medium to large, and that of Biological Science Identity (BSI) is medium (Cohen, 1988). An ANOVA test to compare the mean scores of the URE versus no URE participants’ SE scores reveals the difference between the groups is significant (p = .001). There is no significant difference between the BSI scores.

Table 11 Mean Scores for SE and BSI by URE Participation

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>SE</th>
<th>BSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>No URE</td>
<td>42</td>
<td>23.92</td>
<td>20.976</td>
</tr>
<tr>
<td>URE</td>
<td>23</td>
<td>28.57</td>
<td>19</td>
</tr>
</tbody>
</table>
Objective 4 Insights

Students indicated that support via BIOL 198 when they entered the university and biology program was important, and we have expanded enrollment in BIOL 198 by opening the course to all aspiring biology majors for Fall 2020 (as of July 3, 23 incoming students were enrolled). This class will help connect freshmen and connect students to the biology department, which will be especially important for student support and success moving forward despite COVID-19 disruptions. While we did not have a focus group this spring, we did receive a suggestion from a current scholar that creating subject-specific peer mentors would be a helpful way to encourage peer support further. In the fall, we plan to ask Gateway Scholars to be peer mentors in areas like getting involved in research, navigating the university, and adjusting to being a student. Our plan is to support these peer interactions through Zoom. Our goal is to increase peer support, and address critique regarding the difficulty students had balancing multiple commitments with event attendance. There are many ways for students to succeed outside of event attendance, and a peer mentor system may support that aim.
OBJECTIVE 5: SUMMARIZE AND REFLECT

The focus of objective 5 is to summarize and reflect on the effects of overall projects and activities implemented in objectives 1-4 regarding retention, student success, degree attainment, and diversity. In meeting this objective, we will create project outcomes to provide broader impacts, draw conclusions, and make program plan adjustments.

5.a. Measure progress on objectives by collecting data and measuring via:
   5.a.i. Annual Focus Group (objective 1, 2, 3, and 4)
   5.a.ii. COPUS Instrument (objective 3)
   5.a.iii. Rapport Survey Data (objective 3)
   5.a.iv. Self-efficacy and Biological Sciences Identity (SEBSI) Assessment (objective 4)
5.b. Student retention, academic performance, degree attainment data (objective 1, 2, 3, and 4)
5.c. Distribute a summary of the annual report to faculty for feedback and future action
5.d. Summarize and disseminate broader impacts

Objective 5 Activities in 2018-19

Annual Focus Group [5.a.i.]

While our annual plan specifies conducting focus group conversations each spring with Gateway Scholars to understand the impact of program activities on their academic persistence, biological science identity development, and sense of belonging, the COVID-19 pandemic disrupted these planned activities. We opted, instead, to add a few open-ended questions to the rapport instrument and to rely upon other data collected to inform objective 5. We will resume focus group activities in 2021 through face-to-face or virtual meetings.

Data collection and analysis (indirect and direct assessment) [5.a.ii–5.a.iv]

As described in the previous sections, we have used COPUS data [5.a.ii], Rapport Survey data [5.a.iii], and SEBSI data [5.a.iv] to better understand the department’s progress toward cohort building, increasing active-learning in core biology courses, supporting at-risk advising, building a mentor program, and using curricular and co-curricular activities to support students’ exploration of biology related career paths.

For background on the activities in this section, please refer to our year 2 report. The GSP research includes analysis of student retention/graduation and academic performance data as a key indicator of our progress toward program goals. The DBS is working to increase degree attainment by high ability, low-income, and underrepresented students through the Gateway Scholars Program. While not the sole focus of our activities, we are looking carefully at the ways our efforts
are supporting sub-groups that the NSF qualifies for S-STEM funding (high ability and low-income). Three research questions guide our inquiry into these data:

1. How are faculty members reforming their pedagogies to integrate active learning in the biology core courses (BIOL 191, 192, 304, and 310)?
2. What effect does participation in the GSP courses and activities have on students’ self-efficacy, biological science identity (SEBSI), and their academic success?
3. How do students perceive the student-faculty and peer-peer relationships in DBS?

While we do not yet have enough data collected for conclusive findings relative to these questions, we are making progress toward that goal and present interim insights in the following section.

Faculty Adoption of EBIPs via COPUS [5.a.ii]

Research question one can be answered in part by examining the COPUS data. All the instructors teaching lecture sections of the core DBS courses were observed during the Fall 2019 semester using the COPUS instrument, according to the planned research activities for the GSP. Observations reveal individual results that were generally consistent with prior years’ COPUS results by cluster code (see Table 12). Although instructors’ teaching cluster codes tend to remain consistent, there are differences in the use of active learning practices by term as the faculty assigned to these courses change. Looking at data by the term, we can see that during the Fall 2019 semester, faculty teaching core DBS courses demonstrated a higher level of active teaching during the COPUS observations than the faculty teaching during the Fall 2018 term (see Table 12 and figure 6). In short, the DBS can increase the number of students who are experiencing active learning classes by scheduling these faculty to teach in the core courses. It should be noted that the DBS should continue to emphasize adopting EBIPs because we do see evidence of faculty working to integrate these practices into their courses, as noted in the year 2 report.

Figure 6 Teaching Clusters in COPUS Observations By Semester
Table 12 COPUS Teaching Cluster Code by Instructor and by Term

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Fall 2018</th>
<th>Fall 2019</th>
<th>Spring 2019</th>
<th>Fall 2019</th>
<th>Fall 2019</th>
<th>Spring 2019</th>
<th>Fall 2019</th>
<th>Fall 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
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</tr>
<tr>
<td>2</td>
<td></td>
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<td>1</td>
<td></td>
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<td></td>
</tr>
<tr>
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<td>1</td>
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<td></td>
</tr>
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<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Self-Efficacy and Biological Science Identity (SEBSI) [5.a.iv]
The SEBSI is also discussed in objective 3. It has 14 items that are divided into two scores. Nine are summed for a self-efficacy score. The possible responses range from not at all confident (1), somewhat confident (2), mainly confident (3), and completely confident (4), thus the theoretical range for the self-efficacy score is 4 to 36. Five items are summed for the Biological Science Identity score. These items use a 5-point Likert-type scale from strongly disagree (1) to strongly agree (5) with a midpoint, neither agree nor disagree (3). The theoretical range for the Biological Science Identity score is 5 to 25.

