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Indiana Louis Stokes Alliance for Minority Participation (IN LSAMP)

Year 2: Compendium of Evaluation Activities

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EXECUTIVE SUMMARY

The Indiana Louis Stokes Alliance for Minority Participation (IN LSAMP) has the goal of doubling the number of historically underrepresented minority (URM) graduates receiving a baccalaureate degree in a STEM discipline. The program's three strategies for achieving this goal are:

1. High-impact practice programs to increase the first-year, full-time URM retention rate by 2% per year at each institution and to strengthen disciplinary engagement;
2. Seamless transitions into STEM undergraduate and graduate degree programs; and
3. Mechanisms for project communication and information dissemination.

Goodman Research Group, Inc. (GRG), a research firm specializing in the evaluation of educational programs, materials, and services, was contracted to serve as the external evaluator for the five-year IN LSAMP program. This report is a compendium of evaluation activities conducted during Year Two of the grant, including site visits to four IN LSAMP campuses, attendance and observations at the inaugural IN LSAMP Research Conference and STEM Career and Resource Fair, and the second annual team member survey. These activities revealed strengths and areas for consideration, as summarized below.

STRENGTHS

- **Collaboration:** The infrastructure for an effective collaboration is in place. The IN LSAMP network is "dense" in terms of cross-collaboration, and the Alliance is characterized by concrete objectives, skilled and supportive leadership, and members who see collaboration as in their institutional-interest.

- **Institutional Support:** Alliance institutions have developed strong campus networks and institutional support for the project is high. Deans interviewed on several campuses confirmed that LSAMP fit in nicely with other institutional efforts to meet the needs of underrepresented minorities.

- **Meeting Students' Needs:** The high-impact program activities implemented to date by Alliance institutions have been very effective in meeting students' needs. Moreover, for some activities - on campuses visited by the evaluator – target numbers for student participants were exceeded.

- **Faculty-Mentored STEM Research:** Faculty-Mentored STEM Research has been implemented by all six campuses and is developing well-prepared STEM students. The benefits highlighted by students included preparing them for future coursework, giving them independence and building their confidence, increasing their lab skills, strengthening their resumes, and exploring career options.

- **Research Conference and Career Fair:** The inaugural IN LSAMP Research Conference and STEM Career and Resource Fair were meaningful and beneficial for students. Students were inspired by and received helpful information from peers, presenters, faculty, and staff about research and career opportunities. They had an opportunity to bring their own research full circle and practice their presentation skills, and the events went a long way toward building IN LSAMP community.

AREAS FOR CONSIDERATION

- **Continued Integration:** The Alliance is well-positioned to further integrate. As Year 3 gets underway, we recommend the team review the mutual goals they wish to reach together, take stock of the structure for supporting the Alliance's key strategies, identify common issues they are facing, and begin to strategically share resources to address issues. The two regional campuses would also benefit from greater information sharing between them, around their unique challenges.

- **Role Clarification:** This is a good time for the team to revisit the specific roles and tasks that team members have with regard to the overall Alliance (i.e., beyond their institutions). In particular, clarifying and distinguishing the roles of Director and Campus Coordinator would be beneficial. The team should also consider offering (more) professional development for Campus Coordinators.

- **Recruiting Transfer Students:** Recruiting transfer students has been challenging *for campuses other than the lead institution*, prompting concern about the Alliance's overall ability to meet its goal of creating seamless transitions and increasing program activities for transfers. Other campuses would benefit from learning more about the relationship between the lead institution and the community college partner around transfer students.

INTRODUCTION

The Indiana Louis Stokes Alliance for Minority Participation (IN LSAMP) started in December 2016 and has an end date of November 2021. It is one of 26 Alliances funded in 2016 through NSF's LSAMP Program.

IN LSAMP consists of six institutions. The three research institutions are Indiana University Bloomington (IUB), Indiana University–Purdue University Indianapolis (IUPUI), and Ball State University (BSU). The two four-year regional universities are Indiana University Northwest (IUN) and Indiana University South Bend (IUSB). The Alliance also includes Ivy Tech Community College Indianapolis (ITCC). IUPUI is the lead institution of the Alliance.

The goal of IN LSAMP is to double the number of historically underrepresented minority (URM) graduates receiving a baccalaureate degree in a STEM discipline. The degree baseline from 2015-16 was 278, making 556 the number to reach by 2020-21. The program's three strategies for achieving this goal are:

1. High-impact practice programs to increase the first-year, full-time URM retention rate by 2% per year at each institution and to strengthen disciplinary engagement;
2. Seamless transitions into STEM undergraduate and graduate degree programs; and
3. Mechanisms for project communication and information dissemination.

Goodman Research Group, Inc. (GRG), a research firm specializing in the evaluation of educational programs, materials, and services, was contracted to serve as the external evaluator for the five-year IN LSAMP program. The multi-method evaluation of IN LSAMP is designed to gather consistent data from key stakeholders across each year of the award. GRG's overall aim in this evaluation is to collaborate with the IN LSAMP team to gather data needed to understand how the program is unfolding and to demonstrate whether, and to what degree, the program is achieving its intended outcomes.

This report is a compendium of evaluation activities conducted during year two of the grant. During Year 2, we conducted site visits to four IN LSAMP campuses, attended and observed the inaugural IN LSAMP Research Conference and STEM Career and Resource Fair, and fielded the second annual team member survey.

SITE VISITS

PURPOSE AND METHODS

The purpose of the visits was for the evaluator to gain first-hand experience and direct contact with the Alliance's key players, campuses, and students and faculty. The goals were to obtain qualitative data on IN LSAMP progress in building an effective collaboration, implementing effective STEM education practices, facilitating seamless transitions into STEM undergraduate and graduate degree programs, and developing highly competitive, well-prepared diverse STEM students.

Protocols were developed for interviews and focus groups with project directors, campus coordinators, faculty mentors, and students. The protocols were modified versions of those used in the 2005 evaluation of the NSF LSAMP conducted by The Urban Institute.

The IN LSAMP Program Manager communicated with each site to set the date of the visit and the evaluator followed up by email with the purpose, goals, and desired activities of the site visits. Project directors and campus coordinators then developed agendas for the visits.

Table 1 summarizes the site visit activities/data collection. The number of informants per site ranged from 9 to 19, with a total of 53 informants across the four sites.

Table 1
Number of Informants per Site and Overall

	Institution A	Institution B	Institution C	Institution D	Total
Project directors	1	1	1[a]	--	3
Campus coordinators	1	1	1	1	4
Deans	0	1	1	1	3
Faculty mentors	6	2[b]	4	4	16
Graduate Assistants	2	--	--	1	3
Students	9	4	6	5	23
Total informants	19	9	13	12	53

[a] by teleconference
[b] during lab tour

The evaluator started each interview or focus group by explaining that the site visits were one piece of the larger IN LSAMP evaluation. Faculty and student informants were also told their individual responses during interviews and focus groups would be kept confidential. Sessions were digitally recorded, when feasible and with participants' permission.

FINDINGS

Institution A

Institution A is a public coeducational research university in east central Indiana, with two satellite facilities. The institution offers Associate's, Bachelor's, Master's, and Doctoral degrees. Total enrollment is 21,998, of which 77% (N=17,011) are undergraduates. Five percent (N=876) of undergraduates are transfer-in students. A vast majority (79%) of undergraduates are White; 8% are Black or African American; and 4% are Hispanic/Latino. The first-to-second year retention rate is 81% and the overall graduation rate is 62%. Institution A was a member of LSAMP Indiana from 2002 through 2013, and it was clear that the Director's experience had made her a valuable asset to the lead institution in terms of overall Alliance management and administration.

Program Administration

The evaluator conducted separate interviews with the Director and Campus Coordinator. The LSAMP program at Institution A is located in the Chemistry Department. The Director explained that this came about due to the history of Chemistry faculty mentoring students. LSAMP then brought a focus on minority students.

One of the strengths of program administration noted at Institution A was the close working relationship between the Director and the Campus Coordinator. The two reported meeting regularly to discuss goals, strategies, and responsibilities. The Director described herself as the *"sous chef"* to the Campus Coordinator. The Director had more links to the University-wide community and so one of her key functions was to liaise with internal stakeholders.

The Campus Coordinator is a full-time member in the Chemistry Department. Her major responsibilities for the LSAMP program included coordinating faculty outreach, Graduate Assistant supervision, and program events.

Institution A had a freshman orientation in the spring, after which the Campus Coordinator sent *"call-outs"* to all LSAMP-eligible students. The LSAMP program hosted a picnic prior to the start of the fall semester, to allow students to get to know each other.

While there was not a true application/selection process, the Campus Coordinator did run participants through an application just to confirm their eligibility. There was also not a formal process for monitoring student progress, although the Campus Coordinator asked peer mentors to check in with students about their progress.

LSAMP participants signed a waiver agreeing to keep the program appraised of their activities for three years after graduation.

The program suggested to potential student participants that, if they had a faculty mentor in mind, they contact them directly. The program reached out to faculty in all of the STEM fields to ask about their interest in serving as an LSAMP faculty mentor and maintained a list for students who did not have a faculty mentor of choice. Because of the LSAMP program's history at Institution A, faculty that had been at the institution for some time were already aware of the program. The program ran an orientation for faculty mentors and faculty mentors also watched training videos developed by IN LSAMP.

In terms of resources/support provided to the faculty mentors, Summer Research Scholars received $500 in research supplies.

There was not a formal application/selection process for faculty mentors or a formal process for matching mentors with summer research scholars or evaluating mentors.

In terms of interaction and collaboration among Alliance members, from the Director's perspective, the initial focus was on building infrastructure and now the Alliance has *"room to extend."* In her opinion, the two key mechanisms currently connecting the Alliance members are the Project Manager and the website. In particular, the uniform guidance provided by the Project Manager has helped members *"be on the same page."* The members also have an annual retreat and the Director expressed a desire for increased interaction with each other at this event.

