

USING SITE VISITS TO STRENGTHEN COLLABORATION

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<https://doi.org/10.25891/wpxj-gg40>

ABSTRACT

The SUMMIT-P project is a multi-institutional endeavor to leverage interdisciplinary collaboration in order to improve the teaching of undergraduate mathematics courses in the first two years of college. One goal of this work is to establish collaborative communities among the institutions involved. As part of the project, institutions visit one another on site visits that are structured according to a common protocol. The site visits have been valuable to the project. Participating institutions report the exchange of actionable ideas and feedback; members of the grant leadership team have used the site visits to direct the overall project, and evaluators have refined questions and identified trends that will help their assessment of the project. At a deeper level, the site visits have created a strong sense of community among those involved in every aspect of the SUMMIT-P project.

KEYWORDS

campus visits, collaboration, interdisciplinary, professional development

An overarching goal of the NSF-IUSE funded project, A National Consortium for Synergistic Undergraduate Mathematics via Multi-institutional Interdisciplinary Teaching Partnerships (SUMMIT-P), is the development of robust collaborations between higher education mathematics departments and the partner discipline departments who use mathematics courses as pre- or co-requisites. The project involves teams of educators at nine institutions that are working to improve mathematics curricula and instruction in lower-level courses. Each team (hereinafter referred to as “institutional teams”) consists of at least one mathematician and at least one faculty member from a partner discipline. The institutions range from small, private colleges to large, research-intensive universities.

One of the key features of the SUMMIT-P project is the exchange of knowledge and resources across institutions as they implement the recommendations of the Curriculum Foundations (CF) reports (Ganter & Barker, 2004; Ganter & Haver, 2011). The CF recommendations resulted from extensive conversations among mathematicians and various partner disciplines from the humanities to the natural sciences. Each conversation with a partner discipline resulted in a separate report. The introduction to the first report (Ganter & Barker, 2004) indicated that there was a great deal of consistency across the recommendations presented in the different partner discipline reports. The recommendations included incorporating mathematical modeling in activities and assignments, emphasizing conceptual understanding over computational fluency, and increasing the use of active learning.

The project has many systems in place to encourage collaboration across the institutions, from annual meetings at a national conference to regular virtual meetings to the submission of institution reports. The most extensive system in the project is the site visit pairings. Each participating institution agreed to host two site visits over the five-year project. Additionally, each institution agreed to visit two different partner institutions. The site visits are not symmetric, that is, each visit is a stand-alone experience and is not necessarily reciprocated. In this paper, we will share how the site visits provide a valuable mechanism for showcasing and reinforcing the project activities to the visiting institution, the project management team, the evaluators, and the various stakeholders at the institution being visited. We believe that the site visits have provided a means for substantial work to happen in a shorter time span than would have occurred without the visits. We believe that other large-scale projects spanning different departments and institutions can benefit from incorporating a site visit component.

In what follows, we detail the goals of the site visit along with the structured planning that goes into making a successful visit. We illustrate the value of the site visits by analyzing the responses to post-visit questionnaires, sharing perspectives from different types of participants, and providing a series vignettes from a variety of institutions that highlight the benefits gained by hosting or attending a site visit. The paper is intended to be helpful for planning a site visit and also for motivating the use of site visits to strengthen collaborative projects.

Why Site Visits?

A goal of the SUMMIT-P project is to go beyond creating interdisciplinary course materials by establishing professional development communities that will outlast the grant funding period. The project involves a mix of online professional development with face-to-face site visits.

Online professional development experiences take place through various “clusters” of institutions. The clusters consist of two or three institutions that have a common project attribute,

such as the target mathematics course level or the type of partner disciplines involved in the institutional project. In a narrative study of seven college or university educators, Teras (2016) found that online professional development can result in significant change in participants' perception of education. However, Teras found that the different expectations and preferences of participants were more challenging to navigate in an online environment than in a face-to-face environment. This was partly due to a difference in the sense of community. The study indicated that successful online professional development requires de-emphasizing the accommodation of different participant preferences and instead paying more attention to the participants' self-regulation as well as an intentional emphasis on the quality of facilitation in an online environment. In the SUMMIT-P context, online clusters helped to initiate collaboration across institutions, and the discussions helped to define questions that were further examined during site visits and beyond.