We hypothesize that the students’ self-efficacy and science identity will both increase as students’ experience more facets of the degree (courses, interactions with faculty and peers), as well as the co-curricular experiences (UREs) and working with mentors. In year 2 we conducted a repeated measures analysis and found that 70% of the repeated measures increased from 2017-18 among those completing the instrument two times.
Theoretically, we note that a student’s self-efficacy score might go down with experiences that are challenging (e.g., organic chemistry) or when their initial self-efficacy was not calibrated with their performance (Champion, 2010).

As discussed in objective 3, a recent analysis of the SEBSI data submitted from 2017 to 2020 demonstrates an upward trend in the scores, as predicted.

As discussed in objective 4, we found a moderate to strong effect for participating in a URE when we examined the self-efficacy scores. A one-way between-subjects ANOVA was conducted to compare the effect of URE participation on self-efficacy in comparison to students who did not participate. There was a significant effect of URE participation on these students at the p<.05 level for the three conditions \[F(1,63) = 11.659, p = 0.001\].

We can conclude that the URE experience has a positive impact on our participating GSP participants; however, only 35% of the scholars (n= 23) have reported participating at least one time in a URE.

### BROADER IMPACT

The SEBSI data suggest that the DBS URE experiences are supporting increased self-efficacy among the participating GSP students, consistent with findings in scholarly literature (Hunter, Laursen, & Seymour, 2007; Sams, Lewis, et al., 2015).

### Students’ Expressions of Relationships in DBS [5.a.iv]

Our third research question asks how students perceive the student-faculty and the peer to peer relationships in the DBS. Two sources of data inform this question—the rapport survey quantitative data and open response comments, and the BIOL 198 survey. These sources suggest a positive student-faculty rapport.

The rapport survey is elaborated upon in objective 3 (see 3.b.ii.). As previously explained, many scores for the constructs are similar across courses and course sections, though some differences reach the level of significance (p<.05) and we explain those below. The methods for our analysis are provided in Appendix E.

In the 2018-19 report, we indicated that there were no differences in gender, race, or cultural identity, or status as a biology major when measuring rapport with the BPSRS instrument. As discussed in objective 3, we introduced the self-determination (SDT) scale items (Ryan & Deci, 2017) this year and analyzed these items in comparison to BPSRS items. In short, the SDT scales have
substantial cross-loading with the BPSRS and provide a more nuanced measure of rapport in the biology courses measured in this research. We are, therefore, reporting only on the SDT data. As illustrated in Figure 7, below, comparing SDT data collected during Fall 2019 by course section for each of the SDT constructs, there are differences in the mean scores for three of four constructs. Students' competence scores for BIOL 191 (all sections), BIOL 192 (part 2), and BIOL 304 (both parts) were higher than those of BIOL 192 (part 1) and BIOL 310. In terms of students' reported perceived effort scores, BIOL 310 is lower than the other course scores. The scores in BIOL 191 across all sections are consistent with one another, and those in BIOL 192 and BIOL 304 are also statistically similar. Professor relatedness also splits into three groups with BIOL 192 (part 1) and 310 lower than the other courses and sections. Section 3 of BIOL 191 and part 1 of BIOL 304 also group together with scores between the other two groups. Finally, there are no statistical differences across course sections when analyzing the peer relatedness scores. It is possible that this reflects a lack of student interest in increasing connection to other students, or that the teaching methods do not suggest that possibility.

We also analyzed the SDT construct scores for differences by gender, URM status, and STEM/non-STEM major (see Table 13). There were no statistically significant differences based on self-reported ethnicity (URM status). Comparison by gender did indicate differences in some sections with males scoring higher on competence (Instructors 7 & 5) and professor relatedness (Instructors 1, 4, & 5), and females scoring higher on effort in BIOL 310 and one section of BIOL 191 (Instructors 7 & 4).

We note the differences for BIOL 310 (males score higher in competence than females while females indicate a higher effort score). This course has, regardless of instructor, fallen into a traditional teaching COPUS cluster (2018 cluster 3; 2019 cluster 2). In section 5.b., we discuss the academic performance rates and note that there are no differences that rise to the level of significance when comparing gender in the courses. We also note perceived competence differences by gender in BIOL 304 in professor relatedness for one professor, though that is not the case for the second professor.
**Figure 7 SDT Construct Comparisons across BIOL Course Sections**