The Director is quite satisfied with the lead institution. This is important because there were some problems with new management at the former lead institution (at the end of the last LSAMP program in Indiana), including lack of connection to the member institutions and unrealistic demands. Her only suggestion for the current lead institution is that they consider offering a little more preparation of and professional development for Campus Coordinators.

Given the challenge of travel between the Alliance institutions, the Director advocated for graduate program information at the annual conference so that students could more easily identify opportunities across institutions. The Director also mentioned an interest in starting and collaborating on an LSAMP journal.

The most critical component of Institution A's LSAMP program, as identified by the Director, is the Peer Mentoring Program. First-year students met once a week during the first eight weeks of the year. There were also group events, including some focused on careers.

Another critical aspect of the program was the development of community among students. This was aided by regular meetings throughout the summer and fall.

The Director saw two key challenges for Institution A's LSAMP program. First, the program had challenges recruiting mentors, particularly in architecture, geology, and math. The second challenge was recruiting/attracting transfer students. The Campus Coordinator also identified attracting transfer students as the biggest challenge, adding that there were very few transfer students at Institution A and they had not responded to the program's outreach.

While we were unable to meet with senior institutional administrators during the site visit, according to both the Director and the Campus Coordinator, campus stakeholders were very supportive of the program. For the Campus Coordinator, the key lesson learned in implementing the program was the importance of obtaining buy-in across the campus.

Faculty Mentors

The evaluator conducted a one-hour focus group with six faculty mentors, representing Biology, Chemistry, and Computer Science.

Mentors indicated having watched training videos on mentoring developed by IN LSAMP. Mentors described their roles in a variety of ways. One or two appeared more laid-back and hands-off, with students directing their own work and learning. Most described a more formal training relationship. The mentor role was also different depending on the size of the mentor's lab. Mentors with several mentees engaged in both individual and group mentoring activities. Another factor affecting the mentor role was the student's experience, with more experienced students having more independence.

> *"My field is computer science. We don't have a lab, so we have a standing meeting each week and communicate by email, but she is pretty self-directed."*

> *"My student is interested in specific research and wanted to pursue this. The first month I was away, but now that I am back we will meet on daily basis."*

> *"I mentor with training (lab procedures, science presenting, etc.) and ween them on to their own experiments and check in daily to set up for the day. Then they bring data back to me. Every two weeks in a group meeting we do a presentation on the last two weeks of work."*

"Contact is every day and as it is his second year, I let him decide more and make some of his own hypotheses."

Faculty described LSAMP students as *"very enthusiastic," "motivated,"* and *"dedicated."* They did not distinguish between LSAMP and non-LSAMP students. Some faculty were *"sought out"* by their students, while others approached their mentees.

"I sought one of mine out after having her in classes. Maybe not the brightest student but dedicated, tried really hard to know the material, which is sometimes hard to find. As for my newest student – I can feel her excitement building and I don't think she knew what the experience was going to be like but she is excited and is learning quickly."

"I don't see a big difference that LSAMP students are more or less motivated [than other students]. It's nice to have them in the lab and to have some resource and so they have a stipend."

"The program is running alongside of other programs. How people are paid is the only difference, and outside of that they work alongside each other in the labs."

"More of my students were able to go to a national meeting they would not have been able to go to otherwise [due to LSAMP funding]."

Mentors felt they had derived benefits from their involvement with LSAMP. They saw LSAMP as a *"great pathway to get students in [to the lab]."* They also believed LSAMP *"helps to diversify the group,"* and were gratified to see that *"the students all interact with one another."*

Mentors identified several ways in which the Summer Research Program benefited students, including acquiring problem-solving and other important skills, honing their interests, preparing them for the future, and letting them experience ownership of their projects.

Mentors were quick to add that these benefits were not unique to LSAMP; rather they were true for all summer research opportunities. LSAMP was viewed as a mechanism for reaching *more* students.

"They are picking up professional and problem solving skills."

"I think we try to have an open dialogue about going from classroom to research. Things almost never succeed on the first try, something they have to learn."

"Hirers want people who can find what went wrong, why, and how to fix it. You can't do that in teaching labs, so the research is the only chance to have them fail and figure out why they failed."

"Resilience is huge; you can do everything right and it could still be wrong in a research lab. It's different than studying for an exam."

"Student gets practice on a budget and with small fund to manage their resources for projects. Not an opportunity other students get to practice."

"The effects are huge, whether you are LSAMP or not. The experience helps students to move on to whatever they want to do next and find what they want to do."

"[It helps them] find out early if this is their path or not."

"Ownership of a project, the possibility of discovery; we don't know everything. Students are trying something that could be very important to science."

Faculty mentors found the LSAMP program timeline challenging in terms of conference presentations. As one mentor explained, *"I'm going to a meeting on Friday because it is the only one that fits into the timeline of funding. My student is not ready to present, but it is the only meeting we can go to. We need a year window or longer; ideally I would like to present [with my student] 10 months from now."* Another mentor added, *"The deadlines for abstracts occur earlier than funding, but this is not a specific issue to just LSAMP."*

Mentors also wanted to see an even more highly visible LSAMP program at Institution A. As one mentor put it, *"My student is tentative and I thought a lot about 'How do students encounter that this program exists?' Students with tentative personalities might not find this program. We need a good net to capture them."* Another mentor contributed, *"There is a challenge in identifying students who are eligible and talented in our classes. Talented students need to be funneled into the right place, and it is a bigger road block in the program and undergraduate research, and getting them involved earlier. Need to make them know there is this option and get the contacts."* Other mentors agreed that recruitment could be improved. For instance, one mentor said, *"I try to identify those who would be a good candidate even if not for my own group. There could be a better mechanism for finding students and targeting eligible candidates."*

One final suggestion from faculty mentors was that the program create a "fact sheet" for mentors on what is available through the program (e.g., meetings, funding).

Graduate Assistants

One distinguishing characteristic of Institution A's LSAMP program is that it has a role for Graduate Assistants. The evaluator conducted a 30 minute focus group with the two Graduate Assistants (GAs). One was pursuing a Master's degree in Biology and certificate in Biotechnology. The other was seeking a Master's degree in Chemistry. One GA started in the fall and one in the spring. While they worked together, one focused on the Peer Mentoring Program during the academic year, and the other took the lead with the Summer Research Program.

Their tasks included but were not limited to helping to match students with peer mentors, supervising peer mentors, supervising math and chemistry tutoring sessions for LSAMP and other students, helping to organize LSAMP events, and holding weekly meetings with the summer research students. They provided peer mentors with resources for mentoring students and helped ensure that they were successfully fulfilling their roles.

They described the LSAMP peer mentors as having good leadership skills and good communication skills with their mentees. They identified accountability (i.e., timely communication with the GAs) as an area for improvement.

They described the summer research students as reliable and remarked on the growth they had seen in students, in terms of confidence, leadership, technical skills, learning the process of science, and working with others. They noticed the sense of community developing among students. They felt the students could improve on their professional skills; one example they gave was the low quality pictures students had provided for their profiles. They also relayed that the students were interested in having more research experiences that extended beyond the summer.

The GAs had two suggestions for improving the program overall. First, they wanted to see the program reach more students and wondered if current students could be involved in more of a collective effort to get the word out and help with recruitment. Second, they spoke about the importance of preparing students for the trial-and-error nature of research and giving them motivational messages to keep them from getting frustrated.

Students

The evaluator conducted two 45-minute focus groups with students during the site visit. One of the focus groups was with students who were having their first faculty-mentored research experience that summer. The other group of students had started their research in summer or fall 2017 or spring 2018. Two of the students in the second group also had experience as peer mentors. Most of the students were rising seniors; two were rising juniors. In addition to the focus groups, the evaluator observed two lab sessions.

Students had come to be LSAMP participants in one of two ways. Either they responded to a recruiting email from the program, or a faculty member or advisor recommended the program to them.

For the most part, students did not articulate specific expectations of the LSAMP program. As one student put it, *"I didn't really have any expectations, they just gave me suggestions."* Another student explained, *"Sometimes you don't really know what to expect."* And another added, *"I just went with the flow."* One student had been more intentional, stating, *"[The summer research program] met most of my expectations because I was looking for something relevant to my job and related to something I am going to do in the future."*

Regardless of whether they had explicit expectations of the program, all the students participating in the focus groups described the summer research program as very valuable. This was true even for students whose research was in a different discipline than their major. The benefits highlighted by students included fulfilling research requirements, preparing them for future coursework, giving them independence, building their skills, strengthening their resumes, and exploring career options. In particular, students had clearly gained experience with the scientific research process, including formulating research questions and using very exacting procedures.

> *"At first I did not think it would be very helpful for me because I am a bio major and I am technically in a chemistry lab, but it actually ended up being really helpful in terms of being able to prep certain things because you don't get to do that in labs for classes. The sanitation procedures have been really helpful as well. "*

> *"Certain classes that I haven't taken yet, I've learned most of what they're learning just by the experience here or by using the instrument for my research and being able to analyze the data that I get. It prepares me and gives me that experience that industry or chemistry companies will look for when they want to hire you."*

> *"I'm learning how to answer a question that I don't know the answer to – in research. I'm not really used to that because in class labs, you already know what the outcome is going to be. So, this is different in that way. And, learning how to be patient and to manipulate what you have, not to get the answer that you think should happen."*

> *"It lets you experience failure repeatedly so you can learn from it. I've never done so many experiments. I've failed about 75% of the time because you're new at it, but every time you learn something new from it."*

> *"Just having the opportunity to perform under-graduate research is not only a resume- builder but it also allows you to find your path and determine is this is what you want to do. We can all say we want to be researchers but you don't know what it is until you apply yourself. So, I feel like it opens the door for you to fully involve yourself and figure out if this is your passion."*

"I have never really thought about research because I'm more focused on medicine, but when I met my mentor she really wanted me to do research and then do the LSAMP program. It's helped me think about different things that I could do in the future and also with critical thinking skills as well. I feel like these past four or five weeks I've learned so much and done so much."