We always expected that building trust and forming sustainable communities would require more than online meetings. In addition, gathering information, whether for purposes of informing one's own work or for evaluating projects, required deeper and more intensive interaction. In order to achieve this quality of professional community development, site visits were built into the design of the SUMMIT-P project. The project included dedicated funding to support site visits in order for participants to share ideas, observe the implementation of institutional projects, and refine strategies for interdisciplinary collaborations. In addition, site visits allow members of the project management team and the evaluation team to observe project activities at each of the institutions. During site visits, the evaluation team conducts focus groups with both faculty and students. The faculty involved in the focus groups are those who are not part of the institutional team of PIs and co-PIs but instead are those using the products that were developed through the institutional team's collaboration. Students who participate in focus groups are taking or have taken the courses that have been modified as a result of the collaborative efforts. Face-to-face focus groups facilitate flexible discussions that permit the evaluators to explore teaching and learning interventions in depth with both faculty and students involved (see Greenbaum, 2000 for more information on focus groups).

An Overview of SUMMIT-P Site Visits

The first round for site visits in the SUMMIT-P project is illustrated in Figure 1. Prior to the visit, the host and the visitors exchange goals. The host plans an agenda for the visit which includes classroom observations, focus group discussions with students, conversations between and among mathematics and partner discipline faculty, sharing teaching materials, discussions with host institution administrators, and, of course, meals. The primary hosts, and the group largely tasked with organizing the visit, are the mathematics faculty. They are most familiar with which courses should be observed, the meeting space to be used, the other individuals on campus who will be interested in the project, and they have access to the students taking the mathematics courses. Although there is a significant time investment in preparing for a site visit, the mathematics faculty have the most to gain from the event. Their courses can be modified and further improved based on observations and reflections from the visitors: they are able to hear what students think of the project, they get to showcase their work to the broader university community, and they may gain buy-in from tangentially involved faculty at their institution. Following the visit, participants write a structured reflective review of the experience.

Figure 1*Map of the First Round of Site Visits.*

For example, Virginia Commonwealth University (VCU) volunteered to host the first visit in early November 2017 at the start of the second year of the project. They were visited by Norfolk State University (NSU). This required the participants to start planning for the visit in late August. A general schedule of the site visit activities was outlined in September. Since this was the first visit, several meetings were held to discuss the structure. The planning stage of the process has now been formalized in a protocol, which has streamlined the planning process for all subsequent visits. For VCU, the main scheduling constraints were key administrators' availability and the specific schedules for the courses to be observed. All other components could be arranged around these times.

The Site Visit Protocol

In order to provide consistency among the site visits, the Project Management Team (PMT) developed and revised a common protocol based on the initial VCU visit. The protocol includes required features for each site visit as well as standardized questions to be used for follow-up reporting. After the visit, the host, visitor, a PMT representative, and a project evaluator each submit a post-visit report. Following the first round of site visits, the protocol was modified. The second iteration of the protocol included a small amount of preparatory work for each site visit. The site visit protocol is stated below.

The preparatory work is as follows:

1. The host team prepares a summary of their SUMMIT-P work to date and sends it to the visiting project members.
2. Based on the summary, each team prepares goals for the site visit and distributes the goals to the other site visit participants.

3. Based on the goals, the host prepares, circulates, and modifies (as necessary) a schedule and itinerary for the site visit.

The site visit lasts two days and includes the following components:

- **Project highlights presentation:** Typically, this is a presentation to the university community about the SUMMIT-P work and consists of an overview of SUMMIT-P from the PMT representative along with presentations by both the host and the visiting institution teams. The host invites administrators, including deans and the provost, along with faculty from the mathematics and partner discipline departments to attend. One of the purposes of the highlights presentation is to impress upon administrators the innovative nature of the work as well as the national scope and significance of the work going into this project.
- **Classroom visits:** Typically, there are at least two opportunities for participants to observe the mathematics classes that are being modified through the SUMMIT-P project. One of these classes should be taught by a faculty member who is not a PI or co-PI from the host institution. This gives the team an opportunity to see how well the course materials work when taught by faculty members who were not directly involved in their development.
- **Conversations with students:** Two conversations take place with students taking the modified mathematics courses. One conversation involves the visitors and PMT representatives. The evaluator may or may not be present. This conversation provides the visitors and the PMT representative with an opportunity to learn about the host institution's work from the students' perspective. The second conversation is a focus group with the SUMMIT-P project evaluator. The evaluators use common protocols for this conversation which provides data for the project evaluation.
- **Various conversations among faculty:** Faculty are matched in different configurations to talk with one another. This includes conversations with faculty who are not part of the host institution's leadership team and conversations among partner discipline faculty.
- **Inspecting course materials:** Some institutions provide time for visitors to inspect and work through sample course materials. This provides the visitors with a more comprehensive look at the results of the host institution's collaboration in order to identify ideas that they can borrow or steal. Indeed, several of the examples of borrowing in May et al. (2020) resulted from site visits.
- **Social events:** Meals are critical opportunities for participants to talk about the institutional projects in a casual setting in which everyone "has their guards down." This provides an opportunity to discuss issues and discover concerns that have not yet been voiced and builds a sense of community among participants. Some institutions have also found time to include a tour of campus for the visitors. Augsburg University and NSU both provided tours of new buildings housing the mathematics and partner discipline faculty. Ferris State University (Ferris State) provided tours of the Museum of Sexist Objects and the Jim Crow Museum. Tours help to provide "breathing space" on days that are often densely packed, help the host show off unique features of their institutions, and provide further opportunities for community building.