**Table 13 Comparison of SDT scores for perceived student competence, professor relatedness, and effort**

<table>
<thead>
<tr>
<th>Course Section</th>
<th>Instructor</th>
<th>Competence Gender (adj.p)</th>
<th>STEM Majors</th>
<th>Professor Relatedness Gender (adj.p)</th>
<th>STEM Majors</th>
<th>Effort Gender (adj.p)</th>
<th>STEM Majors</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 304</td>
<td>Inst 8</td>
<td>0.383</td>
<td>NA</td>
<td>0.075</td>
<td>NA</td>
<td>0.449</td>
<td>NA</td>
</tr>
<tr>
<td>BIOL 304</td>
<td>Inst 1</td>
<td>0.099</td>
<td>NA</td>
<td>0.031&lt;sup&gt;1&lt;/sup&gt;</td>
<td>NA</td>
<td>0.466</td>
<td>NA</td>
</tr>
<tr>
<td>BIOL 310</td>
<td>Inst 7</td>
<td>0.042&lt;sup&gt;1&lt;/sup&gt;</td>
<td>0.225</td>
<td>0.437</td>
<td>0.764</td>
<td>0.011&lt;sup&gt;2&lt;/sup&gt;</td>
<td>0.900</td>
</tr>
<tr>
<td>BIOL 191</td>
<td>Inst 4</td>
<td>0.732</td>
<td>0.494</td>
<td>0.765</td>
<td>0.525</td>
<td>0.032&lt;sup&gt;2&lt;/sup&gt;</td>
<td>0.030&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>BIOL 191</td>
<td>Inst 5</td>
<td>0.009&lt;sup&gt;1&lt;/sup&gt;</td>
<td>0.752</td>
<td>0.030&lt;sup&gt;1&lt;/sup&gt;</td>
<td>0.392</td>
<td>0.459</td>
<td>0.136</td>
</tr>
<tr>
<td>BIOL 191</td>
<td>Inst 4</td>
<td>0.709</td>
<td>0.087</td>
<td>0.002&lt;sup&gt;1&lt;/sup&gt;</td>
<td>0.293</td>
<td>0.750</td>
<td>0.512</td>
</tr>
<tr>
<td>BIOL 192</td>
<td>Inst 6</td>
<td>0.152</td>
<td>0.001&lt;sup&gt;3&lt;/sup&gt;</td>
<td>0.100</td>
<td>0.007&lt;sup&gt;3&lt;/sup&gt;</td>
<td>0.853</td>
<td>0.113</td>
</tr>
<tr>
<td>BIOL 192</td>
<td>Inst 3</td>
<td>0.450</td>
<td>0.136</td>
<td>0.631</td>
<td>0.063</td>
<td>0.151</td>
<td>0.211</td>
</tr>
</tbody>
</table>

**Notes**

1. Males’ scores are statistically higher than females’
2. Females’ scores are statistically higher than males’
3. STEM majors report significantly higher Competence and Relatedness than non-STEM majors
4. Other majors report significantly higher effort than STEM majors

NA There are no non-STEM majors in BIOL 304
How do faculty integrate active learning practices into their core biology courses? [5.a.ii]

In our discussion of objective 3, we detailed the COPUS data reflecting the level of active learning in core biology courses in the classes observed in Fall 2019. In addition to the codes for faculty and student teaching and learning behaviors observed, co-PI Stieha and GSP team member Earl conducted a qualitative analysis of the observation notes relative to the use of EBIPs reported in the literature as supportive of students’ competence and rapport with faculty.

These data demonstrate that there is a significant positive change in stated EBIP usage by both self-report data and empirical measurement through the COPUS instrument. We briefly describe the faculty report in our objective 3 discussion, above. In an analysis of the Fall 2019 COPUS and rapport data, we examined COPUS observation notes and coding relative to EBIPs that are likely connected to rapport related constructs. These include students’ perceived competence in the course, students' perception of the rapport with the course instructor, and their perception of rapport with other students. We also coded observed behaviors that may undermine rapport in the class. The analysis of these data continues, and we anticipate a manuscript sharing our findings by the end of 2020.

Student retention, academic performance, degree attainment data [5.b.]

Our data tracking for the GSP asks the enrollment status of cohort students as DBS majors from the census date\(^2\) of a given term to the census date of the next term. If a student changes their major after census date during a given term, that change is reported as of the census date of the next term.

The goal of the GSP is to retain and graduate students in BIOL or another STEM major. If a student switches their degree to another STEM major, they are counted as “retained in STEM.” If a student pauses matriculation for up to two academic years, the university considers them as taking a “leave of absence.” To date, three students have changed majors (two to non-STEM majors) and one has changed to a STEM major. Five students are classified as “leave of absence,” with two of those approaching the two-year time frame.

As we reported in the findings for objective 1, we are achieving our goals for student recruitment, retention, and graduation with special attention to first-generation students and URM students:

- Cumulative retention (2017-2020): 82.5%
- % of need met (2019-2020): 85.0%
- Recruit first-generation students: 48.0%
- Recruit URM students: 35.0%

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\(^2\) The Boise State census date for the fall semester is October 15\(^{th}\), and the spring semester census date is March 15\(^{th}\). There is no defined census date for the summer term.
Comparing all BIOL majors to the GSP students, by percentages, the GSP students (although far fewer in number) are retained and graduated at higher rates, however, it is our intention to improve outcomes for ALL biology students as we also improve the conditions to foster student success for the Gateway Scholars.

**Overall academic performance in core DBS courses**

Our focus on inclusive teaching and EBIPs is designed to increase the success in BIOL courses for all students, regardless of their demographic variables or major. Here, we discuss the academic performance in core BIOL courses (BIOL 191, 192, 304, and 310) focusing on DFW rates by gender (see figure 8). While there are differences in the rates, none of the differences rise to the level of statistical significance when comparing grade point average by gender. We compared grade point differences for biology majors and non-majors. Table 13 shows that non-majors were different from majors on BIOL 191 grade point \((p = .000)\), which was significant. Comparing the two group means indicates that the average grade point in the course for non-majors \((M = 3.173)\) is significantly higher than the score \((M=2.407)\) for majors. The difference between the groups is .7655 on a scale of 0 to 4.0, and the effect size \((d=.7)\) is typical to larger than typical for social science research (Cohen, 1988).

*Figure 8 DFW rates by course and gender*

<table>
<thead>
<tr>
<th>Grade point</th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>p</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non Majors</td>
<td>3.173</td>
<td>1.0552</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Majors</td>
<td>2.407</td>
<td>1.2026</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Distribute summary of annual report to faculty for feedback and future action [5.c.]**

In the discussion of objective 3 findings, we reported that the GSP team combined efforts with other sponsored project teams in the DBS to coordinate goals toward shared teaching and learning. The **Synergies team** held monthly meetings to coordinate efforts and led two faculty development sessions focusing on EBIPs and other practices (e.g., redesigning syllabi for a more inclusive course) to support improved retention and persistence goals.