"We had the opportunity to go to Eli Lilly, which I did appreciate. I've met a couple of people that work in industry; one of them … she works there … meeting her and getting her card and her information was very exciting. Just being able to experience the industry portion of science, I appreciated that."

During lab observations, the evaluator had an opportunity to observe students at work and ask them questions. The students were highly engaged in hands-on tasks. They appeared competent and confident and were eager to answer questions, which they did clearly and effectively. Their answers demonstrated their ability to interpret the results of their experiments.

Speaking of LSAMP more broadly, on the one hand, students said things such as, *"I think LSAMP is the same as other research groups because I work with people that are not in LSAMP and we do the same things, so I don't think we receive any special treatment."* Eventually, however, students pointed to the focus on minority students as what distinguishes LSAMP from other STEM research programs on campus. As one student summed it up, *"Having a group of minority students is a positive thing to have, so it is like a community."*

This sense of community was evident in the students' harmonious and trusting interactions during the focus groups. During their weekly meetings, students explained that they shared their experiences and helped one another through struggles. Their involvement in LSAMP activities and the support they received from each other and from their mentors appeared to have instilled a sense of belonging, not only in their LSAMP cohort, but in their labs and on campus more generally.

A sense of community was also noted during lab sessions. LSAMP students were working in labs alongside other (non-LSAMP) students. Their interactions were positive and helpful. Faculty mentors were observed engaging with students in meaningful ways that promoted learning and a sense of commonality.

Students were positive about the math and science courses they had taken at Institution A. They described professors as helpful and found that the courses they took had prepared them for their summer research experiences. They also felt the courses had helped them self-direct their own learning.

As a group, students spoke most favorably about Cell Biology, adding that it was a real advantage to take that particular class earlier rather than later, despite advice to the contrary. In contrast, students were less positive about Organic Chemistry, perhaps because of its difficulty level.

> *"I really like the professors, they are very helpful."*

> *"They prepared me for what I am currently working on."*

> *"They helped me teach myself. Cell biology was really helpful."*

> *"Chemistry, algorithm, the second half of organic chemistry, and biology were most difficult."*

> *"Cell Biology is the best decision I have made because it covers so many other classes. By taking that class early, you have such an advantage. I was told not to take it early because it was too hard."*

> *"I loved Cell Biology. It was one of my favorite classes, maybe because of the professor."*

> *"The worst class I took was Organic Chemistry. I only took the first part and that was enough, because it was really hard."*

> *"I took Organic Chemistry and I don't think it helped me, considering what I wanted to pursue. I didn't like doing it."*

When it came to discussing plans for the future, most students had graduate school in mind, and all seemed intent on continuing in a STEM field. Some students were already thinking past graduate school to work; both research and industry were mentioned as possibilities. Only one student said, *"I have no idea what I am going to be doing."*

Considerations/Recommendations

Institution A is a resource for other IN LSAMP institutions in terms of the Director-Campus Coordinator relationship, the liaisons with internal campus stakeholders, the Peer Mentoring Program, and the development of community among scholars; in addition, other institutions should contact Institution A if interested in the idea of an LSAMP journal. Specific recommendations for Institution A (in addition to overall recommendations made at the end of the report and highlighted in the Executive Summary) included:

- Responding to mentor frustration over conference/program timeline mismatch;
- Creating a Fact Sheet for Mentors; and
- Adding preparing students for the trial-and-error nature of research to the faculty mentor orientation (if not already included).

Institution B

Institution B is a regional campus of Indiana University. The institution offers Associate's, Bachelor's, and Master's degrees. Total enrollment is 5,591, of which 94% (N=5,244) are undergraduates. Nearly half (47%) of undergraduates are White; 18% are Hispanic/Latino; and 13% are Black or African American. The first-to-second year retention rate is 65%; the overall graduation rate is 28%; and the overall transfer-out rate is 31%. Institution B was a member of LSAMP Indiana (Phase II) from 2007 through 2013.

Program Administration

The evaluator conducted a 45-minute interview with the Campus Coordinator and then had a 45-minute teleconference with the Director who was out of the country at the time of the site visit. The Campus Coordinator and the program's Administrative Assistant also attended the teleconference.

The Director had been involved in LSAMP since it first began at Institution B. The Director's key responsibilities include developing LSAMP activities, approaching stakeholders, liaising with potential partners, and troubleshooting any problems that arise.

n the Director's mind, the main ways that Institution B has interacted with other partners in their Alliance has been through hosting partners' visits to the campus. The Director remarked on the similarities between the two IU regional campuses in the Alliance and wanted to know more about how the other regional campus recruits students for LSAMP.

The Campus Coordinator joined the project in fall 2017 and coordinated three activities related to the retention of STEM students. The Coordinator started the Institution's One-Step STEM Tutoring Center in fall 2017. The site visit included a tour of the center, which is a large, well-equipped space. The center provides tutoring for all gateway STEM courses during the academic year, including Biology, Chemistry, Computer Science, Geology, Math, and Physics.

The Coordinator explained that the center had *"competition"* from the Institution's Math Department, which runs a Math Assistance Center, so students in need of math tutoring would be most likely to visit that center. The One-Step STEM Tutoring Center is open to *all* IU Northwest students, STEM and other majors. Services are advertised through STEM faculty and advisors, in intro STEM classes, on digital monitors, in the Red Hawk newspaper, and through flyers.

Program records indicated an average of 4 students served per week, although the Coordinator said this was an underestimate due to both tutors and students forgetting to sign in. Nevertheless, moving forward, both the Director and the Coordinator wanted to see greater use of the center. In the 2017-2018 school year, 25 students were hired through the center, about half of whom were underrepresented minorities in STEM.

In spring 2018, the program began its second activity, Math Placement Peer Coaching, set up in coordination with the Mathematics Department and several other university services (i.e., Student Programming, Admission and Placement Testing Offices, The Advising Council), and available to all students who have yet to take a math placement test. The service was advertised through advisors and electronic communications.

This program was slow to start up so the administrators wanted to also provide an online option for this activity. They built this on an already existing program for at-risk students and the Coordinator built another three levels to the program. Most of the students who came were at Level 2. The activity is meant to serve two purposes: one is to build students' confidence and the other is to prepare them for the placement test so that they do not end up bored in a less challenging class than they can actually handle.

An initial challenge was the lack of qualified and available underrepresented minorities to hire as tutors. This was something the Coordinator sought to overcome in the next year.

A third planned activity, Assistance Learning Peer tutoring, did not get off the ground in 2017-2018. As the Coordinator explained, *"This is the program we are struggling with a little bit because it has direct competition with our SI [Supplemental Instruction] program."* The Institution has had SI programs in place for many years for courses with high DFW (D/fail/withdraw) rates. In addition, the Assistance Learning Peer Tutoring program was attached to classes, and relied on the initiative of professors to identify minority students as potential tutors.

The Coordinator clarified that the SI program had a shortage of minority peer mentors, so that this was a *"niche"* that LSAMP could fill. Indeed, one Biology professor had stepped up and identified two African-American students whom he would like to recruit as peer mentors for the fall. There was also a possibility of rolling out the program in one of the Computer Science courses, so as the Coordinator said *"it is slow but we are making some progress."*

An overall challenge for the Coordinator was accomplishing all these activities in the 20% of her time on the project. The administration was discussing the possibility of providing more time for her on the project. From the Director's perspective, the key challenges were recruiting students and faculty, noting that lab capacity also plays a role.

In addition to the three program described above, the Director explained that LSAMP also sponsors a STEM Summer Camp for high school incoming sophomores, juniors, and seniors. The camp is open only to URMs and there were 66 registrants at the time of the site visit, about seven weeks prior to the start of camp.

The Director and Campus Coordinator were satisfied with the role of IN LSAMP's lead institution, describing members of the leadership team as very supportive. The lead institution had also encouraged Institution B's team to send their students to the lead institution. However, the Director explained that their students want to be with their families and *"they are used to this place."*

The Coordinator added that, *"[The lead institution] has been serving as a model for many things, but [the lead institution] is a huge campus. They never had a problem hiring undergraduate or graduate students to work as peer tutors. Our students are a different body. Most of our students have families and most of our students are working. We are located in [location], which is an economically depressed area with a high crime rate. We get some of the best students, but it is hard for them to commit and it is hard to find enough minority students to commit to the things we are doing."*

The Director also praised his own team. He described the Campus Coordinator as *"devoted"* and *"bringing new ideas"* to the program. He explained that the Administrative Assistant gets things done immediately and with a positive attitude. He also felt the program had developed allies on campus who wanted to help minority students. Notably, the Director mentioned all the LSAMP students by name, expressing admiration for the way in which the students study and help themselves. The Directors was particularly proud of the high level summer research the students were engaged in and will present at national conferences.

Dean

The evaluator also had an opportunity to speak with the Dean of the College of Arts and Sciences. The Dean confirmed that LSAMP fit in nicely with other institutional efforts to meet the needs of underrepresented minorities and his own activities to advocate for student success. He would love to see LSAMP be one component of the institution's solution to the White-URM achievement gap. While Institution B is in a contracting phase (reducing from 6,000 to less than 4,000 students), the Dean reassured that there is promotion of and focus on STEM fields.

Faculty Mentors

The evaluator spoke informally with the three Institution B faculty mentors while visiting their labs, where she observed their students at work. It was clear that the mentors had spent time building positive and productive mentoring relationships with their LSAMP students. They appeared to take pride in the students' confidence in and ability to explain their research to the evaluator. They enjoyed an easy style of interacting with the students, joking about some of the tedious aspects of the research and speaking in a celebratory way about some of the accomplishments. Faculty were appreciative of the opportunity to have undergraduates work in their labs and to have a stipend accompany the scholar.

While working in their labs, students appeared comfortable with the scientific terminology they and their mentors were using. They seemed to be clear on what was expected of them.

