CALSTEP EVALUATION

Key Findings: Spring 2018 SETI Interviews

Introduction

This document summarizes findings generated through interviews with 11 engineering instructors. Most (8) were SETI participants in 2016 or 2017. The three instructors who had not yet participated in SETI had used other CALSTEP resources. The interviews were designed to further explore subjects investigated in a survey of SETI participants and other CALSTEP resource users. The survey findings can be found at (are they posted on the CALSTEP website?).

The presentation that follows is divided into two sections. Section I identifies key findings. Section II presents recommendations. The interview design and implementation is documented in Attachment A. The interview protocol is presented in Attachment B.

Section I: Key findings

This section presents key findings related to each of the major themes identified in the interview protocol: the state of technology integration achieved by SETI and CALSTEP participants and users; advice to the incoming SETI participants and suggestions to strengthen SETI; challenges to technology integration; feedback on the CALSTEP website and resources; interest in continuing the technology momentum; and interest in coordinated online offerings.

The State of Technology Integration—SETI and CALSTEP Integration of Technologies Post-SETI

The technologies SETI interviewees were most likely to identify when asked which SETI tools and approaches they currently use or plan to use were writing on slides during lectures and using videos to enhance teaching and learning.

While the interviewees seemed most engaged when recounting how they are making and using videos, they were also enthusiastic about their new ability to write on slides they present in class. Annotations during class really help students understand the material, the interviewees agreed. The other advantage is that they can then post the slides on the class website for reviewing purposes. Two instructors pointed out the advantage of not having to run from the white board to the slideshow which allows them to focus more closely on their presentation and on the students.

In talking about their experimentation and use of videos, interviewees spoke very positively about Camtasia and about videos CALSTEP/SETI have made available to them. However, most of the interviewees described these resources as sources of inspiration and ideas that they use to guide the design and development of their own videos.   Students, the interviewees agrees, prefer to view videos presented by their own instructor. One instructor explained that she had viewed several times Tom's Circuits recordings and then recorded her own adapted version.   "*I took a lot of inspiration from the content* [of Tom's videos]," she said.

Interviewees reported using CALSTEP, UTube and, especially their own recorded videos in the following ways:

- record and post home work assignments
- record and post in-class assignments (one instructor advised using a small mike instead of the headset she received from SETI. The small mike better allows students to hear what is going on in class so she does not have to restate every question)
- record and post responses to frequently asked questions (that can in turn become part of a library)
- accelerate – through use of video – lab experiments to show students what changes occur over what would otherwise have been a very long time
- short U-Tube and other videos showing, for example, engineering in action, 3D applications, etc

Interviewees reported the following advantages and benefits they and their students are enjoying from the use of videos:

- provides students with opportunities to replay content they don't understand – this in turn makes it less challenging to teach a group of students who start out at different baselines of learning and/or who learn at different paces and have different learning styles.
- allows students to focus entirely on a lecture or experiment and not get distracted taking notes – knowing that the lecture will be posted and they can watch again and then take notes. *"[With the class recordings] I can tell students – you don't have to write it all down. I'll post it after class,"* the instructor noted. She then recounted that a dating couple in one of her classes have date nights where they watch her class videos. They call it "Date Night with Tram."
- provides opportunities for faculty member to record and post responses to repeat questions, thereby eliminating the need to explain the same thing over and again. "*I used Camasia to develop and edit videos that I posted on the class website to address questions that I knew students would have. Instead of answering the same question 20 times I referred students to the website*."
- allows the instructor to work individually with students ("*this makes me a coach more than an instructor*") who after watching a video in class can work at their own pace or in teams on assignments. Students can also replay the videos as many times as necessary.
- provides opportunities for instructors to bring to class or assign for homework short videos highlighting, interesting real-life applications of engineering, examples of what it is like to work in different engineering fields, etc.

One instructor reported asking students themselves to use their phones to record lab experiments conducted in class. The instructors noted he tells students to take the videos in slow motion so when they replay the recording they will be able to see things they cannot see with the naked eye.

Another interviewee explained he is experimenting with inserting quizzes into his videos.

An instructor who is relatively new to teaching and very open to technology explained that she records all her classes and then posts them and her class notes on the class website. She updates her video library and class notes each semester and will take down the old material when she posts the updated version. She pointed out that students who miss a class can download the lecture and catch up, adding that many students watch the lecture in addition to coming to class.