Each of the visit components has associated challenges. The most significant challenge is getting those from outside of the project to participate, including administrators (who have been mostly interested but are very busy), faculty, and especially students. Some institutions have accomplished this easily; others have had to be creative in order to fit in as many components as

possible. Scheduling meetings over meals and offering refreshments can help improve faculty and student attendance. Indeed, serving food and refreshments is a strategy for success in convincing participants of the difference between professional development and a committee (Cox, 2004). Ferris State made sure to get the highlights presentation on administrators' calendars early. Some teams were creative about scheduling class observations. For example, at LaGuardia Community College, the modified class normally takes place in a two-hour time block, so the host team planned one of the observations for one hour of lesson time and utilized the second hour for discussion among visitors and students.

Figure 2

Post-Site Visit Questionnaire

PI of host institution

1. Please discuss challenges/successes about your SUMMIT-P work, relative to what you learned during the site visit.
2. What did you learn about planning and coordinating a site visit? Include suggestions for others who will host site visits. Include suggestions for the PMT for future site visits.
3. Describe the new ideas that you learned during the site visit that you plan to apply to your SUMMIT-P work.

PI of visiting institution

1. Describe the new ideas that you learned during the site visit that you plan to apply to your SUMMIT-P work.
2. Provide advice to the host institution regarding what you learned about the work they are doing. Include ways you think the project work could be enhanced.

Representative of the Project Management Team

1. How well are mathematics department faculty and partner discipline faculty at the host institution communicating with each other?
2. How well did the site visit protocol work? How should the protocol be changed for future site visits?
3. Provide advice to the host institution regarding what you learned about the work they are doing. Include ways you think the project work could be enhanced.

Representative of the Project Evaluation Team

1. Describe the evaluation team's focus group with students. What were some highlights?
 2. How well are mathematics department faculty and partner discipline faculty at the host institution communicating with each other?
 3. What did you find particularly noteworthy about the work being conducted at the host institution?
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Post-visit reflection and discussion are built into the protocol. Each party completes a report after the visit. The report includes an assessment of the value of each component of the visit with space for comments along with specific questions for each party (see Figure 2). The site visit reports are combined by the PMT and shared with the PIs across all SUMMIT-P

institutions. These reports strengthen the collaboration among institutions by allowing visitors to reflect on what they learned through the visit and ideas they can incorporate into their own projects. The host institution is provided with valuable feedback to help improve their work. The reports are also used by the evaluators as part of their project evaluation and by the PMT as they monitor the direction of the project as a whole.

The Value of the Site Visits: Analysis of Questionnaires

While it is too early to tell whether the collaboration among institutions will continue after the project funding period, we will share how the site visits have been uniquely valuable for participants during the course of the SUMMIT-P project. This article will illustrate the value of the site visits in three ways. First, we will analyze what participants shared in their post-visit questionnaires. Then we will share perspectives on the site visits from participants in each role. Finally, we will share some of the individual stories that have arisen out of the site visits in a series of vignettes.

Analyzing responses to the questionnaires suggests that the extended time together on campus resulted in the kind of sharing of actionable advice and deep reflection that comes from meaningful collaboration. By *actionable* we mean advice or ideas that fall within a SMART framework—advice that is specific, measurable, attainable, relevant, and time-bound—a framework regularly used in educational settings (see, for example, O’Neill, 2000).