Students

The evaluator conducted a one-hour focus group with Institution B's four 2018 Summer Research Scholars, two females and two males. Three of the Scholars were Biology majors and one was a Chemistry major. Two were rising seniors, one was a rising junior, and one was a rising sophomore.

Two of the students were NSF-Advancing Indiana Math and Science (AIMS) Scholars prior to participating in LSAMP, and were targeted for LSAMP through NSF-AIMS, a scholarship funded by the National Science Foundation and providing up to $10,000 per year for undergraduates pursuing STEM degrees. Another scholar heard about LSAMP through word-of-mouth the previous summer while involved in another research project. The fourth scholar had found out about LSAMP through her professors.

Two of the students had provided tutoring (one in physics and one in Biology) through the LSAMP program and another was slated to do so in the fall. The fourth student had *received* tutoring through LSAMP (in physics). The students were very positive about the LSAMP tutoring program for undergraduates and were looking forward to the opportunity to mentor high school students through LSAMP.

When describing their research, students were highly articulate and spoke confidently about complex scientific concepts. They also demonstrated an understanding of how their research connected to the real world.

The students cited several benefits of the Summer Research Program. They had become experienced in lab procedures and skills which had made them more comfortable and confident in the lab setting. They saw this as very valuable to the future research they hoped to do.

> *"I feel like if any one of us plan to go to a lab scenario we'd be a lot better off because we have a head start with being in these labs and working with these procedures."*

> *"The experience we get, especially with the lab scenario and being able to use that as background, like "Hey, I was able to experience this. I did the research. I was able to use all this equipment. And, the skills, gaining all of that, will help as well in the future."*

> *"It gives you experience in working in the labs and it prepares you for working in higher labs. I personally want to do research later on. This is helping me prepare for that."*

> *"Being able to do the research; it structures your time. You have your own deadlines. No one's over your shoulder telling you what to do, so you really have to stay on your deadline and get everything done; otherwise you'll be in trouble when it comes to the end and finishing up and getting all your data in from your project. It gives you an individual sense of importance and also it gives you the time and structure that you don't really have throughout the regular year."*

In addition, one student shared a story of having to write a letter to a company requesting them to send a technician to help troubleshoot a piece of equipment and explained that it was an opportunity for him to learn how to write a professional letter. The Director also commented on outcomes for students. He had observed growth in terms of interest in STEM and self-confidence in their ability to do STEM.

Students also spoke about challenges associated with their research, but seemed to welcome and embrace challenge. Being in charge of their own projects, learning the equipment, and the exacting nature of the work were all experiences that tested the students.

> *"You've got to design the experiment. If the data's wrong, you've got to figure out why. There's no professor standing in front of the classroom telling you what to do and why it's wrong. You've got to figure that out all on your own. I think that's also what makes it interesting."*

> *"If the machine doesn't work, I have to figure out why it doesn't work. It's more hands-on instead of in class, where they tell you what to do."*

> *"Getting the ovaries out [of fruit flies] gets to be real tedious. If you go too much, then the whole thing just shatters and the fly's dead, and you can't re-use the fly."*

> *"RNA degrades fast. We have to be really gentle with it. Some of the stuff in the lab, we can't use. We have to use stuff that's sterile for RNA purposes only, so having to adjust to that and having to use RNA later to wash everything beforehand. Having to get into that habit has been a little challenging from normal lab just being able to use everything."*

In listening to students talk about their mentors, it was striking how well they knew them as people. They knew about their mentors' backgrounds (where they were from, how long they had been at the University) as well as their professional activities (when they were coming up for tenure, which grants they were waiting to hear about). Their admiration and appreciation for their mentors came through in their comments.

> *"He's a wealth of knowledge. To have that caliber graduate at [Institution B] is a privilege."*

> *"She's very supportive. She's the kind of professor that will tell you what to do and how to do it, but then she'll give you your own space to figure it out. And, she's not the type to be condescending if you can't figure it out and need to go to her."*

Students were generally positive about the STEM courses offered at Institution B. In talking about what was most helpful, they focused on professors who went *"really in depth with what we should know, making sure we know it."* Molecular Biology stood out as particularly helpful in this way as well as in preparing students for later courses. Biochemistry appeared to be universally challenging. One student summed it up while others nodded in agreement: *"Biochem destroys your feelings of what you think about yourself. It's partly the material and partly the disconnect between what you study and what's on the test."*

All four of the scholars planned to go to medical school. Notably, Institution B is home to the region's only medical school. As they spoke about medical school, the scholars placed importance on staying local and on being able to work at the same time.

Considerations/Recommendations

Institution B is a resource for other members of the Alliance in terms of its Tutoring Center, its departmental partnerships, its experience building on existing programs, and the faculty-mentor-student relationships. Specific considerations/recommendations for Institution B (in addition to overall recommendations made at the end of the report and highlighted in the Executive Summary) included:

- Clarifying and highlighting the value-added of LSAMP activities to existing services with similar goals around student retention (e.g., Supplemental Instruction)
- Improving tracking of Tutoring Center usage/sign-in process
- For program activities that are open to all students, ensuring tracking of URMs and of LSAMP participants, in particular
- Following up on the Coordinator's idea of an online option for the math tutoring program
- Following up on exploring the allocation of more time to the Coordinator position

Institution C

Institution C is another regional campus of Indiana University, offering Associate's, Bachelor's, and Master's degrees. Total enrollment is 7,185, of which 93% (N=6,653) are undergraduates. Nearly three-quarters (73%) of undergraduates are White; 10% are Hispanic/Latino; and 6% are Black or African American. The first-to-second year retention rate is 64%; the overall graduation rate is 29%; and the overall transfer-out rate is 28%. Institution C was not a member of the previous LSAMP Indiana project.

Program Administration

The evaluator conducted brief interviews with the Director and Campus Coordinator, as time allowed. The Director at Institution C had been involved since the start of the grant and continued to stay in the loop, although she characterized her present role as *"minimal"* and credited the Campus Coordinator with putting the program into place.

She described her main functions as listening and supporting the Campus Coordinator, acknowledging, *"I'm not in the sciences."* She also troubleshot specific issues, such as budget. The Director is moving into a new role as the institution's Interim Executive Vice Chancellor for Academic Affairs, thus she will be even less hands on with the LSAMP program and the Campus Coordinator will be even more involved, including representing the institution at the Alliance level.

The Director felt that the lead institution was *"invaluable,"* noting their leadership with the conference and the website. She added that, *"The individual campuses don't have the time and resources so centralizing there is critical. I think being connected with them also allows for students to have experience off campus and presenting at another conference and to mingle with other students from other campuses. Students of color seeing other students of color doing things is an invaluable experience."*

In terms of challenges or lessons learned, the Director shared that there had been a learning curve in terms of the lead institution's budget processes. She also expressed some regret that they (Institution C) could not pay the faculty a little more given the amount of work they did.

Institution C had an open meeting about LSAMP for interested faculty. The Director recalled hearing from faculty at that meeting that they would have more eligible students than lab capacity. The Director and Campus Coordinator sent the faculty a link to the application and faculty recruited students. The Director was satisfied that the program was able to identify/recruit good students and committed faculty.

In moving forward, the Director had two main concerns. One was that they continue to *"identify students and use the budget for the right purpose and help these students graduate and go on to graduate schools."* The other was that the roles of Director and Campus Coordinator be revisited and possibly redefined. In her own words, *"In the beginning I was more hand-on, and now I feel I don't need to be involved and the program has found its own rhythm."*

Students and Faculty Mentors

At Institution C, the evaluator conducted four group interviews with students and faculty mentors – two each with a scholar and his/her faculty mentor, one with a pair of two scholars and their two faculty mentors, and one with two scholars whose faculty mentors were not available that day.

<u>Students</u>
Of the six students, three were rising seniors, one was a rising junior, and two were rising sophomores. Two were Biology majors, one was a Chemistry major (with a minor in Math), one was a Biochemistry, one was a Math major, and one was a Computer Science major.

Two of the students had transferred in to Institution C. One had spent her first semester at a community college in Michigan and another had transferred from an Ivy Tech campus after his first year. Both described their transitions as easy.

Most students had heard about LSAMP from their professors, some of whom turned out to be their mentors. As one student explained, *"My mentor said it in class and the same day I emailed him about it and asked him to be my mentor."* One student had heard about it from a classmate whom he had approached for help: *"I learned about it in one of my courses. I asked him about physics and he told me that LSAMP helped him a lot."*

Of particular note among this group of LSAMP students was their long-term interest in what they were studying. For example, one student said, *"I have always been obsessed with fish and marine life since I was a kid."* Another said,*" I have always been curious about what things are made of."* A third said, *"I have always liked computers."* From a fourth, *"Since I was little I wanted to do something that had to do with the medical field."*

Immediately after college, some students imagined themselves working while others were intent on graduate school. One student who saw himself working added *"maybe taking some graduate classes and not rushing right into it."* Another student who acknowledged the possibility of graduate school, but was not sure about it yet said her interest was in a job at a state park or a nursery, *"something like that, where I get to be outside and work with nature."* A third student indicated an interest in software development or project management.

Three students were firmer about their plans for graduate school. One was considering graduate or medical school; one wanted to go to a Pharmacy program; and the other was hoping to get a Master's degree in mathematics. This student added, *"My dream job would be to be a professor. I would like to continue researching."*

In describing how their summer research experience had been beneficial and/or might be helpful to them in the future, students pointed to developing an understanding of and confidence in how to do research, gaining science content knowledge, learning about different applications of specific knowledge, developing professional skills, and preparing for future careers.

> *"When I first started research I did not know what I was doing, or how to go about research. With my mentor, he taught me how to go through and review the information. He taught me how to come up with something new and also utilize theorems that have already been created. I like the confidence that I have to do research."*

> *"I have a good background in computer science and programming but I was never involved in such a big project. I am proving my ability and skills. I am watching myself and proving to myself that I can do it and learn something new if I need to."*

> *"I never knew how people purify their protein. Now I can actually stand up and teach people how to do this."*

> *"At first, I didn't know anything about plants. It is also helping me build a better work-ethic."*

"The most eye-opening experience is that there are different kinds of applications to what I have learned in chemistry. Here, I actually have to grasp everything I have learned and actually apply it to rules we have learned or different situations where we can and cannot apply these rules."