Another, more seasoned interviewee, reported that she for the first time in her career is teaching an online class. The instructor recounted it was a steep learning curve and that "*so much technology was required to deliver the online course*." Once the course (Statics) launched, technical challenges kept occurring. As an example, she did not have a working mike for a month. She added that she had expected to teach half of the students online and the other half face-to-face (FTF) . However, so many students signed up for the class that she has a full online and a full Face-to-Face section. "*The grading is killing me*," she said. The instructor added that the online students are not doing as well as the FTF students. One reason, she speculated, may be that many of the online students chose to take the class in this format because they are enrolled in so many other courses that there was no other way to fit in Statics. As a result, the online students include more over-committed students than the FTF students, a fact that complicates any attempt to compare grades across the two different delivery formats.

Many interviewees expressed interest in trying to flip classes, although, thus far nobody had actually done so. One instructor thought flipping could help her become more effective teaching large classes.

A large number of interviewees expressed gratitude and appreciation for having been given the opportunity to attend SETI and for the computer and other resources they received as SETI completers.

Advice to Incoming SETI Participants and Suggestions to Strengthen SETI

The most common advice provided by SETI alumni was increased focus. The SETI alumni encouraged incoming SETI participants to pick one technology they want to try when they return to their college and to take immediate steps to try it out. If you wait till the fall semester, "*it is too late – you will have forgotten a lot and you will be overwhelmed with getting ready for the semester.*" One SETI alumni had the following advice to those who are interested in learning how to develop their own video content. "*Immediately after SETI, pretend you are teaching a class – go to the classroom and pretend there are students. Then record a five minute lecture and post it to see how it goes.*"

The SETI alumni also proposed that SETI itself would become even better with increased focus and presentation of fewer technologies. One past participant summed it up this way: "*Less content, more depth and more opportunities to try things out.*" Some interviewees proposed that SETI introduce fewer courses and instead present in more depth technologies that can be used in two or three different courses. Others felt it would be more productive to focus on a limited number of technologies and examine and practice how to apply them across engineering disciplines.

With much discussion of and interest in video production, interviewees also shared the lessons they learned with their own video-making. "*Initially, I took a long time making and editing the videos. It took forever. I then decided – hey, you are not making a Hollywood movie. So I just shot it and posted it. Turns out students actually like it when you mess up a bit here and there.*"

In terms of connecting post-SETI, some interviewees liked the idea of having a more experienced mentor. However, the most popular idea was to virtually convene past participants around either a course or around a technology – e.g., video production. Several interviewees spoke of how useful and supportive it would be to have a group of colleagues engaged in a similar effort and connecting on a regular basis to compare notes and learn from each other's failures and achievements.

One participant said that it would be helpful to have the SETI alumni and the CALSTEP leadership brainstorm how technology can be applied to support engineering departments at colleges that rely on

only one full-time engineering instructor.   How can technology be used to streamline and make the instruction more efficient – for example by posting answers to frequently asked questions instead of answering the same question 40 times/semester? How can online instruction help the small department focus on delivering a few full courses while students needing a more expansive array of offerings are directed to online courses? And how can the single-person department become connected to other engineering departments across the state?

Many interviewees also mentioned that they had resources that others may be interested in sharing, including curriculum and videos. This raised the question of whether the resources could be posted on the CALSTEP website or uploaded to the ELC resource site which also, at the end of the CALSTEP funding period, could possibly host CALSTEP.

One interviewee mentioned that he only found out about updates to the CALSTEP website when the CALSTEP PI told him. Now, that he no longer works at the same campus as the PI, he receives no such information. This raised the question of how to alert the CALSTEP and SETI community that new resources have been posted for their review. The instructor who had lost his "source" suggested that "somebody" send out a notice mid-semester when there are updates and at the same time invite all faculty members to submit content they want to share.

Challenges to Technology Integration

Aside from lack of time, interviewees identified as the major barrier to technology integration the difficulty of being isolated. As one SETI alumni noted: "I'm doing everything on my own." A colleague commented: "I loved SETI because I'm so isolated I have no way to measure myself against other programs. I don't know what others are doing."   And while SETI is very inspiring and participants tend to leave with ambitious plans to integrate technology into their courses, "*it is too easy to revert back to …. well, it is easier to do it the way I have always done it…especially if there is nobody there to encourage you*."

Technology challenges were also highlighted not necessarily as obstacles, but as an ongoing challenge, especially for faculty from small and remotely located campuses. "You never know if the Internet will go down in the middle of a lecture," commented a faculty member who added that a burned out light bulb recently required a complete change of plans in her carefully planned video-presentation. One of her colleagues expressed a similar sentiment: "*It is scary using technology that relies on the Internet because you never know what kind of day it will be.*"

Another instructor mentioned waiting a month to get a microphone she needed for an online course. And a faculty member who records and posts each session on the class website commented that the sound system had recently broken down creating a difficult situation for her online students. While these challenges can be met, they can make even the most forward looking faculty member hesitate to move forward with a new technology application – especially if s/he is in charge of a one-faculty member department.

