

# CALSTEP

## Status Report, Spring 2016

This document draws from interviews with the CALSTEP PI, Co-PIs and others using CALSTEP resources and curriculum to review progress achieved, lessons learned and ideas for how to consolidate and build upon work completed to date. Seven questions are discussed:

1. **How are we doing in terms of achieving the expected outcomes?**
2. **What additional outcomes are we achieving?**
3. **Who needs CALSTEP online course the most?**
4. **What are we doing to disseminate CALSTEP's resources?**
5. **What have we learned so far?**
6. **What kind of interaction has taken place among the CALSTEP team members?**
7. **What should be next for CALSTEP?**

The document is designed to stimulate and guide discussion about progress to date and next steps among the CALSTEP team. A team meeting will be called shortly by the CALSTEP PI.

### 1. How are we doing in terms of achieving the expected outcomes?

The expected outcomes, as proposed to the funder summarize as follows:

- Develop online and other alternative ways to deliver instruction required for transfer in engineering to increase access for students in colleges that lack the capacity to offer the full range of courses required for transfer. A particular focus is on online lab instruction and experimentation with Emporium style and flipped delivery.

In our first meeting this year, we reviewed progress achieved in terms of curriculum development and testing. Based on this conversation and on subsequent information gathered from the CALSTEP team, we are more or less on track for the development and testing of curriculum in Circuits, Materials, MATLAB, Engineering Graphics and Introduction to Engineering. One area that is lagging a bit is in the testing of online delivery. We have thus far offered only one course that was all online for all students (Engineering Graphics). Materials, developed by Erik (COM) and piloted by Tom (MPC) tested how a college without a lab can offer Materials. Erik has experimented widely with flipped delivery in Materials and MATLAB. Tom has developed online Circuits curriculum that has been tested by his own online students and by others – although not yet in a course where all students attend online all the time. New curriculum was developed by Nick for Intro to Engineering and tested in a FTF environment in Spring 2016 with subsequent online testing scheduled for Fall 2016. The Emporium Style delivery has yet to be tested.

The new material has been shared and tested within CALSTEP and by at least three additional instructors who are using the entire or components of CALSTEP curriculum. These include two instructors at Canada testing Circuits, Engineering Graphics and Intro to Engineering at this college and at College of San Mateo. An instructor who learned about CALSTEP's curriculum

at the 2015 SETI have been using some of Tom's (MPC) circuits projects with his students at Butte, reporting that the portable boards have been a game changer for him. The main reason is that he now can offer Circuits without having to rely on delivering the courses in a lab. The instructor said in an interview that access to online instruction such as MATLAB could have a "potentially huge impact on students in the far northern part of the state."

Below is additional information from faculty interviews about CALSTEP testing currently in progress:

- Albert is testing in FTF environment and for the second time the Graphics curriculum that Amelito developed for online delivery
- Cheri is using some of Nick's curriculum for Intro and adding to the curriculum herself.
- Cheri is using Tom's Circuits lab curriculum in a FTF environment. She added one activity. Cheri uses Rachel's videos to help her prepare for the labs. Cheri thinks it would be really hard for students to be successful in online environment – they are working in teams in her current delivery.
- Tom is using Amelito's Circuits curriculum for theory along with his own lab curriculum. He has 10-13 online students this Spring.

CALSTEP's ultimate outcome goal is to increase transfer. Amelito suggested that we use the ELC enrolment survey to document increases in transfer statewide – a measure that we recognize cannot be linked directly to CALSTEP. We will document additional course offerings and may also want to capture enrollment in CALSTEP online courses, especially labs, from students who are not enrolled at the college that is offering the course.

## **2. What additional outcomes we are achieving?**

A brainstorm of what we are accomplishing over and beyond what we promised to deliver in the CALSTEP proposal identified the following areas where we are developing and exchanging knowledge and insights:

- providing a venue for faculty to collaborate to develop online lab curriculum and to experiment with other alternative ways to deliver instruction (flipped, emporium)
- learning which courses are most likely to work in flipped/online formats
- learning what faculty needs to know in order to decide if they want to deliver flipped/online/emporium courses
- learning about barriers students encounter in flipped and online courses
- adding to and improving Intro to Eng curriculum (student development through Reading Apprenticeship, intro concept of a student in full)

## **3. Who needs CALSTEP online course the most?**

In thinking about further dissemination of CALSTEP curriculum and other resources, two questions came up:

1) If the purpose of CALSTEP is to increase transfer, who can benefit most from having access to CALSTEP online courses?

2) What is required for instructors around the state to teach online courses.

In a preliminary conversation about question 1 above, the CALSTEP PI and researcher discussed the opportunity of making CALSTEP curriculum (once fully tested) available to students in colleges that do not offer courses needed for transfer, or that only offer these once a year.