"When I have previously taken classes, the labs were something that I really liked because we were always outside. This research is by far the most on-track with what I am interested in doing. I feel like they trust in what we want to do."

"I tried different things before and none of them made me happy and this makes me happy. I like working within the system of nature versus having the outside view where we would be separated from everything."

Students also gave glowing reviews of their mentors, describing them as *"helpful," "caring,"* and *"supportive."* One student inserted, *"You can tell that they know what they are talking about."* The students also said their mentors pushed them to excel in their STEM courses.

Students were hard pressed to come up with suggestions for improving the program, with the exception of having it be longer. A part of this suggestion was to have more time to complete their current projects. As one student explained, *"I know in the real world, research can be given a lot of time and you are given a certain amount of time. Limited time is helpful, but maybe just a bit more."* Another commented, *"I would say more time; eight weeks is a little bit rough."*

<u>Faculty</u>
In describing their role as mentors, faculty emphasized providing the students with experience doing research, *"making sure that the students get something out of the experience"* and *"giving the right job to the right person."* The faculty had worked through the online training module provided by the lead institution, which they found helpful, as evidenced by the following comment: *"They were helpful because they talk about things I have not thought about, like the role of the mentor. They hammered in the fact that our goal is to not have a mini-graduate student doing our research for us; we are supposed to create an educational and fun summer for the students."*

Faculty derived satisfaction from working with the LSAMP students. In the words of one mentor, *"I have always wanted to be in college forever, so this is my dream job. It is the most rewarding job I could ask for. In the fall and winter I teach in the classrooms and in the spring and summer I teach in the labs."* Another mentor summed it up by saying, *"It is fun to work with these guys during the summer. I don't experience the students in this context. Being in the laboratory is more of a lecture. It's fun to interact with the students in this way."* Another added, *"It is always great to have funding for students."* One mentor also saw the program as helping interest students in his field. He explained, *"I always like to see people get more experienced with plants because it is a hard sell. Biochemistry is easy; animal behavior is easy; but plant ecology is not as easy."*

Some of the mentors were working with non-LSAMP students as well and described the LSAMP experience as more structured. As one mentor put it, *"For the actual research there is no difference, but the LSAMP is supplemented with these extra programs to encourage students to present in conferences and to think about their research in a broader view."*

From the mentors' perspective, the summer research experience afforded the students a unique opportunity they would not have otherwise had, an opportunity for ownership of a project as well as being part of a team.

> *"I see the LSAMP program as providing a unique opportunity. It provides an opportunity for students who do not have that opportunity."*

> *"It is a good introduction to research experience and taking a project from beginning to end and taking more ownership in data."*

> *"When the students* [an LSAMP and non-LSAMP student] *work together, they are able to bounce ideas off of one another and they can trouble-shoot their problems."*

Faculty also liked that the program was a way for students to meet others like themselves. While LSAMP students at Institution C interacted with one another, it was not immediately clear that they had come together as a cohort in as meaningful a way as at other campuses. For instance, when asked about interacting with other LSAMP summer research scholars, one student replied, *"It depends on where we are at. I talk with [name] who is across the lab, and we talk about our assignments and what we are doing."* Another student reported, *"We have had two meetings this semester, but we are more independent with our mentors."*

The only suggestion for improvement, offered by one mentor, was to increase the stipend. He explained, *"To make LSAMP competitive with other research opportunities, the price would probably have to go up a little bit. And maybe also an extension of the number of weeks."*

Considerations/Recommendations

Institution C is a resource for other members of the Alliance in terms of recruiting faculty and students. The institution is also valuable in terms of its perspective as the newest member of an Indiana LSAMP program. Specific considerations/recommendations for Institution C (in addition to overall recommendations made at the end of the report and highlighted in the Executive Summary) included:

- Redefining the roles of the Director and Campus Coordinator given the Director's new appointment;
- Investigating the possibility of a longer summer research program;
- Investigating the possibility of a greater stipend; and
- Increasing the community-building aspect of the program

Institution D: The Community College Partner

The community college partner of the Alliance is a member of the nation's largest singly accredited statewide community college system. In addition to offering degree programs and technical training, it offers courses and programs that transfer to other colleges and universities in Indiana. The site we visited is the top provider of transfer students for one of the other Alliance partner's STEM degree programs (hereafter the senior institution). The LSAMP program is housed in the Biotechnology department, which had relatively small student enrollment; it has conferred a total of 33 associate's degrees.

According to the National Center for Education Statistics, the community college partner has 75,486 students enrolled across all of the programs and campuses. Concerning attendance status, 72% of students are enrolled part-time whereas 28% are enrolled fulltime. The student body is 57% female and 43% male. In terms of racial demographics, the institution is 71% white, 12% black, 4% Latino/ Hispanic, 2% Asian, 3% multi-racial. The remaining 8% of students indicated their race and ethnicities as unknown.

The retention rate between years one and two is 50% among full-time students, and 41% among part-time students. The graduation rate for all students – full-time and part-time – is 16%, and 18% of the students transfer-out to another college or university. The graduation rates by race and ethnicity for full-time students are 18% for white students, 9% for black students, 10% for white students, 23% for Asian students, 17% for multi-racial students, and 6% for American Indian or Alaskan Indian students.

The community college and senior institution share an office, the Passport Office, which liaises and coordinates programs between the two institutions to facilitate seamless transfers for students. The office helps with course-to-course articulations, "2+2" transfer agreements, pre-transfer advising, and student affairs activities.

Our primary goal for this site visit was to gather qualitative data on IN LSAMP progress in offering program activities for community college transfers. We accomplished this by meeting with two Scholars who had transferred from the community college to the senior institution, the Graduate Assistant who had worked with them, two representatives from the Passport Office (a joint operation office), and a Co-Coordinator at the senior institution. We also had a telephone call with one of the transfer student's faculty mentors.

We also wanted to gain first-hand experience and direct contact with the community college's key players, faculty, students, and campus. So, at the community college site, we had lunch with three IN LSAMP faculty, three Scholars/Learning Assistants, and the site's new Program Coordinator. We also toured several labs, observed a Cell Culture lab in session, and had a chance to sit down with the Dean.

The three most important themes resulting from these activities are discussed in the following pages and include:
- The connections that IN LSAMP is making with students while they are still enrolled in their community college are important to their transition, retention, and future workplace readiness.
- IN LSAMP's faculty-mentored summer research opportunities for transfer students have positive academic and social outcomes.
- The LSAMP program at the community college is doing an exceptional job of preparing students for their transition to the senior institution.

The connections that IN LSAMP is making with students while they are still enrolled in their community college are important to their transition, retention, and future workplace readiness.

The community college faculty and administrators with whom we met as well as the Passport Office representatives described the creation of an articulation agreement, in which students who complete an associate of applied science degree in biotechnology at the community college receive transfer credits toward the bachelor's degree of science in biotechnology at the university. The community college informants we met with also described engaging in alignment activities with employer partners, in which they aligned their course outcomes with business hiring requirements and the labor market needs of relevant industries.

Our interviews with the Graduate Assistant and the two transfer students highlighted *other* ways in which IN LSAMP is making connections with students while they are still enrolled in their community college. The program offered transfer students a range of activities in which to participate beginning the February before their transfer. These support activities focused on providing guidance and information on the knowledge and skills students need outside of courses. These included the soft skills needed for college completion and workplace readiness, such as time management, scheduling, resume-building, and networking activities. Our meetings with Passport Office representatives underscored how these activities have complemented and helped deepen the existing relationship between the two institutions.

The two transfer students with whom we met both reported that they had had participated in LSAMP as Learning Assistants (tutoring other students in labs) during their final semester at the community college. LSAMP had been recommended to them by the same faculty member. They had both enrolled in community college with the goal of continuing to the senior institution. However, nationally, while 80% of students entering community college intend to transfer to a four-year institution, only 24% actually do. The students felt LSAMP had made a difference in their ability to follow through on their transfer intentions.

> *"I wanted to go to [the senior institution], for sure, that was a definite thing. And [I saw LSAMP as something that would help me to be able to do that] and it would be easier for me to transition here if I kind of new some people."*

> *"I heard about financial benefits, and that was like the huge catalyst because I am '21st century' and I don't really have that much money for school. And that would help me out."*

The students viewed the IN LSAMP activities as a combination of personal and professional development. In particular, they stressed how the activities helped them build confidence in interacting with others and at professional events. They were enthusiastic about having put these lessons learned to the test and with good results. They clearly appreciated the importance of social connections and networking. It also means a great deal to them to be part of a community of other students "like me."

> *"[The IN LSAMP Graduate Assistant] went over how to convey myself with interacting with other people in the field and how to make me feel more comfortable because there are other people there who are just as nervous as us … He pretty much prepared me to go [to the Research Conference] … He worked on our professional development in a way that we could all relate."*

> *"Going to [networking events], I don't know what to say to people. [The Graduate Assistant] showed us a video that showed different ways that you can look welcoming, and how to introduce yourself to someone and not just be awkward and that helped out. I actually went and I spoke to quite a few people … So that was really awesome!"*

> *"When I first started college years ago, I kept to myself. I would leave class, go right to my apartment, and I didn't really explore campus. I didn't really join any groups or anything. So, [LSAMP], it helps out because I'm introduced to other people; I know the people on campus. I'm not scared. … And a few of them are over in the science building with me, so I was like, 'Hey, how are you doing? How are the classes? You need help with this? I need help with that…' So, it's a feeling of belonging. Having a group that I am in, and others like me are in, is … it's just welcoming."*

> *"Being with this group it kind of helps … because there are new students that came that I met during the summer time and I'm like, okay, each one new person that's joining, just kinda open up a little bit and talk to them … and it's neat because I found some students who are in the same classes but at different times, so I was like, 'Let's exchange numbers,' and we talk with each other."*

IN LSAMP's faculty-mentored summer research opportunities for transfer students have positive academic and social outcomes.