For some, the scheduling of SETI at the end of the Spring semester provides time to practice and get started over the summer. However, those who leave town or have full-time obligations over the summer face a two month hiatus that is sure to dampen the SETI momentum. In addition, when they return in August, they will be swept up in efforts to get ready for the Fall semester.

CALSTEP Web Site & Resources

All interviewees were aware of the CALSTEP website, but their use of it varied from faculty members who had spent a lot of time reviewing all the resources on the site and used those that matched their priorities to those who had only quickly perused the website.

One faculty member new to teaching felt that the website is "*amazing*" because it provides "*access to full courses and gives us ideas for how we can adopt thing*s." Several other interviewees highly familiar with the website also described the website as an important resource from which they draw content and inspiration. A few interviewees spoke of using the entire CALSTEP curriculum posted for a course, but most described visiting the website to find a few videos or other resources to incorporate into a course or use as a model for local adaptation.

Specific input was provided about the curricula posted on the website. One instructor noted that she had directed a colleague to the Circuits curriculum and he had used it with good results. Another interviewee felt that the Circuits curriculum is too ambitious*, "expecting too much of the students."* Yet another interviewee said her Circuits courses are based on the Naval Post Grad Manual and that this resource is so terrific she would not use anything else. Having made this declaration, the interviewee offered to post the Naval Post Grad Manual on the CALSTEP website. However, several other interviewees spoke of drawing both inspiration and using experiments from the Circuits "package." One interviewee, referring back to SETI, said that even though she had already shopped for items for her next Circuits course when she attended SETI, it was very helpful to have "Tom's shopping list." (Note – if this shopping list is not posted yet on web site, it should be).

One interviewee who is teaching MATLAB in Fall 2018 said the "MATLAB curriculum" on the CALSTEP website is "invaluable." Another interviewee said that the MATLAB outline turned out to be too short for her curriculum committee which requires more documentation. Yet another interviewee said the MATLAB curriculum does not have the same sequence she uses and that the videos are too long. One interviewee reported that her department will use the MATLAB curriculum, and that it will prepare to do so by sponsoring the instructor to take the course online at MPC before he teaches the course himself. Another interviewee said that MATLAB is "*totally online already*" at her college and offered by the Physics Department.

Many interviewees expressed interest in integrating lab activities and other projects into their Introduction to Engineering course and there was a lot of interest in the CALSTEP resources posted for this course. An obstacle for one instructor – and possibly for some of her colleagues around the state – was that her college does not have any math requirements for the course. The instructor said she would like to see more videos and activities on the site that can be used and understood by all students such as short videos showcasing what it is like to work in different engineering fields.

One interviewee explained he had taken some parts of the Engineering Graphics material and used it with good results. Three other interviewees reported that they had used the Engineering Graphics *c*urriculum, but encountered problems because the posted curriculum and some students used different versions of the software. This had created confusion about assignments and references that related to different versions of the software. Additionally, there were challenges resulting from the fact that some colleges had Autocad or SolidWorks – but not both -- while the CALSTEP curriculum uses both. One instructor commented that she had referred students to enroll in Canada's online Engineering Graphics

course. The interviewee added that it was important to her that she knew the instructor (Amelito Enriquez) and that he would provide "her" students with the best possible experience.

Several interviewees had reviewed and used the Materials curriculum and several interviewees highlighted "Erik's excellent videos."

Interest in Continuing the Technology Momentum

All the interviewees are interested in contributing to an effort to secure additional support to continue technology education and integration. Several would be willing to help develop a grant request that could focus on or include: additional SETIs; networking efforts to connect current technology users and to provide them with opportunities to collaborate and learn from and with each other online; support for a person who can coordinate efforts to connect technology leaders and plan and organize training events; maintenance of a resource bank that uses as its foundation the CALSTEP website.

Interest in Coordinated Online Offerings

Not one of the interviewees knew how to obtain information about which engineering courses are offered online across the state each semester. If there is a list of these courses, it is a well-kept secret. Some instructors had referred students to online courses taught by instructors they know and trust at other colleges. However, there was a consensus that having more information about online offerings would be very valuable to students and instructors alike. One interviewee commented: "*It would be great to have an online catalogues for across the state.*"

Interviewees spoke repeatedly about having to cancel courses that only attracted a few students, even though these students had to complete the course to meet transfer requirements. There was widespread agreement that it would be useful to find a way to "pool" these students to enroll in an online course so they could achieve their goal of becoming transfer ready in a timely manner.