Additionally, reports summarizing COPUS and rapport data are shared with the faculty after each semester, and a summary of open responses regarding students’ perception of the teaching methods that were most and least helpful were shared with faculty at the conclusion of the spring term.

**Summarize and disseminate broader impacts [5.d.]**

- BIOL 198, which was created to support students’ development of a biological science identity and a growing awareness of the diverse career paths for GSP students, has been approved as a general elective for any biology student and is being offered for Fall 2020.
- The GSP leadership team, in conjunction with the Synergies group, developed a system for monitoring and outreach to students enrolled in core courses based on metrics that suggest they may be at risk of falling behind. This effort has replaced reporting to the advising office and is more direct.
- The GSP initiated Faculty Lightning Talks and undergraduate research presentation in the fall semester has been institutionalized as an ongoing co-curricular event to support students’ Biological Sciences self-efficacy and science identity.
**GOALS FOR YEAR 4: 2020-21**

**Objective 1** Manage a faculty-mentored cohort program that provides scholarships and a coherent ecosystem of support for low-income, academically talented DBS students.

In the fourth year of the GSP we will:

1.a. Continue support for upper division students who have participated in previous years and who can reasonably complete the program during the grant period. We will maintain 20-25 scholars in the cohort. It is clear that many students experience financial barriers while attending college. Our students indicated that in many instances, the financial support allowed them to pursue undergraduate research or focus on coursework instead of working outside jobs. Our plan it to continue to support our current students as they complete their degrees.

1.b. Continue providing support for students to meet with their faculty mentor twice per year and add a focus on transitioning from undergraduate to graduate school or career.

1.c. Continue providing structures and supports for student-mentor program including:
   1.c.i. Shared focus on SMART goals.
   1.c.ii. Mentor readings including content that is designed to help support students’ transition from a bachelor’s degree into either graduate programs or professional roles.
   1.c.iii. Continue building mentor training into faculty meetings using professional facilitators.

1.d. We will measure performance on this objective through student self-report forms documenting mentor meetings and through comments during the annual focus group, which will resume in 2021 either face-to-face or via Zoom, or by other student questionnaires.

**Objective 2** Risk-based advising system with proactive advising for Gateway Scholars

In the fourth year of the GSP we will:

2.a. Continue to monitor on/off track students using the approach developed and implemented in BIOL 304 (as discussed in objective 3.d. Support for Learning), extending this practice into the other core courses. We will measure this process by adding check-ins based on student responses and increasing training for TAs.

2.b. Continue to encourage all Gateway Scholars students to meet with a professional biology advisor each semester. **RECOMMENDATION:** Consider the implications of remote access and adjust proactively to assist students. Tap into organizations such
as NACADA to inform best practices in response to the pandemic. EAB offers actions related to student success in the age of COVID-19.

2.c. Continue advising documentation via advising notes for meeting and at-risk advising.
2.d. Continue to include discussions about advising and student success issues with faculty at department faculty/committee meetings.
2.e. Continue to collect and document midterm grades in all courses for Gateway Scholar students.
2.f. Continue to collect and document midterm grades in all core courses for all DBS students (Add BIOL 310 to the midterm grade data collected). **RECOMMENDATION:**
   In year 2, the GSP identified challenges for students in CHEM 308, and actions were recommended to address the situation with the CHEM department chair. No actions were reported relative to this student success barrier. Approaches should be considered to evaluate students’ performance in CHEM courses.

**Objective 3** Integrate evidence-based instructional practices (EBIPs) in the DBS core

In the fourth year of the GSP, we will:

3.a. Continue to encourage EBIP usage and inclusive teaching practices in undergraduate biology courses and labs and measure these faculty self-reports and additional questions on the course evaluation. **NEW:** The additional questions for the course evaluation are a broader impact of the Synergies for Student Success team and have been proposed as a standard question set on the course evaluation (student evaluation of teaching). **NEW:** Send Inclusive Teaching Syllabus Guide to faculty prior to the academic year with the reminder to update their syllabi in accordance to those guidelines.

3.a. Continue to encourage biology faculty participation in the Center for Teaching and Learning BUILD certificate or Inclusive Excellence faculty learning opportunities. We will document the number of faculty participating in these programs. **NEW:** Encourage faculty to participate in the Flexible Learning and Instruction Program offered by the Center for Teaching and Learning.

   **RECOMMENDATION:** Invite Tasha Souza from the Center for Teaching and Learning to attend a faculty meeting at the beginning of the academic year and to discuss the array of Inclusive Excellence development sessions available to faculty. Faculty meetings will be held by Zoom in the Fall 2020 semester.

3.b. Continue to measure impact of EBIPs in core courses.
   3.b.i. Student sense of biological sciences self-efficacy and professional identity (conducted in the fall semester). **NEW:** We will expand the administration of this instrument to all majors to determine if there is a difference in the biology self-
efficacy or professional identity based on the demographic and experiential data collected in that instrument. Our goal is to achieve a 60% response rate for all biology majors and a 90% response rate for our GSP students. 3.b.ii. Rapport Scale (in core course lectures and labs). **NEW:** Given the constraints of COVID-19, we will administer the rapport survey via Qualtrics electronically through the course Blackboard sites (response rate goal: 70%). **NEW:** We will create an easy to administer instrument to other biology courses for faculty who are interested in using it in their classes.