Both transfer students had participated in faculty-mentored research at the senior institution the summer before transferring. One had a faculty mentor in the Department of Biology as well as a mentor who was a graduate student in Medical Neuroscience. The broad goal of her research involved investigating the potential role of a particular protein in ameliorating ADHD. The other IN LSAMP transfer student had a faculty mentor in the Department of Anesthesia in the School of Medicine. Her research involved trying to better understand how long-term pain develops and the implications for prevention and treatment.

Both students' research resulted in poster presentations at summer and fall student research conferences. Both students also had positive and meaningful mentoring experiences. They developed trusting relationships with their mentors, engaged in hands-on research that built their self-esteem, and enjoyed feeling part of a community.

> *"Because of that summer experience, my mentor got to know me and understand me. And he has seen all that [the community college Biotechnology program] did for me. So now they trust me a little bit more. I trust myself a little bit more."*

> *"Initially, I didn't even have an interest in neuroscience. So, when I got paired with him, I was kind of like ugh…kind of scared a little bit because I wasn't sure how it was going to turn out. But when I got there, they did a lot of other stuff there that I was actually prepared to do. So it actually went really smoothly, and I wasn't as nervous as I thought I would be. And it wasn't as nerve racking as a thought it would be. And it was like, I don't know, I think I was like, very well prepared."*

> *"We were all learning together. It was a lot of trial an error, and we all had to kind of work together and bounce off of each other. And research is research, so we didn't really accomplish anything or make any groundbreaking techniques or whatever…"*

> *"I would like to continue with LSAMP next semester, and then in the summer hopefully do research again because it was a great experience. Doing a whole summer of research with the Ph.D. students in our labs – it's really awesome!"*

Community college LSAMP students also participate in the annual **Research Conference** and the **Career Night**, described on the following pages.

The LSAMP program at the community college is doing an exceptional job of preparing students for their transition to the senior institution.

The Biotech coursework and labs that students completed at the community college not only prepared them for their courses and research at the senior institution, but gave them a leg up. This advantage was verified by faculty at both institutions.

"I feel like I have a great advantage starting over there and then coming over here. 'Cause, like, so many students, I feel like they are at the level I was when I first started the program. And I am about to graduate. So it is great."

"I was really like 'Wow!' My teacher [at the community college] who told me about the program, he told me, he told all of us students, 'You guys are going to need this; it's going to be helpful for you.' I didn't get it at the time. Until I actually got like hands-on experience and I had to actually show these random people what I was made of … So I was like 'Wow!' I was kind of just shocked. I didn't know how well prepared I was. And I don't know if I can dedicate that to [the community college], or LSAMP, or just me as a student."

"In my personal opinion, I feel like I'm a little more ahead of some of my peers [at the senior institution] – because of [LSAMP] and some of the opportunities I had in the summer, because I had that hands-on experience."

Considerations/Recommendations

The community college site is a resource for other IN LSAMP institutions in terms of preparing community college students for transfer to four-year institutions, especially developing students' lab skills. Specific recommendations for the community college site – or for community college transfer activities – include:

- Orienting students to the IN LSAMP "big picture"; that is, that they are one of six campuses in an Indiana Alliance (each with its own group of Scholars), which is itself one of more than 100 such Alliances funded by the National Science Foundation – and orienting them to the resources that will be available to them from/at other IN LSAMP institutions; it wasn't until the Research Conference that some students realized that they were part of something bigger
- Creating a database of potential faculty mentors and ensuring the mentors understand LSAMP and are willing to help LSAMP Scholars, in order to facilitate easier pairing of Scholars with faculty mentors; one student talked about difficulty getting matched with a mentor
- Dispelling or moderating students' perceptions that Biotech is a field where they "don't really have to deal with people"; both transfer students expressed this belief
- At the senior institution, detailing from the beginning what continued involvement in LSAMP means; students were not clear on plans for their spring 2019 semester

RESEARCH CONFERENCE AND STEM CAREER AND RESOURCE FAIR

Conference and Career Fair

From our attendance and observations at the Research Conference and Career Fair, we conclude the events were meaningful and beneficial for students (and faculty, although our observations focused on students). Students were inspired by and received helpful information from peers, presenters, faculty, and staff about research and career opportunities. They had an opportunity to bring their own research full circle and practice their presentation skills, which they did admirably. Finally, the events went a long way toward building IN LSAMP community. This section of the report describes the conference and these observations in a bit more detail.

The inaugural IN LSAMP Research Conference took place on Friday, October 19, 2018 at the Alliance's community college partner. The conference theme was "Investing in Future STEM Leaders." The conference featured separate tracks for students and faculty. In the morning students had sessions on developing and promoting professionalism in STEM and on using ePortfolio to leverage their undergraduate research and build their STEM networks. Faculty had sessions on research mentoring (including discussion of the first international journal that publishes undergraduate research in microbiology) and on cultural proficiency.

In the afternoon, the student and faculty tracks featured panels and Q & A (on summer research and faculty mentoring, respectively). The student panel was helpful in providing students with information about summer research opportunities.

Over lunch, six IN LSAMP Scholars shared their summer research. The students presented their research in a professional manner and clearly expressed their ideas. This was followed by two keynotes. The first was from the community college President and the second was from an LSAMP Alumnae who holds a Ph.D. in Chemistry and is an Associate Scientist at Amvac Chemical Corporation. The alumnae keynote was exceptionally motivating in terms of pursuing STEM post-baccalaureate and career opportunities.

The last 90 minutes of the conference featured the STEM Undergraduate Research Poster Session. This session was very effective in demonstrating the kinds of research being conducted at Alliance institutions. Most important, the session provided students with both experience presenting their research to an audience, and with recognition for their work. The experience was clearly a positive one for students.

There was ample opportunity throughout the day for students to network with peers from their own institutions as well as from other Alliance campuses. The students appeared to feel part of a community and part of "something bigger."

Following the conference, the community college hosted a STEM Career and Resource Fair for the students. This event gave students direct exposure to

STEM faculty from other Alliance institutions and representatives from STEM businesses and industries that need STEM workers with higher levels of career preparation.

Student Interviews

The conference also provided an opportunity to interview four students who had not been on their campuses during the evaluator's June 2018 site visits. All of the students were seniors. Two were majoring in biology, one in biology and chemistry, and one in geology and Spanish. These interviews surfaced themes similar to those heard during the prior site visits.

Students found their research opportunities and experiences invaluable. Two of the students had had summer research experiences off-campus, one in another state and one in another country.

> *"LSAMP has opened up a lot of doors in research."*

> *"What LSAMP has mostly done for me is build my confidence, especially in the lab setting. It has allowed me to think in a different way. When you're in class, you think you just need to study, whereas in lab it is just different; it allows you to really think."*

> *"Because I was funded for research, I was able to get a lot more progress done on my project and was then able to go to present at the National American Chemical Society meeting. That was also funded by LSAMP, a chance to get exposure at a national level."*

The students had graduate school in mind, and all seemed intent on continuing in a STEM field. Specifically, one student intended to go to dental school, one to optometry or medical school, and two to graduate school and then industry. As the second quote below illustrates, some students may learn that the lab route is not for them.

> *"When I started school, I didn't think I was going to do grad school but as I've been through it that's definitely what I want to do."*

> *"I enjoy being in the lab, but that's not everything that a Ph.D. and the career entails. There is a lot of writing and reading and you are constantly trying to write and fight for money just to be able to be in the lab and I don't like that."*

One of the students had served as a peer mentor and described the experience very positively, and eloquently. In addition, two of the students were involved in outreach to high school students through LSAMP.

> *"I've always liked helping people when I can and if I'm able to. I feel like when they accomplish something, I feel like I've also accomplished something. It is rewarding for me. If they are successful, that's another successful person in the country that's going on to do something meaningful for society."*

The students spoke very highly of their mentors and it was clear in some cases that they had developed close relationships with them.

> *"She has been an extremely invaluable person in my life. She took me into her lab and then I was able to start a research project and collaborate with [her] on it. I was able to continue that same project with her through LSAMP. Without her I wouldn't have been able to go to France because they required research experience and a recommendation. With grad school, she is able to help me choose the right fit. She is a guiding hand and she goes one step and above with helping."*

In our June 2018 site visits we had heard students say they had not had specific expectations of the LSAMP program. We heard something similar from these four students. Some of the students went further in describing the challenges of the LSAMP "unknowns." Some expressed their surprise at learning what LSAMP is really all about at the conference.

> *"I think it comes off as a lot of unknowns. LSAMP doesn't do a good job of telling students how grad school works and what exactly the program entails overall. It's just kinda like, 'We'll pay you to come do research, and we'll just make it happen."*

> *"… I think it is more, 'So, what all is LSAMP going to offer me?' and that's just like a big unknown. It's just like, 'Oh hey, here's some money.' Until you get to [the] conference, you have no idea how big and how supportive LSAMP is."*

> *"When I heard about LSAMP, I thought it was this small thing of minorities. This [the conference] is all a shock to me."*

> *"I was surprised. At first I thought it was just a source of funding but it was so much more. LSAMP exposes you to research but also these events that expose you to what other people are out there and it is interesting to see the different paths we can take. LSAMP is more of a network to me than just funding. [It] opens your eyes, opens the view of all these avenues to science."*

> *"I thought they would just pay me to mentor a student. I didn't know about the research or anything. It all exceeded my expectations above that. It was life changing and I was not expecting it to be."*

IN LSAMP TEAM SURVEY

In order to assess the experience and impact of the IN LSAMP collaboration, GRG conducts an annual IN LSAMP Team Member Survey. In May 2018, GRG revised and then launched the second annual IN LSAMP Team Member Survey.