Dynamics was the course that most interviewees explained that they either do not offer, or frequently cancel due to low enrollment. "*Having online options could save the day of trying to cancel classes." one instructor commented.* Another interviewee pointed out that even when courses students need are offered at a college, some students may not be able to make them at the time they are available, thus creating additional demand for online options.

Some concerns were raised about online course referrals. One interviewee said she always includes in her courses a project-based component that is fully integrated into the content. The instructor wondered how this kind of learning experience could be accommodated in an online environment with an instructor from outside the college. "*Or what is one of my students in an online course offered by another college is building something weird and needs help troubleshooting*?, "the instructor asked.

Another concern raised was about transfer requirements and how students enrolling in online offerings at other colleges would acquire information about where the course transferred. In addition, a practical question was raised about how to proctor exams and pay for this service.

Finally, while it wasn't discussed there is the question of colleges resisting the idea of "their" students going elsewhere to obtain credits.

However, overall there was agreement among the interviewees that the opportunity of "pooling" students into online offerings should be investigated. Almost all interviewees also expressed interest in supporting the development of a system that could support these kind of referrals.

Recommendations

The following recommendations are based on the interview findings and on the CALSTEP leadership's interest in continuing to move forward with technology integration after CALSTEP funding sunsets.

- The interviews revealed that most SETI participants are integrating technology gradually, recording and/or adding a video here and there, improving lectures with live-annotations, and posting more technology-driven resources on their class websites. It may be useful to share this gradual approach with the incoming SETI participants as a realistic way forward.
- All interviewees would like to have a community of other "users" to connect with on a regular basis. It is likely that developing a structure for these kind of interactions would accelerate and strengthen technology integration among current users. This is particularly the case since so many interviewees spoke of feeling isolated and not having much local support. One particularly popular approach was to have SETI participants from the current and previous sections sign up for a technology they want to integrate into a particular course. Alternatively, the common denominator could be the subject, so one group could form around Circuits, another around Introduction to Engineering, etc. The groups would meet virtually on a regular basis to update each other on their progress, compare notes, and learn from what worked and did not work. Having a funded part-time coordinator and facilitator would greatly strengthen these interactions and such an investment could be included in a future grant proposal by the group.
- Almost everybody was eager to sign up to help secure additional support for technology integration. There is a great opportunity here that should be pursued. One interviewee mentioned her college may even have a grant writer who could help.
- Since there is so much interest in videos, it may be useful to have a session on the many ways in which you can use videos to enhance teaching and learning and to include real life examples provided by past SETI participants.
- The ELC website's resource page is managed by one of the interviewees (Tram from SMC). There are great opportunities to integrate the CALSTEP resources onto that platform. In addition, many interviewees identified additional technology-resources they have developed or discovered. With the help of a coordinator, it may be possible to create and maintain an organized technology resource library on the ELC website after the CALSTEP support sunsets.
- There is great interest in additional technology training, including more SETIs. However, it seems the next SETI should be in Southern California to enable more instructors from that part of the state to attend.   SMC has already volunteered to serve as a host for a Southern California SETI.
- The group should brainstorm how to connect SETI alumni, especially as the number of past participants continues to increase.
- Future SETIs should (continue to) make a strong effort to recruit new faculty members, including part-time instructors who show commitment and interest in technology.

- Would it be possible to have SETI alumni – or some of them – showcase one thing they learned and intend to use, to their colleagues back home? This may contribute to build local support for SETI and it could highlight the need for more technology support at colleges that lack behind in upgrading and integrating technology.
- There is a strong interest in using technology to engage students in Introduction to Engineering, and Nick Langhoff's experiments were mentioned by many interviewees. It may be useful to post different ideas and options for how to get started with this on the ELC and CALSTEP websites.
- In general, it would be useful to identify for all courses featured on the CALSTEP website, stand-alone activities/experiments/ course sections that newcomers, especially, could try to get their feet wet.
- A resource guide should be developed and updated each semester listing all online Engineering courses offered by the CCCs. It would be good to brainstorm what information should be included for each course, including supports required on students' home campus, transfer guidance, and information about travel requirements for possible lab activities, technology resources required, etc.
- CALSTEP should develop a plan for how colleges can collaborate to take turns or assign particular colleges to offer online courses that are frequently cancelled due to low enrollment, such as Dynamics.
- Finally, with so many engineering departments having only one full-time faculty member, it would be useful to initiate a conversation – that could subsequently lead to development of a grant request – to explore how technology can be used to support and build capacity in these highly stretched and often isolated departments.
- In a related point, opportunities should be explored to determine how community colleges can collaborate to use technology to build capacity across the system – for example by identifying courses that too often are cancelled due to low enrollment at individual campuses, yet could be filled if offered online to students statewide.