3.c. More effectively close the loop through data sharing meetings with faculty. As discussed above, it is challenging for peers to directly address teaching approaches of their colleagues. The GSP leadership team will address ways to approach faculty about these data in a way that is respectful and honors the strengths each of the faculty members bring to the department. **RECOMMENDATION:** based on the COPUS and rapport report analysis (discussed in objective 5), we will generate materials to explain the connection between EBIPs and rapport to share with all BIOL faculty.

3.d. Measure the impact of learning supports including TA outreach effort for early alert and students’ participation in Learning Assistants, whether face-to-face or via remote connections.

**Objective 4** Engage GSP students in co-curricular activities to support cohort building

In the fourth year of the GSP:

4.a. The department will support opening BIOL 198 to permit non-GSP students to enroll and will encourage students to include this elective course in their first semester at Boise State.

4.a.1. Students will continue to develop 4-year academic plans in the BIOL 198 course.

4.a.2. Continue evaluating BIOL 198 and disseminate findings through an article or presentation about the impact this course is having on participating students.

4.b. Continue to provide 6 or more co-curricular events or peer-mentoring opportunities per year for GSP students to help scholars explore diverse career paths. **NEW:** We are planning to be flexible with how students can attend events, and by incorporating remote opportunities such as Zoom, we hope to have higher attendance and build more individual connections. We plan to continue to encourage our students to become part of a club or organization (like the Biology, Pre-medical, Pre-dental club, etc.) during their first year of the program and count participation in these clubs as meeting a recommendation of the award (i.e., attending events) in addition to continuing our monthly Gateway Scholars events. We will provide them
with information about each club at the start of the fall semester. **NEW:** Work with student involvement to track attendance or club participation outside the GSP.

4.c. The GSP will provide two or more field trips (or Zoom tours) per year designed to support career exploration and cohort building.

4.d. Continue increasing the goal for URE participation from 25% to 35% given current engagement level. We understand from focus group data that there are many students who cannot participate in research. However, we will continue encouraging participation and looking for additional ways to provide students this opportunity. We will continue to use the newly created student group to track URE participation for biology majors and GSP students through our student information system.

**Objective 5** Summarize progress toward program goals and reflect

In the third year of the GSP we will:

5. a. Continue to monitor progress on objectives by collecting data and measuring via:

   5.a.i. Conduct one or more focus group sessions with GSP students (objective 1, 2, 3, & 4). **NEW:** Ask questions about participation in UREs because, as noted in objective 3, there are differences in biological science identity for those who have participated in these co-curricular experiences.

   5.a.ii. Conduct the COPUS Instrument (objective 3) for faculty that have not been observed more than once (in lecture sections only).

   5.a.iii. Administer the rapport scale (objective 3) in core courses and, upon request, in other courses.

   5.a.iv. Continue to administer the self-efficacy and Biological Science Identity (SEBSI) Assessment (objective 4) with GSP students. Explore administering the instrument across the major.

5.b. Continue to evaluate student retention, academic performance, and degree attainment data (objective 1, 2, 3, and 4).

5.c. Continue to distribute a summary of the annual report to faculty for feedback and future action.

5.d. Continue to summarize and disseminate broader impacts with an article draft submitted for publication in 2020-21.
REFERENCES


APPENDIX

Appendix A: Faculty-Student Mentor Supporting Material

Objective 1.b. and 1.c. Faculty Reminder Email with Supplemental Reading

DBS Gateway Scholars S-STEM student check-in (sent to faculty mentors February 2019)

Hi [name],

Thank you for participating as a mentor in the NSF Scholarships in STEM Gateway Scholars program. Most of you were able to meet with your student at least once in the fall and the feedback we had from students about these meetings was all positive, they loved talking with you one on one!

Feedback from our students indicates that they would benefit from more discussions with faculty when they are choosing their courses. Aside from formal advising, they are looking for more guidance on which courses to take to learn skills they will need in their careers, tips for doing well in courses that are difficult, and conversations about how to approach learning and balance.

As the date nears when students can enroll in courses, it is good timing to reach out to your student to invite them to meet with you and discuss courses or anything else (like how to apply for undergraduate research and experiences this summer!).

As a reminder, your student (s) is (are): [student name]

Please let me know if you have any questions or concerns and thank you for your involvement in this program!

Amy

Also, here is info about this program:

This year (yr 2 of the grant) we have 28 awardees and the goal of this program is to help support students in our department so they can make progress to their future goals.

Your role as a mentor is to be a resource for your mentee by meeting with them twice a semester. You all have specialized knowledge of how to navigate the university and also have a wide network of people (your colleagues, grad student or undergrads in your lab) that you can connect to your mentee.

Scholars in our program are academically high achieving and are an under-represented group in STEM (i.e. first-generation in college, minorities, women). One topic all students can benefit from is
learning how to get the most out of college. This New York Times article is a good one and reading it may help give you ideas for what to discuss with your student.


**Objective 1.b. and 1.c. SMART Goals Activity Preparation (for students)**

**S.M.A.R.T. Goals for Fall 2018/Spring 2019 (this academic year)**

*YOUR NAME HERE*

**Purpose:** Crafting S.M.A.R.T. Goals are designed to help you identify if what you want to achieve is realistic and determine a deadline. When writing S.M.A.R.T. Goals use concise language, but include relevant information. These are designed to help you succeed, so be positive when answering the questions.

________________________________________________________________________

Type your responses under each prompt.

**Step 1:** Think about your long term goals and answer the following (it’s okay if you are unsure or if these change – just give it a try!)

1. Where do you see yourself in 5-10 years?
2. What kind of work are you doing? What is the career you have?
3. Why was choosing this goal important to you?