Both hosts and visitors indicated that there were valuable take-aways from the site visits. Some examples of useful feedback are as follows:

- A visiting team noted that the integration of partner discipline applications in the hosts’ mathematics classes were only used in a few, seemingly isolated in-class labs. In order to improve the impact on students, the visitors recommended finding ways to integrate partner discipline applications throughout the mathematics courses.
- A PMT representative recommended that non-tenure track faculty and graduate teaching assistants, as well as more partner discipline faculty, play a larger role in the development of course materials.
- The hosts of a site visit learned that the feedback provided by students was consistent and matched the goals of the course they are working on. They also learned that there will be non-trivial challenges to supporting new instructors teaching the course, especially non-tenure track faculty. This led to a conversation about having faculty who have taught the course serve as mentors for those who are teaching it for the first time. Conversations like this would not be possible without the on-site, collaborative nature of the institution visits.

After the first round of site visits, seven out of eight host PIs described an actionable new idea from the visiting institution that they planned to implement in their own project. These ideas matched with the seven out of the eight visiting PIs who contributed actionable advice in their post-visit reports. For the visitors, six of the eight reports described an actionable idea that they will implement back at their home institution. In addition, six of the eight reports described the ability to see the host’s project in action through classroom visits, conversations with students, and meetings with faculty as critical to providing a basis for exchanging actionable ideas. In terms of moving the project forward, six of eight reports provided critical reflections on the project’s next steps. To see how some of the ideas were implemented, see May et al. (2020).

The PMT representative's and the evaluator's roles were to observe what was taking place at the host institution. In seven of the eight post-visit reports, both the PMT representative and the evaluator indicated that quality communication took place. The PMT representatives tended to characterize the communication as *strong* or *excellent* whereas the evaluators tended to describe the communication as *good*. This is an indication of the difference between the leadership role of the PMT representative and the more scholarly and summative role of the evaluator. Further to this distinction, the PMT representative was asked to provide advice to the host team, and seven of the eight reports included actionable advice. In half of the reports, the evaluators noted that students in focus groups indicated that they can better see how mathematics is used in real life as a result of the host institution's actions to improve mathematics courses. In five of the eight reports, the evaluator described a unique, valuable, and scalable achievement of the host institution, such as adding a lab hour to an existing mathematics course like College Algebra.

The reports describe benefits of the site visits that could not occur simply through online meetings and discussions. The extended time focused on understanding the host institution's project and seeing it in action through class visits and discussions with students were critical to the exchange of actionable ideas that could be used to move both projects forward. In one case, an institution that was struggling to meet project goals was able to use the site visit as an opportunity to bring the team together. By engaging with the visiting institution, the PMT representative, and the evaluator, they were able to reinvigorate their project. The observations and advice from the PMT representative and the observations from the evaluator would also be very difficult to develop outside of the site visit framework. The SUMMIT-P project is, at its heart, about collaboration. The nature of the collaboration and communication among members of a team requires extended observations over time and in context. This is an opportunity that uniquely occurs through site visits.

The reports also include some of the challenges involved in site visits. In one case, a host PI had difficulty getting students and faculty from outside of the grant to participate in the site visit. We learned from this experience about the importance of quality food and the use of calendar invitations. Another site visit was interrupted by a blizzard, and the participants learned how to improvise as best they could.

The analysis of the post-visit reports and the perspectives offered above illustrate the value of different roles among the site visit participants. Both visitors and hosts are looking for something that they can use in their projects. Evaluators and leadership representatives are interested in the project as a whole— the quality of the collaboration and the impact of the nature of each institution on the project. Each perspective is enriched by participating in the site visit together.

The Value of the Site Visits: Perspectives by Role

The site visits involved many individuals coming together to make the interactions a success. At a minimum, the participants for each site visit include the host mathematics PI, a host partner discipline co-PI, visiting faculty from an outside institution who include mathematics and partner discipline faculty, a representative from the PMT, and a project evaluator. The various roles a participant plays in a site visit each provide a different perspective about what is learned during the experience. Below, we provide comments contributed by participants about the different tasks and goals of a site visit. These comments are from a representative sample of the

different roles faculty assumed as they participated in a visit. The perspectives represent a PI from mathematics and co-PI from a partner discipline for a host institution, a PI from mathematics and a co-PI from a partner discipline for a visiting institution, a representative of the PMT, and a representative of the evaluation team. Although the site visits discussed below took place at different institutions, the reader should see the diverse benefits that result from including the variety of roles in the design of the site visit, including the differing perspectives between mathematics faculty and partner discipline faculty.

Host Institution—Virginia Commonwealth University (VCU)

Virginia Commonwealth University is a large, public institution. The mathematics department is housed in the College of Humanities and Sciences and teaches courses for students in that college, as well as students in the School of Engineering, the School of Business, the School of Education, and students in pre-health majors on the Medical Campus.