Two new components to this year's survey included:

1. **Social Network Analysis (SNA):** The survey asked the 20 team members across the six institutions to indicate with whom they collaborated, how often those collaborations occurred, and how often those collaborations resulted in gaining information they needed to fulfill their IN LSAMP roles and responsibilities. This enables us to provide SNA maps illustrating the working relationships between partners in the collaborative network.

2. **Wilder Collaboration Factors Inventory:** The survey featured an adapted version of the Wilder Collaboration Factors Inventory to assess the IN LSAMP partnership and identify strengths and areas for growth.

Of the 20 IN LSAMP team members invited to take the survey, 17 responded. Table 2 summarizes the institutional affiliations and roles of the respondents. Each of the six institutions was represented by more than one respondent. All three major team member roles (Investigator, Director, and Coordinator) were represented among respondents.

Table 2
Institutional Affiliations and Roles of Respondents

		Number	Percentage
Institutional Affiliation	IUPUI	5	29%
	IUB	2	12%
	BSU	2	12%
	IUN	3	18%
	IUSB	2	12%
	ITCC IN	3	18%
Role	Investigator (PI or Co-PI)	5	29%
	Campus Director	3	18%
	Campus Coordinator	6	35%
	Other team member	3	18%

IMPLEMENTATION OF IN LSAMP PROGRAM ACTIVITIES

The partner survey asked Campus Coordinators to indicate the implementation status of 16 possible IN LSAMP program activities. The 16 activities are high-impact practice programs and/or activities to ease transitions into STEM degree programs.

Based on Coordinators' responses, all six campuses have implemented Faculty-Mentored STEM Research. Degree Mapping, Student Orientation, and Transfer Student Support have been implemented at five campuses. First-Year Experience, Math Tutoring, Online Math Review, Professional Preparation, and Summer Bridge programs have been implemented at four campuses.

Table 3 shows, for each campus, which activities have already been implemented (yes-green shading), which activities are expected to be implemented (plan to-orange shading), and which activities will not be implemented (will not-red shading). Uncertainty is indicated by "not sure" (gray shading).

Table 3
Implementation Status of IN LSAMP Activities, By Institution

	IUPUI	IUB	BSU	IUN	IUSB	ITCC
Conference Participation	PLAN TO	YES	PLAN TO	YES	YES	PLAN TO
Degree Mapping	YES	NOT SURE	YES	YES	YES	YES
Faculty Mentored STEM Research	YES	YES	YES	YES	YES	YES
First Year Experience/First Year Seminar	YES	NOT SURE	YES	YES	YES	PLAN TO
Math Placement	PLAN TO	NOT SURE	YES	YES	YES	NOT SURE
Math Tutoring	YES	NOT SURE	YES	YES	YES	PLAN TO
Online Math Review	YES	NOT SURE	YES	YES	YES	NOT SURE
Professional Preparation	YES	PLAN TO	YES	YES	PLAN TO	YES
Resource Center(s)	YES	NOT SURE		YES	NOT SURE	YES
STEM Peer Mentor	YES	PLAN TO	YES	NOT SURE	PLAN TO	YES
Student Orientation	YES	NOT SURE	YES	YES	YES	YES
Summer Bridge	YES	NOT SURE	YES	YES	YES	NOT SURE
Supplemental Instruction	YES	NOT SURE	NOT SURE	YES	PLAN TO	YES
Telephone Math Tutoring	WILL NOT	NOT SURE	WILL NOT	NOT SURE	NOT SURE	WILL NOT
Themed Learning Community	YES	YES	PLAN TO	NOT SURE	NOT SURE	YES
Transfer Student Support	YES	NOT SURE	YES	YES	YES	YES

Effectiveness of Implemented Activities

On average, all respondents (Coordinators and others) felt the IN LSAMP program activities their campuses have implemented to date have been *very effective* in meeting the needs of their target populations.

Figure 1
Respondents' Perceived Effectiveness of IN LSAMP Activities
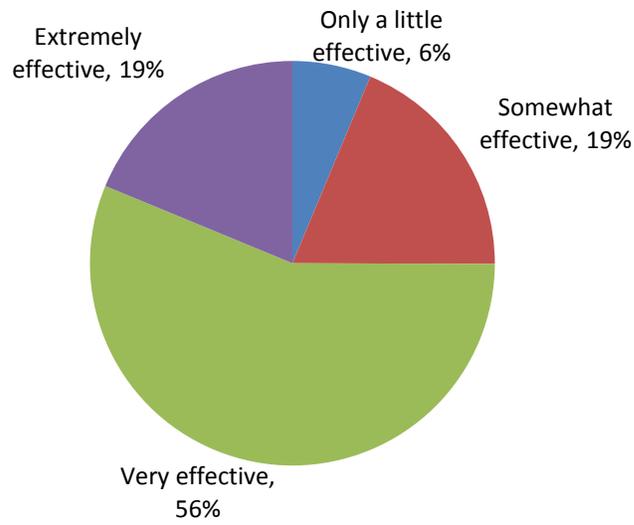
INSTITUTIONAL CAPACITY FOR IN LSAMP STRATEGIES

As in 2017, the partner survey asked respondents to describe the current capacity at their campus to carry out high-impact practice programs and/or activities to ease transitions into STEM degree programs. The rating scale was a 4-point scale, where 1 = clear need for increased capacity, 2 = basic level of capacity in place, 3 = moderate level of capacity in place, and 4 = high level of capacity in place. Table 4 shows the average ratings (averaged first for each institution and then across institutions) for 2017 and 2018.

On average, institutions reported moderate capacity, with small increases from 2017 to 2018. One exception was in improving undergraduate preparation for STEM graduate programs, where perceived capacity was a bit higher in 2017. Of note, one institution demonstrated greater confidence in most areas in 2018, and one institution appeared considerably less confident in implementing HIP programs in 2018.

Table 4
Institutional Capacity Ratings

	2017	2018	Change
Improve undergrad prep for STEM grad programs	3.60	3.38	⬇
Implement HIP programs	3.10	3.27	⬆
Improve undergrad disciplinary connections	2.97	3.27	⬆
Increase support to CC transfers	2.90	3.02	⬆
Facilitate transfer into STEM undergrad programs	2.80	2.88	⬆

SOCIAL NETWORK ANALYSIS

Social Network Analysis (SNA) maps illustrate working relationships between partners in a collaborative network. Beginning in Year 2, the Annual IN LSAMP Partner Survey asked team members across the six institutions to indicate with whom they collaborated and how often those collaborations occurred.

In Figure 2, each node (circle) represents one of the IN LSAMP team members. Each individual node is color coded to reflect role (i.e., PI/Co-PI, Director, Coordinator, Project Manager, Web/Tech Assistant, Senior Leadership, Assistant). The lines connecting each node represent a reported collaboration between two team members. Between two team members, there may be a minimum of zero connections and a maximum of two connections (bi-directional).

The heaviness of the connecting line represents the frequency of the interactions. The lightest lines represent less than monthly collaboration, while the heaviest lines represent at least weekly collaboration.

SNA analyses yield metrics that help to conceptualize network functioning. Analyses of the IN LSAMP partnership reveal a "dense" network. Network density is a measure of the number of connections or collaborations that occur in relation to the number of potential connections (PC2), given the size of the network. Density correlates with effectiveness of a network: the more people collaborate, the more productive the network.[1] Among the 17 responding IN LSAMP team members, there was potential for 323 connections, 159 of which occurred in Year 2.

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[1] Anklam, P. (2007). *Net work: A practical guide to creating and sustaining networks at work in the world.* Burlington, MA: Elzevier.
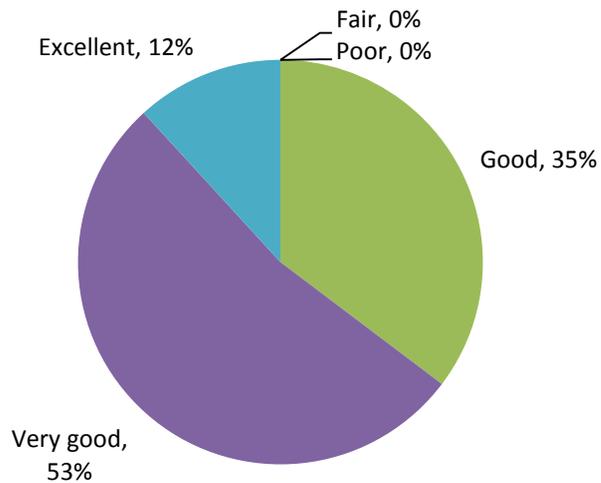
Figure 2
IN LSAMP's SNA Map
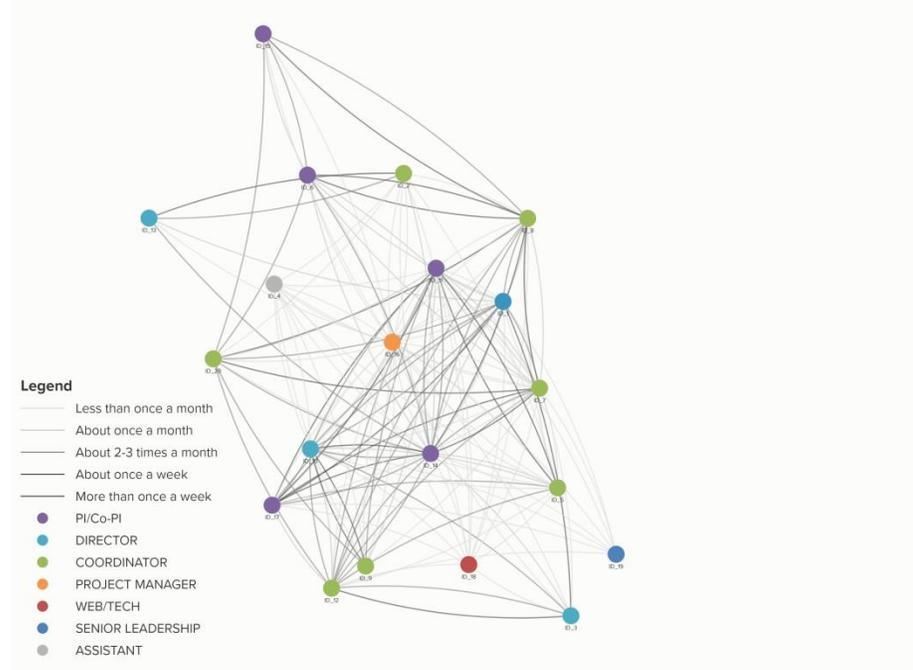
QUALITY AND EFFECTIVENESS OF COLLABORATION

On average, respondents felt the collaborative relationship among partners/institutions within the Alliance has been *very good*.