**Step 2:** Think about some intermediate goals you want to accomplish in your undergraduate experience and answer the following:

1. What do you need to accomplish in the next 2-5 years in order to reach your long-term goal or to help you formulate a long term goal? For example, do you need to explore one or more areas of interest? Who can help you do this? What kind of information will be helpful to you?
2. What do you need to do to do this year to make progress toward defining a goal or toward focusing your efforts? For example, can you identify the resources available to help you make decisions?
**Step 3:** Pick two short term goals for this semester and/or year that will help move you forward:

**Initial Goal** (*Write the goal you have in mind):*

1. **Specific** (What do you want to accomplish? Who needs to be included? When do you want to do this? Why is this a goal?)

2. **Measurable** (How can you measure progress and know if you’ve successfully met your goal?):

3. **Achievable** (Do you have the skills required to achieve the goal? If not, can you obtain them? What is the motivation for this goal? Is the amount of effort required on par with what the goal will achieve?):

4. **Relevant** (Why am I setting this goal now? Is it aligned with overall objectives?):

5. **Time-bound** (What’s the deadline and is it realistic?):

**S.M.A.R.T. Goal** (Review what you have written, and craft a new goal statement based on what the answers to the questions above have revealed).
Appendix B: Proactive Risk-Based Advising System for Gateway Scholars

Objective 2.a. Monitoring On/Off Track Students: Supporting Material

DBS Core Course Early Detection of Struggle Brainstorm

- Which week would it make sense to implement this in? Week 3 and 6 – may vary by course
  - Which metric should be the trigger?
  - Options –
    - Miss one or two labs
    - Do not turn in one or two homework assignments
    - Do poorly in quizzes or exams
    - Missing lab report
- Have formal outreach email for TA to send (should they cc the lecture instructor?)
- Include language about:
  - How to train TAs – need protocol.
- Attendance idea: Google sheet for attendance for the whole class.

TA check in emails

Hi X student first name X,

I just wanted to check in and see if everything is okay. I noticed that you did not turn in two assignments on Blackboard/missed lab for Biol 192 (Biology 2: Diversity of Life) in the last few weeks. In past semesters we have found that students who complete all (or almost all) of these assignments end up learning more and earning higher course grades. You aren’t getting this email because you are “in trouble.” I know that you can do well in this class, and I am happy to meet with you to discuss strategies to help you succeed or identify campus resources that can be helpful with all sorts of barriers.

One strategy might be to look at your schedule/calendar for this semester and identify the times when you will complete the pre-class quizzes. They are due each week at 4:30 pm on Tuesdays.

Your 192 Lab TA –

X your name X

Appendix C: Integrating EBIPs into the DBS Core Supplemental Material
Objective 3.a. Encourage EBIP usage in core courses and labs

Strategies for Inclusive Classrooms/Courses: Workshop Activity
The workshop handout is available as a web-based document through the link provided: Inclusive Classrooms Workshop Activity. Please note, this activity has been adapted from other researchers with attributions noted on the document footer.

Synergies for Success Planning and Documentation

Synergies for Student Success (SSS) meeting follow-up

Meeting 1: Sept. 6, 2019


Goals for Fall 2019 semester:

✔ Step 1 completed (Sept meeting): Obtain, review, synthesize info from existing surveys

Actionable steps from the 9/6/19 meeting were around planning topics to be discussed during two DBS faculty meetings in this fall. An outline of those meetings and action items for each are listed below.

Jen expressed interest in accessing the SESI confidence and rapport survey questions from Vicki for use with graduate students and faculty.

Proposed faculty meeting discussions:

Faculty Meeting, Topic 1: Focus on Culture of Teaching (early Oct. or late Sept.?)

Purpose: Use the outcomes from COPUS and Rapport to close the loop and engage faculty in thinking about EBIP effectiveness and linkage to student engagement and belonging.

Action to be taken to facilitate this meeting:

• Make pre survey to assess extend to which faculty include activities that promote autonomy, relatedness, and competence in their course- Amy can do in google forms
• Frame why this is important (Ebscore & Tromp) – Jen?
• Identify the outcomes from the S-STEM grant that are most important to share with faculty to guide the conversation – These are outlines in the S-STEM report
• Decide on what type of contextual information from the literature would be useful to share (i.e. why to do we care about sense of autonomy, relatedness, and competence) – Vicki?
• Case study or “skit” on effective EBIPs vs. “going thru the motions” EBIPs – Jen & Amy  
Deliverables: Results of the pre-survey and in the spring results of this assessment again.

Faculty Meeting, Topic 2: Inclusive Teaching and Documenting Progress (Late November?)

**Purpose:** Make concrete what good teaching looks like and process for showing improvement

**Action to be taken to facilitate this meeting:**

- Valuing inclusive teaching and faculty development
- Thinking about inclusive teaching – syllabus or transparent assignment activity
- Discussion of ideas like “purpose” statements in syllabi for example or how faculty want to be perceived by students vs what the syllabus says...
- How do we capture teaching methods that are based in the literature? This could be a discussion about types of questions to add to the teaching evals at the department level as well as other methods to show the impact of effective evidence based practices and training? (Amy collect current ways faculty do this as a starting point?)

Deliverables: Before and after syllabi; New departmental level course assessment questions to deploy in spring 2020

Objective 3.a. Inclusive Teaching Practices Faculty Development Content

The following linked documents are referenced in the Synergies for Success notes above and were included in the faculty development workshops in Fall 2019.

1. Workshop 1 PowerPoint
2. Workshop 2 PowerPoint
3. Pre-semester Student surveys
4. Syllabus Sorting Activity
5. New Syllabus Guide with Inclusive Teaching Additions

Objective 3.b.ii. Rapport Scale Changes and Data

As discussed in objective 3, the GSP team agreed that adding questions to the existing brief rapport instrument (BPSRS) would be helpful to increase the nuance in our data. We introduced questions that are linked to self-determination theory (SDT) and provide a measure of thriving (Jones, Osborne, Paretti, & Matusovich; 2014; Ryan & Deci, 2000; Vanasupa, Stolk, & Herter, 2009). A factor analysis including the Fall 2019 rapport survey data clearly indicated that the five BPSRS items and four faculty rapport items were measuring the same construct.