Mathematics Faculty—Rebecca Segal, VCU PI.

VCU's efforts have focused on collaborating with the engineering faculty on revising the Introduction to Differential Equations mathematics course. This course is taken by students majoring in engineering, mathematics, physics, and chemistry.

As mentioned above, VCU served as the host institution for the first SUMMIT-P site visit. Although the project was still in the early stages, the site visit allowed the PI to (1) pull the team together, (2) strengthen the project activities, (3) rally the faculty and administration behind the grant-funded work, (4) encourage meetings with and buy-in from the partner disciplines, particularly from engineering, and (5) exchange ideas and get feedback from site visit participants. Although the planning and delivery of the visit was time-intensive, the visit positively influenced the work. It created a more immediate need for time to be spent on the project, and the time invested in the visit paid off by generating a boost in activity both before and after the visit.

Partner Discipline Faculty—Afroditi Filippas, VCU Co-PI (Electrical Engineering).

There were multiple components of the site visit that the engineering faculty played a large role in. The engineering faculty had the opportunity to describe perceived challenges for students to the visitors as well as to faculty from the VCU mathematics department. While the conversation was centered on Differential Equations, some side conversations identified student difficulties in Calculus and other mathematics courses that are required courses in the engineering curriculum. The discussions confirmed that the visitors from NSU shared the same challenges. Further discussions revealed similar trends in thinking among faculty.

Classroom visits were instrumental in allowing engineering faculty to witness both the quality of mathematics teaching (high to very high) and the students' abilities to comprehend the material and manipulate differential equations (again, high to very high). This is important for engineering faculty to witness, as it shifts at least some of the onus away from the mathematics faculty to teach the material and onto the engineering faculty to create better and more intentional links to review the material that students have already mastered.

Preparing for the highlights presentation was also very useful, as it provided the engineering faculty with an opportunity to re-focus their attention on their initial project objectives and review how the activities up to that point were informed by those objectives. It

also provided an infrastructure through which the engineering faculty could make an initial assessment on whether the designed activities led to the desired outcome. Through the presentation and a recap at the end of the visit, the engineering faculty confirmed their commitment to this project, reconnected with colleagues, and evaluated and improved the plan for further work on the project.

Visiting Institution—CUNY LaGuardia Community College (LAGCC)

LaGuardia Community College (LAGCC) is a Hispanic-serving institution with a diverse 50,000-student population (45% Hispanic, 20% Black), most from families in poverty and many in the first-generation of their family to go to college.

Mathematics Faculty—Tao Chen, LAGCC PI.

At LAGCC, a group of mathematics and economics faculty are integrating economics into College Algebra. They are also creating a “paired course learning community” with College Algebra and Introduction to Microeconomics. This means that a cohort of students take the two courses together, and the faculty design common assignments to be used in both courses.

The faculty from LAGCC visited St. Louis University (SLU) during Spring 2018. SLU mathematics faculty are also collaborating with economics and business faculty in order to contextualize mathematics in College Algebra as well as in Calculus.

LAGCC’s goals for their visit to SLU were:

- Learn how Excel was embedded in mathematics instruction and course activities.
- Observe the interaction between the instructors and students from different majors.
- Learn from student feedback about the courses being redesigned.
- Learn about discipline-specific applications being incorporated into College Algebra and Calculus.

The visitors noted that the economics and business contexts are well integrated with the mathematics content in SLU courses. In particular, Microsoft Excel use is seamlessly integrated into the courses, and the mathematical needs of students taking business courses are comprehensively addressed. Moreover, Tao learned the following during the visit:

- Contextualized mathematics boosts students' interest in the course work.
- The introduction of partner discipline applications helps to facilitate students learning.
- Working with academic advisors is necessary to increase enrollment in revised courses.

Thanks to what they learned during the visit, the LAGCC team worked closely with academic advisers to promote the course pair successfully. Moreover, assignments in the course pair are designed to be relevant to students from different academic backgrounds and also be self-contained activities so that students can work independently if they need to.

Partner Discipline Faculty—Soloman Kone (Economics).

Tao was accompanied on the visit to SLU by Soloman Kone, an economics professor from LAGCC. As part of the LAGCC project, Soloman developed a “wish list” of mathematical skills that need to be applied when learning economics, developed theoretical and applied activities and assignments for College Algebra linking mathematics to economics, and collected qualitative and quantitative assessment data from his students taking Introduction to Microeconomics.