Figure 3
Respondents' Perceived Quality of IN LSAMP Collaboration

The 2018 Partner Survey included 15 of the 20 items from the Wilder Collaboration Factors Inventory, a tool used to assess the elements of effective collaboration.[2] Each item is a statement and respondents rated their agreement using a five-point scale: strongly disagree (1), disagree (2), neutral (3), agree (4), or strongly agree (5). The results are displayed in Table 5.

All of the items fell within the 4.0—5.0 range, or "strength range." At the upper end of the strength range were items reflecting concrete objectives, skilled leadership, and members who see collaboration as in their institutional-interest. At the lower end of the strength range were items reflecting members' shared stake in the efforts and the group's pace of development.

Table 5
Results of Wilder Collaboration Factors Inventory

	Mean
I have a clear understanding of what our IN LSAMP partnership is trying to accomplish.	4.71
The people in leadership positions for the IN LSAMP partnership have good skills for working with other people and organizations.	4.65
My institution will benefit from being involved in the IN LSAMP partnership.	4.59
I am informed as often as I should be about what goes on in the IN LSAMP partnership.	4.50
The level of commitment among the IN LSAMP partnership participants is high.	4.50
People in our IN LSAMP partnership know and understand our goals.	4.47
The IN LSAMP partnership is currently able to keep up with the work necessary to coordinate all the people, organizations, and activities related to this collaborative project.	4.38
There is a clear process for making decisions among the partners in the IN LSAMP collaboration.	4.38
Our IN LSAMP partnership has adequate "people power" to do what it wants to accomplish.	4.31
People in the IN LSAMP partnership communicate openly with one another.	4.31
My ideas about what we want to accomplish with the IN LSAMP partnership seem to be the same as the ideas of others.	4.29
People in our IN LSAMP partnership have established reasonable goals.	4.29
People in the IN LSAMP partnership have a clear sense of their roles and responsibilities.	4.24
The IN LSAMP partnership has tried to take on the right amount of work at the right pace.	4.19
The institutions that belong to the IN LSAMP partnership invest the right amount of time in our collaborative efforts.	4.13

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[2] https://www.wilder.org/wilder-research/research-library/collaboration-factors-inventory-0

TEAM MEMBER SATISFACTION

Overall, team members expressed high satisfaction with the IN LSAMP project. They were most satisfied with the support for their work, both from IN LSAMP leadership and from their institutions. About one-third of the team would be more satisfied if they could spend more time on the project and increase their campus' coordination of activities with other IN LSAMP partners.

> *My responsibilities in other areas prevent me from greater involvement in this project.*

> *Knowledge of HIPs implementation strategies from partner institutions would help all partners.*

Figure 4
Percentage of Team Members Highly Satisfied with Aspects of IN LSAMP
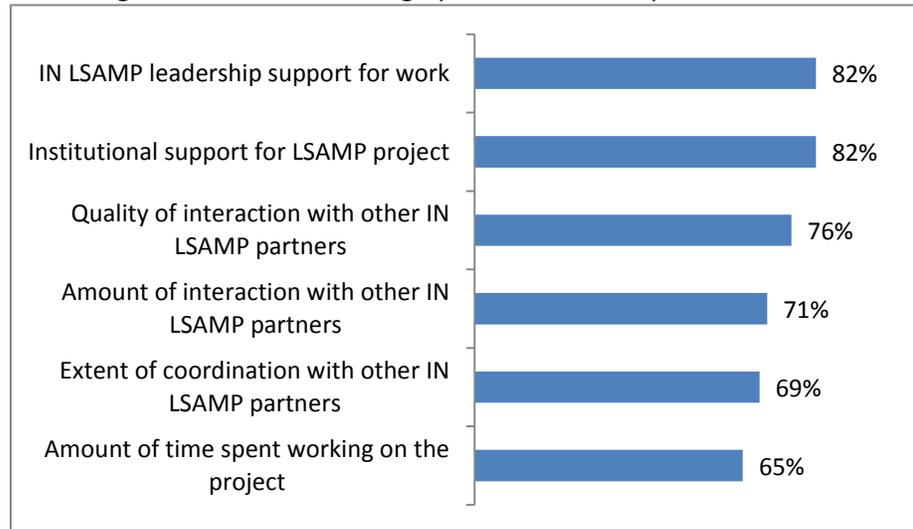
Note: "Highly satisfied" is defined as a 4 or 5 on a 5-point scale where 1=Not at all satisfied, 2=Only a little satisfied, 3=Somewhat satisfied, 4=Very satisfied, and 5=Extremely satisfied.

INITIAL SUCCESSES AND CHALLENGES

In reflecting on the major successes so far of their IN LSAMP projects, several respondents pointed to developing and launching specific programs. These included newly developed programs as well as programs that had been attempted but not successfully launched in the past. Other successes included exceeding participation targets, supporting community college students, student recruitment and engagement, teamwork, and developing campus networks to support the project.

> *"Starting a peer mentoring program from scratch; students are really buying into that."*

> *"Placing our students with research mentors and helping them through the transfer process has been a major success."*

> *"The major success was opening the door for my students to participate in summer laboratory research opportunities at IUPUI."*

> *"We have been able to place 14 scholars in the summer research positions, which is two more than we had planned."*

> *"The biggest success we have had so far is our LSAMP High School Summer Camp. Last year we had over 50 underrepresented minority students attend this year we are looking into taking more students."*

> *"Our LSAMP scholars [are] doing weekly tutoring in several subjects … once a week. Although this program was attempted in the past numerous times and has failed, [the Campus Coordinator's] perseverance and determination have made it highly successful."*

> *"Providing support to community college URM students for research opportunities in science and engineering at other colleges."*

> *"Recruiting of excellent students and faculty to participate in the program."*

> *"Student engagement in research."*

> *"The team understands the project, [has] shared goals, and actively engages in activity planning and program implementation."*

> *"Developing a network of supportive personnel across campuses to share ideas."*

The biggest challenges encountered by team members in implementing their IN LSAMP projects were identifying, recruiting and engaging students, not having sufficient time to devote to the project, buy-in and communication across partner institutions, identifying publication and presentation opportunities

"Ability to find high achieving minority students to participate in peer mentoring and tutoring"

"It has been challenging to identify the high performing students from URM groups."

"Getting the STEM incoming students to make use of free Math placement coaching."

"The biggest challenge is finding new ways to get the word out about tutoring."

"Communication with students and getting them to show up to events is extremely difficult."

"Finding adequate time to invest in promoting and expanding LSAMP opportunities."

"The time commitment required to publish, research, collect artifacts, ensure training, etc., was not anticipated in our grant writing."

"Limited time availability of our STEM students to work on different aspects of LSAMP project."

"Buy-in varies across campuses."

"Routine communication from the campuses to the management of the alliance."

"Formation of a research project related to LSAMP for publication or presentation purposes."

"Funding not provided in grant to pay for housing for summer research scholars."

"The biggest challenges were the onboarding of students into the payroll system."

"A grant will never provide the type of leadership necessary to make the type of systemic change necessary to move the needle on URM retention."

LOOKING AHEAD

Even at this relatively early point in the project, team members have full confidence that the project will result in improved undergraduate preparation for STEM graduate programs. The team is also highly confident that the project will achieve its goals of improved undergraduate disciplinary connections and implementation of high impact practice programs at their campuses. In relation, team members are less certain – at this point in time – in the project's objectives around community college transfer students – creating seamless transitions and increasing program activities for transfers.

Figure 5
Percentage of Team Members Highly Confident in IN LSAMP
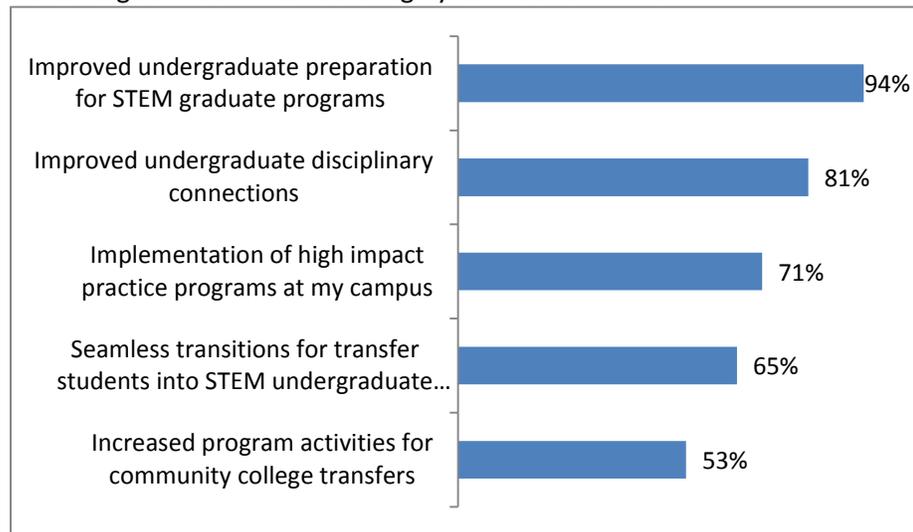
Note: "Highly confident" is defined as a 4 or 5 on a 5-point scale where 1=Not at all confident, 2=Only a little confident, 3=Somewhat confident, 4=Very confident, and 5=Extremely confident.

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