We used a Rotated Factor Pattern (varimax rotation), and factor loadings greater than 0.4 are starred; values are multiplied by 100 for presentation. The 4-factor solution explains 66.7% of the total variance. See figure 9 for details.
**Figure 9 Rotated factor pattern (varimax rotation) with factor loadings for BPSRS and SDT construct identification**

<table>
<thead>
<tr>
<th></th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
<th>Factor 5</th>
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<td>63 *</td>
<td>40</td>
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<tr>
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<td>* 8</td>
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<td>81</td>
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<td>20</td>
<td>11</td>
<td>80</td>
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</tbody>
</table>

- **% var expl**: 43.1% 10.2% 7.2% 6.1%

**COPUS Report (Fall 2019)**

Evidence-Based Instructional Practice (EBIP) observations in core biology courses via the COPUS continued during the Fall 2019 semester, however, we opted not to measure the laboratory courses as prior observation and analysis indicated very little difference across laboratory sections.

**Methods**
Brittnee Earl, Instructional Transformation Project Manager for the Center for Teaching and Learning, conducted COPUS observations in the biology core courses (BIOL 191, 192, 304, and 310) during Fall 2019, consistent with prior observations. No observations were conducted during Spring 2020 as the patterns that had been previously noted were also evident in the Fall 2019 data. Even prior to the unexpected disruption in Spring 2020, the team concluded that the best use of time and resources for objective 3 would be to analyze the data that has been collected to prepare it for broader dissemination. Two observations were conducted per faculty lecture in the two part courses (BIOL 192 and 304), and three per lecture faculty in the traditional 15-week courses (191 and 310). The COPUS analysis, which provides a cluster code for each observed faculty member, was analyzed with the SDT data by statistician Laura Bond. The resulting plots provide a perspective about the intersection of instructional activities and SDT measures for rapport. In addition to the COPUS coding, Earl records brief observations to contextualize the coding for each two-minute segment during the observation. Thus, for each segment of the course, we can describe the teacher’s actions, the students’ actions, and the context for those actions (e.g., topic, connection to other segments, behaviors that are not coded, questions that arise, numbers of people interacting, etc.). These mixed methods data have been analyzed to generate a more nuanced understanding of the intersection between EBIPs and student-professor rapport.

Enhance Learning Assistance Program [3d]

Fliers posted for DBS students to inform them of new space available to support their need to study between classes:

Looking for a place to study between classes?

Check out the following spaces:

NEW: Second floor of the South east corner of the Math building (end of the hall). This is near lots of the biology labs and the Biomolecular Research Center and is a good place for group or individual studying!

or check out these other locations that have desks/chairs for studying:

- 1st floor of the Multipurpose building
- 1st floor of Riverfront Hall
- all floors of the library – there are tons of study tables and areas here!
## Appendix D: Engaging students in co-curricular activities

### Objective 4.a. & 4.a.1. BIOL 198 Course Details

**Table 15 Course outline for BIOL 198**

<table>
<thead>
<tr>
<th>Week</th>
<th>Complete before class (on BB): Due In class, Friday 3pm</th>
<th>In-class topic/activity</th>
<th>Follow-up (on BB) Due before next class period (Friday at 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>None the first week</td>
<td>Topic: Welcome and course introduction</td>
<td>Journal: Tell me about you and your path.</td>
</tr>
<tr>
<td>2</td>
<td>Watch: TEDtalk</td>
<td>Topic: Interest and Passion/Mindset Particiate: Mindset</td>
<td>Journal: How might you use this knowledge to approach problems?</td>
</tr>
<tr>
<td>3</td>
<td>Do: None</td>
<td>Topic: Bio-Molecular Research Particiate: Visit a BioMol Research Lab and take a tour</td>
<td>Journal: None</td>
</tr>
<tr>
<td>5</td>
<td>Do: How might you use chemistry in your future and what do you think the classes will be like?</td>
<td>Topic: Biology + Chemistry = Amazing! Particiate: Guest Dr. Henry Charlier</td>
<td>Journal: How did his visit change your perception of chemistry?</td>
</tr>
<tr>
<td>6</td>
<td>Do: Read article</td>
<td>Topic: Success strategies Particiate: Panel discussion with current students</td>
<td>Journal: How do you think you can use the strategies discussed, what do you still have questions about?</td>
</tr>
<tr>
<td>7</td>
<td>Prompt: Research opportunities</td>
<td>Topic: STEM undergraduate research opportunities and how to apply</td>
<td>Journal: Make a plan to apply for those opportunities.</td>
</tr>
<tr>
<td>8</td>
<td>Do: write about interests and future goals</td>
<td>Topic: VIP opportunities in research Particiate: Guest Dr. Jenn Forbey</td>
<td>Journal: Research an opportunity and make a plan for your undergraduate path</td>
</tr>
<tr>
<td>9</td>
<td>Read and Prompt: TBA</td>
<td>Topic: Information synthesis &amp; IdoTeach program Particiate: Guest Dr. Leslie Atkins</td>
<td>Journal: What are some courses you will have to take that you don’t want to and how might you need them and the info in them?</td>
</tr>
</tbody>
</table>
|   | **Read:** Podcast | **Topic:** SMART goals  
Participate: Make your goals! | **Journal:** Refine your goals and take action |
|---|------------------|---------------------------------|-----------------------------------------------|
| 10 | **Watch:** Desktop Diary  
(choose your own) | **Participate:** Create your 4-year plan and consultations | **Journal:** Check in with Clay about your 4-year plan |
| 11 | **Reflect:** On how you would teach another person something you are an expert in | **Topic:** Metacognition and expertise  
Participate: Training to be an expert | **Journal:** How can you apply metacognition to your studies? |
| 12 | **Do:** Write about barriers to motivation | **Topic:** Finishing the semester  
Participate: Class wrap up and reflection | **Journal:** TBA, follow-up motivation goals |
Part one:

Rank each topic from most impactful/useful (1) to least (11) and do not use the same rank twice. In general, think also of the accompanying prompts and journals for each topic when you consider your choices.