The CALSTEP leadership is encouraged to review the recommendations and to mark the 3-5 each of them find to be most interesting or important for moving forward. The priorities identified by each member of the leadership group can then be discussed and decisions made on next steps.

Attachment A: Survey Design and Implementation

Interviewees were recruited from among faculty members who responded to the Spring 2018 survey of CALSTEP and SETI participants. Twelve survey respondents indicated they would or might be willing to participate in the follow-up interviews. Eleven of these survey respondents were reached for a 20-30 minute phone interview.

The interview questions were developed by the external evaluator with input and guidance from the CALSTEP leadership. The protocol is presented in Attachment B.

Interviews were conducted between April 25, 2018 and May 15, 2018.

The 11 interviewees included 8 full-time instructors and 3 part-time instructors. While the former comprised instructors with many years of experience, the latter group of instructors had only recently begun to teach engineering.

The interviewees included 8 past SETI participants and 3 who have yet to attend SETI. Among the past SETI participants, 3 attended in 2016 and 5 in 2017.

The interviewees included instructors from three colleges located in rural or remote parts of the state.

Six interviewees teach physics in addition to engineering and another three also teach mathematics.

Half of the interviewees indicated in the survey they had some experience integrating technology, 3 described themselves as having several years of experience and 2 indicated they had limited experience.

Attachment B: Interview Protocol

Introduction

Thank you very much for agreeing to an interview about your SETI/CALSTEP experience and for taking the SETI survey a few weeks ago. The purpose of this interview is to collect more information about the state of technology integration, and to document priorities for additional technology training. We are also interested in hearing your ideas about how we can use technology-including what we have developed through CALSTEP-to improve both access to and the quality of engineering instruction.

The interview will take no more than 15-20 minutes of your time. We will use your responses and input to plan this year's SETI and to make recommendations for next steps in STEM technology integrations after CALSTEP ends (this summer).

We will share a summary of the findings from the survey and interviews on the CALSTEP website.

Interview Protocol

Assessment of SETI/CALSTEP Experience/Resources
For SETI Participants

With the benefit of hindsight, what was the most useful thing you learned or took away from SETI and why?

Again, drawing from your own experience and hindsight, what can we do to strengthen SETI so that participants are most likely to leave with a realistic plan for how to integrate SETI technologies and approaches into their classrooms?

What advice do you have for the incoming SETI participants? For those who are presenting at SETI?

What kind of post-SETI connection did you have with other SETI participants? What kind of interaction/meetings/webinars do you think would be helpful to build a SETI network?

In the surveys, several respondents said they would have liked to be paired with a more experienced SETI mentor. What do you think of that idea? Would you be willing to serve as a mentor?

For SETI Participants AND CALSTEP resource users who have not yet attended SETI

Which resources have you reviewed/used on the CALSTEP website?

What ideas do you have for improving the site (in terms of presentation/content/alerting community to its existence)

Your Use of Technology and Alternative Instructional Approaches

Which technologies and alternative instructional approaches are you using at this time in your classroom? Which, if any of them, did you learn or learn more about at SETI? How did SETI advance your use of technology and alternative instructional approaches?

What challenges, if any, did you encounter when taking a technology that you had learned to use outside of the classroom into the classroom?

What kind of support or resources do you need to make additional progress in the integration of technology in the classroom?

How are students responding to your use of technologies/alternative instructional approaches? (probe: engagement, learning, performance) Which student group or community is benefiting most and least from technology applications and why?

Using Technology to Make Engr Courses Avlb to More Students

One of CALSTEP's goal is to increase access to engineering courses, especially for students in remote areas of the state. There are two ways to do this. One is by offering courses not offered by colleges in these regions to students online through CALSTEP. The other is by providing resources to local colleges that can adapt the CALSTEP curriculum and offer the courses themselves. What do you think about the need for more access? Which approach do you think will work best with students and with the colleges?

Would you be interested in moving forward with one of these approaches? Why, why not?

Conclusion

Would you be interested in contributing to an effort to seek additional funding for projects like CALSTEP? (explain, if needed about the new technologies and approaches coming out to enhance teaching and learning opportunities – also mention idea of connecting technology users among STEM faculty)

Is there anything we have not yet discussed that is relevant for the topic of technology integration and increased student engagement and learning opportunities?