Solomon found the visit to SLU to be very productive and beneficial. His goals were to learn about some best practices through the project highlights presentation of the host institution, to see examples of business content integrated into College Algebra through class visits, to hear the students' perspectives through the focus group meetings, and to learn about approaches to collaboration by meeting with the SLU project mathematics-business working group. He learned that (1) some of the best practices at SLU were portable and could be replicated at LAGCC, and (2) the mathematics and partner discipline faculty were communicating very well at SLU. He was also impressed by the enthusiasm of SLU students and the hospitality of the host institution.

Project Management Team (PMT)—Rosalyn Hargraves, VCU

As a PMT member, Rosalyn participated in the visit by LAGCC to SLU. Her goal for the visit to SLU was to observe how the project was progressing and to provide any advice or new perspectives on the work of the team. The most beneficial components of the site visit were meeting with the partner discipline faculty and attending the student focus groups. While the classroom observation was informative, the highlight was talking to students afterwards to inquire about their reasons for taking the course and the benefits of the revised content. In conversations with students, she found that a number of students in College Algebra that were not majoring in business were struggling with linking the mathematics concepts learned in their classes to what they may need in the other courses required for their majors. However, they did believe that the content that they were learning (such as the time value of money) may be valuable at some time in their future lives when they need to know about retirement funds, taxes, and mortgages. Therefore, they did not necessarily see the importance of having examples linked specifically to their major. It was surprising that many of the College Algebra students in the focus group were not business majors but still appreciated having “business” type examples linked to real life instead of examples related to their social science or life science majors. Furthermore, because they could not predict what direction their career path may take, they could not be certain the content would not be relevant in the future. In both College Algebra and Calculus, students saw the value of learning Excel as a computational tool and potentially for jobs in the future. Learning Excel was one of the best features of the course even though it placed an additional workload burden on the students compared to the non-modified sections of Calculus and College Algebra.

One of the most noteworthy aspects of this site visit was seeing the institutional commitment to the work of the project. For example, the dean of the School of Business matches the salary supplement for participating mathematics-business working group faculty. This type of monetary commitment was not seen in any other site visit. This incentive may be one of the reasons the monthly meetings with mathematics and business faculty are attended and valued by faculty from the two disciplines. These monthly meetings allow for all of the faculty to come together to discuss issues pertinent to the project. This type of close collaboration across the campus facilitates what appears to be a strong connection between the participating mathematics and partner discipline faculty, which is one of the desired outcomes from the SUMMIT-P project.

Evaluation Team—Jack Bookman, Duke University

Jack participated in Oregon State University's (OSU) visit to San Diego State University (SDSU), VCU's visit to Augsburg, and Ferris State's visit to LAGCC. In general, as an evaluator, he observed the differences in the engagement and awareness of faculty in other

disciplines in addition to the mathematics faculty not directly involved with the project. The site visits give a glimpse of the variety of ways institutional projects have been implemented along with the unique challenges faced by each institution.

During his various visits, he has observed that the size and mission of an institution can have an impact on the implementation of the project. He also noted that the level of experience of those teaching the modified courses can be an important element of early successes. Finally, Jack observed that even at a very large institution, a well-developed culture of student learning communities can contribute positively to the implementation of the project.

Collectively, Jack has found it invaluable to observe classes and see how students interact with the content and pedagogy developed through the SUMMIT-P project. One also gets a snapshot of what the culture of a campus is and how that can affect the success of a project like this. Talking with students in the focus groups is important, but getting students to participate in these focus groups is difficult, and those who do are unlikely to be representative of the entirety of the student experience.

The Value of the Site Visits: Highlights, Vignettes, and Challenges

The benefits and challenges we identified from the post-visit reports are well illustrated by the following vignettes. Although each site visit followed a consistent protocol, the nature of the visit was influenced by the type of institution being visited, the interests and personalities of the participating faculty, and the nature of the curriculum work being undertaken. We try to capture the range of experiences in the site visits and highlight some of the interesting interactions. Each of the contributors below is either a PI or co-PI and has involvement both on curriculum work in the classroom and with the interdisciplinary collaborations.

The institutions featured in these vignettes range from large, public universities, to small, private colleges. The diversity of the institutions represented in these vignettes illustrates that the benefits of the site visits are not limited to one type of college or university. These stories provide the reader with a few episodes in which they can peek at what happens during the site visits. Some of what we see is expected—such as learning a new approach to teaching a topic. Others are unexpected and lead to the kind of social bonds that become stronger than the grant funding itself. In all cases, these vignettes give examples of the human stories of the site visits, stories that illustrate the high level of interaction and engagement among colleagues and friends and illustrate the power the site visits have for building community among university teams and among colleagues at different institutions.