<table>
<thead>
<tr>
<th>Topic, Presenter</th>
<th>---</th>
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</thead>
<tbody>
<tr>
<td>Neurobiology of learning &amp; Mindset, Dr. Ulappa</td>
<td></td>
</tr>
<tr>
<td>Social behavior &amp; learning, Dr. Ulappa</td>
<td></td>
</tr>
<tr>
<td>Biology + Chemistry, Dr. Charlier</td>
<td></td>
</tr>
<tr>
<td>Success strategy panel with other Gateway Scholars</td>
<td></td>
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<tr>
<td>SMART goals</td>
<td></td>
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<tr>
<td>Framing failure, Dr. Stieha</td>
<td></td>
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<tr>
<td>Undergraduate Research Opportunities, Catherine Bates</td>
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<tr>
<td>Metacognition and expert thinking</td>
<td></td>
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<tr>
<td>Information Synthesis and teaching, Dr. Atkins</td>
<td></td>
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<tr>
<td>4 – year planning workshop</td>
<td></td>
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<tr>
<td>Bio-medical research center visit</td>
<td></td>
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<tr>
<td>Motivation and barriers</td>
<td></td>
</tr>
</tbody>
</table>

Briefly discuss two topics from the list above that you think would be most useful to ALL biology students and why?

What is a topic that we did not discuss in this course that you think would have helped you this semester or could be useful to future students?

Was there one reading/video/activity/discussion that really resonated with you? If so, what was it and what did you take from it?

Part Two:

Compare the “you of today” to the “you of the first week of the semester” and rate how you have changed in that time related to the topics below.

A) How aware are you of resources on campus related to student success (i.e. tutor sessions, undergrad research opportunities, etc.)?

| Less aware | -3 | -2 | -1 | no change | 0 | more aware | 1 | 2 | 3 |

B) How likely are you to use those resources (from part A)?
C) How often do you reflect on how you learn and make decisions based on the knowledge?
Less often                              no change                                    more often
-3                  -2                  -1                  0                  1                  2                  3

D) How has your awareness of the types of careers that are possible in the field of biology changed?
There are fewer than I thought           no change                        There are more than I thought
-3                  -2                  -1                  0                  1                  2                  3

E) How has the network of people (fellow students, graduate students, faculty) that you know changed?
Gotten smaller                      no change                             Expanded
-3                  -2                  -1                  0                  1                  2                  3

F) Has your perception of scientists/faculty members changed and if so, how?

Supporting material for objective 4.b.
Flier disseminated through Blackboard and email inviting biology and GSP students to attend fall 2019 events:
NSF S-STEM Gateway Scholars

You're Invited to Participate!

Mark your calendars and sign up via the "NSF Gateway Scholars in Biology"Orgsync page

Day Hike to Dry Creek Trail with BSU Outdoor REC

Sunday, Sept 30
Leave campus at 11:30 and return by 5
Transportation and lunch provided, sign up via Orgsync

Undergrad Research Opportunities INFO Session

Thursday, October 18
1:30-2:30 ILCS 401
Sign up via Orgsync

Catherine Bates from the BSU STEM Institute will discuss upcoming fellowship and research award opportunities and:
- application details
- deadlines
- tips for selection

Guided tour of the BSU Biomolecular Research Center

Thursday, November 8
1:30-3
Sign up via Orgsync

Meet at the BRC (in the math building) for a tour of the research center and:
- see research in action
- talk to grad students and faculty in the program
- test out their technology
- learn about ways to get involved

Department of Biological Sciences Faculty Lightening Talks

Tuesday, November 27
3-5 pm
Sign up via Orgsync

Come here DBS faculty talk about their research and teaching in 5 minutes. Then talk with their labs to see what is happening in our department!

All Events are FREE

Questions about events? Contact Dr. Amy Ulappa, Program Coordinator at amyulappa.boisestate.edu or 208-426-4590

Questions about advising? Contact Clay Cox, DBS Academic Advisor at ccox.boisestate.edu or 208-426-2843
Appendix E. Summarize and Reflect

Objective 5.a.iv. Rapport Scale Item Statistics Methods

After confirming that responses were complete across entire sub-scales (e.g., all items for Perceived Competence were answered by students, or none of the items for Perceived Competence were answered), we averaged the responses over the scale, keeping the summary value in range of the available choices (e.g., 1-4 or 1-5). We did this for each outcome: Perceived Competence, Professor Relatedness, Effort, and BPRS. For each criterion, we conducted either a one-way Analysis of Variance (ANOVA) (Biology course, student academic level) or a two-group t-test (gender, whether they were a STEM major (STEM); whether they were an under-represented minority (URM)). Overall p-values for the tests were reported. If that value was statistically significant (less than 0.05), all pairwise comparisons were made and p-values adjusted using the Tukey method, and identified as significant where these adjusted values were less than 0.05 (but they were not otherwise reported). For these comparisons, mean and standard error are reported.

Within each class, we conducted two-group t-tests comparing gender, URM status, and STEM status, or one-way ANOVA comparing class level. All overall p-values were adjusted using a Hochberg correction, which is based on the Bonferroni method but less conservative (Hochberg, 1988), and adjusted values that were less than 0.05 were flagged.

All analyses were done using R (R Core Team 2020) with RStudio (RStudio Team, 2019) and primarily the libraries tidyverse (Wickham et al., 2019) and emmeans (Length, 2020).