Sharing Teaching Approaches Across Disciplines—John Hearn (co-PI), Chemistry, Lee University

Lee University is a private, four-year, liberal arts college in East Tennessee serving 4,000 undergraduates. During a visit by Ferris State to Lee University, John met with Victor Piercey from Ferris State and discussed what Victor was doing in his quantitative reasoning class. Students have always had trouble with algebraic manipulation in John's chemistry classes, and Victor described some of the "moves" that he defines in his class (see Piercey, 2017). Victor uses the term "moves" as a student-friendly way to describe the types of steps that are needed during algebraic manipulations. The move that John has used in his teaching since is the "swap move," in which the unknown in the denominator is swapped with the other side of the equation (if $a =$

b/c , and we want to solve for c , we can “swap” a and c to create $c = b/a$). Thus, a chemistry faculty member was able to take a concrete teaching tool from the visiting mathematics faculty and implement it in his course.

Feedback from Classroom Visits—Rebecca Segal (PI), Mathematics, VCU

Because the VCU team was hosting a site visit in the early stages of the SUMMIT-P project, they decided to have their own engineering faculty visit some sections of Differential Equations just prior to the site visit in order to solidify connections between mathematics and engineering faculty. This turned out to be a great boost to their collaboration. It allowed the engineering faculty to experience the course in ways that would not have occurred during a typical meeting conversation. The mathematics faculty gained valuable feedback from their engineering colleagues. Some specific suggestions related to a comparison between how problems are presented in a mathematics textbook and how they are presented in an engineering textbook. The authors of the mathematics book vary the units in examples and problems, often using slugs and feet. The engineering faculty revolted when they saw this, explaining that they never use anything except metric units. As a result of the classroom visits, the VCU team was able to make some immediate adjustments to the way material was being presented in Differential Equations. Planning for the site visit prompted a beneficial level of interaction among faculty at the institution, interaction that was not in the initial plan. This helped to energize the project activities during and after the site visit.

Scheduling Challenges—Victor Piercey (PI), Mathematics, Ferris State

Ferris State is a public university in Michigan serving 14,000 undergraduates and is a popular transfer destination from community colleges. When Ferris State hosted SLU during a site visit in 2018, the hosts planned several events and hoped to include a broad spectrum of individuals involved in the project. They especially wanted to include the mathematics, social work, business, and nursing faculty involved in a faculty learning community (FLC) (see Bishop, Stone, & Piercey, 2020). Having the SLU visitors observe a session of the FLC would have been ideal, but the time of the visit could not be scheduled during any of the times that the FLC met. Consequently, Ferris State planned multiple opportunities to meet and, more importantly, eat together. Unfortunately, there was not much participation from faculty involved in the FLC – with the exception of a dinner at one of Big Rapid’s finest eateries. Where was everybody? As the reader likely knows, scheduling is nontrivial. But in this case, there were added challenges. Most of the FLC participants (along with many faculty at Ferris State) commute from Grand Rapids—which is about a one hour drive away from campus. They also have significant family and other responsibilities at home. It is not easy for them to be spontaneous. On top of this, the Ferris Faculty Association (the union for tenure and tenure-track faculty) was mired in contract negotiations that had already produced several work actions, including a strike at the beginning of the academic year. As a result, morale on campus was quite low. From this experience, the Ferris State team decided to use calendar invitations for the next time they host a site visit.

Team Bonding—Debbie Pike (co-PI), Accounting, Saint Louis University

SLU is a private university in Missouri serving 8,000 undergraduates. Debbie could recite many benefits that SLU's SUMMIT-P project received from the site visits, such as (1) identifying content to be shared, (2) developing a diverse network of contacts with shared interests across universities, and (3) increasing visibility of the project to SLU administration. None of these benefits are likely to be surprising in the context of this project. However, during a visit to Ferris State, Debbie found an unexpected benefit to the site visit. During a three-hour car drive from the airport to the Ferris State campus, she got to know her colleagues better and more personally. The deepening friendship strengthens her resolve to do her part for the success of the SUMMIT-P project because it is *the team's* shared success. She doesn't ever want to let her friends down.

The time away from day-to-day to-do lists gave the team a much-needed opportunity to really think about where they were with the project so far and, more importantly, some ideas of where they could take it. Finally, the most unexpected benefit of all, in the course of conversation, the team happened to discuss a current business school discussion item: strengthening curriculum around business data analytics. The chance to have a meandering conversation led directly to Debbie being much more informed for the ensuing discussions within her partner discipline.

Inter-institutional Bonding—Kathy Williams (co-PI), Biology, San Diego State University

SDSU is a public, Hispanic-serving, research university with 29,000 undergraduates, over 34% from underrepresented groups. A team from SDSU visited Unity College to observe their work with the biology department. During the course of the visit, weather intervened to provide an opportunity for a community-forming experience. Due to Nature's intervention, this carefully planned visit turned out to be a richer experience for all. Janet Bowers (PI, mathematics) and Kathy Williams (co-PI, biology) from SDSU were to meet with Augsburg colleagues Joan Kunz (co-PI, chemistry), Jody Sorensen (co-PI, mathematics), and Su Doree (PI, mathematics) at Unity College, where Carrie Diaz Eaton (PI, mathematics) and Emma Perry (co-PI, biology) teach.

The teams had a great visit to campus during the first day, observing classes, talking about teaching and learning with faculty and students, touring the campus, and even visiting the animal care facility while building on ideas and discussing what elements of the programs might transfer. Unfortunately, a blizzard hit on the second day of the visit and Unity cancelled classes. Snowbound at their hotel, the visiting teams held scheduled meetings with Unity students and faculty online via Zoom that were wonderfully rich, with all of us caught in the same unexpected situation. Even though we were locally "apart," we were together in a way that would not have been the same if we were at our home campuses. The storm broke the next morning; after digging cars out of the snow, the Augsburg team (skilled in snow travel) led the SDSU team (from southern California) along the snowy turnpike to the Portland airport, driving behind snow plows the whole way. What team work!

This visit encapsulates what the SUMMIT-P project has been to many participants: a shared adventure—not knowing what was coming and adapting as necessary, and always looking for opportunities to learn from each other as we share our discoveries about improving our students' successes.

Conclusions

The site visits are expensive in terms of both time and money and may only indirectly advance the project goals in terms of curriculum development and collaboration between mathematics and partner disciplines within an institution. But they accomplish a great deal at a much deeper level. The site visits are very focused events and *contribute to community building, the cross-pollination of ideas, and provide time to reflect on the SUMMIT-P projects*. Some institutions have found hosting site visits to be critical moments to regroup as a project flounders. They are eye-opening and powerful, and there is simply no substitute for face-to-face visits.

For future visits, the SUMMIT-P project management group is considering some minor changes to the protocol which include:

- preparing students to participate in the visit by explaining to them what is different about the courses they are taking compared to prior course offerings;
- including visits to courses taught by partner discipline faculty, if applicable to the goals of the visit; and
- focusing the site visits on plans for sustaining the project beyond the period of grant funding.

The series of site visits serves to strengthen the SUMMIT-P project community. One host PI wrote in their post-visit report that:

[T]he most important part [of the site visit] was the relationship building. While content is important, I think that the site visits help the institutional PIs create relationships that can be built on for future curriculum development.

Hosting a site visit is a vulnerable experience, but in each instance, the host institution has risen to the occasion to showcase their project and their institution. It has allowed for a significant exchange of ideas as well as first-hand experience of the differences in institutional cultures. It has allowed for deepening of professional relationships during down times between sessions. Colleagues who have travelled together to site visits have also had quality time together outside of the normal, hurried day-to-day interactions. By facilitating sharing and collaboration via intensive visits in ways that are not possible with virtual meetings, the site visits are the heart of the SUMMIT-P project.

For a large, multi-department and multi-institution project, site visits provide a means of community building and substantial exchange of ideas beyond traditional meetings. Engagement and longer contact time with faculty and students surrounding the project enables better exchange of information. Although individual experiences were different with different site visit institutions, and sometimes the visit did not go as planned, all participants left the visits energized for their own project, having learned valuable information and built stronger ties with their colleagues.

Acknowledgment

This paper was developed in part through the project *Collaborative Research: A National Consortium for Synergistic Undergraduate Mathematics via Multi-institutional Interdisciplinary Teaching Partnerships* (SUMMIT-P, www.summit-p.com) with support from the National Science Foundation, EHR/IUSE Lead Awards 1625771, 1822451, 1942808. The opinions expressed here are those solely of the authors and do not reflect the opinions of the funding agency.

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