We realized that we don't know which colleges, for example, don't offer Materials or MATLAB and thought it might be useful to map where courses are offered (and thereby determine where they are not). The idea is to identify regions of the state where students do not have sufficient access to transfer courses in engineering and to consider how CALSTEP online courses/labs can help these students meet their transfer requirements. In this discussion, it also became clear that we do not know at this time which Engineering courses are offered online – both lecture and lab components. The ELC survey did not identify online delivery so additional data collection is required to begin to develop a statewide list of online offerings. It is not clear if this is something CALSTEP could start and support as the list will need regular updates. Question: Could the Online Ed Initiative (OEI) help develop and maintain such a list?

A related issue concerns the capacity that colleges/faculty teaching online courses have to enroll and support additional students from around the state. A related question is what kind of support OEI may be able to provide to online engineering students? Supposedly, OEI provides and supports tutoring for all online students. Should we look into this as a potential, future resource for engineering online students?

For question 2, Amelito noted that one of SETI's goals is to prepare STEM faculty to teach online and that SETI is now, for the first time, focusing on on-line lab delivery with workshops by CALSTEP Co-PIs scheduled for this summer. Amelito added that there is a lot of interest among new faculty in learning and using online delivery. One additional point made was that each college has its own requirements for online teaching. For example, the Butte faculty who likes Tom's Circuits curriculum so much has to be certified at his college before he can offer any CALSTEP online delivery to students.

#### **4. What are we doing to disseminate CALSTEP's resources?**

The main source of dissemination is SETI. This year's Northern CA SETI will feature workshops led by CALSTEP team members and introducing CALSTEP curriculum. Amelito suggested that we conduct a survey at the end of 2017 to document the extent to which SETI participants have started using the CALSTEP resources and how it is working. If they have not used CALSTEP curriculum, we will find out what is holding them back.

Another source of dissemination is the CALSTEP website which includes materials for Engineering Graphics and Materials that can be accessed by somebody from outside the team. Intro and Circuits are not yet available through the website. Circuits can be accessed through Tom's Dropbox. Amelito and Eva discussed the possibility of having a one page guide on how to use the website.

We discussed whether OEI may be able to post information about CALSTEP curriculum and other online engineering courses to alert faculty to the resources and students to the availability of online courses.

## 5. What have we learned?

Below is a list of lessons learned and questions raised in interviews with CALSTEP team members and with those who have used CALSTEP curriculum. The idea is to build on this list during the next group meeting and during the next year and a half until CALSTEP sunsets.

- a) Curriculum review process takes a long time and in some (all?) colleges you have to start over if you teach a course a new way. In some colleges (Butte) you have to be certified before you can teach online.
- b) It is tedious to create a new course. One CALSTEP faculty noted that Canvas is great for students, but awful for instructors, noting that “you have to set it up click a million boxes.” The CALSTEP team member (Tom) is wondering if the courses could be offered on the CALSTEP website as a Moodle zip file.
- c) One challenge to the viability of the Emporium style delivery is that it is difficult to know how many students will actually end up in your class. For example, 14 signed up for Materials at COM and only 6 enrolled.
- d) It is time consuming to integrate pieces of other faculty members’ curriculum – as the MOOC people realized. Therefore, the CALSTEP curriculum may be best suited for those who are about to offer a course the first time. A particularly good group to target is new faculty – see discussion of SETI participants (#3 and #4).
- e) Materials is probably not a good candidate for Emporium delivery -- but it may be a good candidate for online delivery. Materials is also difficult to deliver flipped, thinks Erik. The problem is that flipping requires that students come to class prepared. Materials requires a lot of reading and many students do not do their homework. Flipping is better suited for classes that focus on problem solving such as Circuits and Statics.
- f) Erik’s thinking: for flipping, how about first identifying learning objectives and content mastery required for a C. Then, give an assessment at the beginning of each class and have those who fail do the C-level work during the problem-solving part of the class while those who pass will do the A-level work.
- g) All agree that students really struggle with the videos. Different experiments are in progress to improve the effectiveness of this type of delivery. These include giving students ways to check during/and or at the end of watching the videos if they mastered the material. Another tool is to have tests at the beginning of each class to assess learning and identify gaps and to motivate students to arrive prepared. (We may want to set aside 10 minutes in a team meeting to discuss and compare notes on how to deliver and encourage productive video watching). )
- h) Reading is a problem, one CALSTEP instructor emphasized. What is the potential of RA for STEM to address this problem? Nick has had good results from using RA – should we disseminate his experience w/l the group and beyond?
- i) If you don’t have a testing center on campus what do you do for online students? Tom has to track the online students and direct them to a testing center. He then has to be available when they come to take the test – way too time consuming and not scalable
- j) Erik noted that recordings he made using CCCConfer with live captioner are made available in YouTube which students really like. However, he cannot edit these videos

and break them into shorter modules w/o losing the captioning. Is it possible to get a YouTube link to a specific location in a video allowing him to create hyperlinks that take students to specific topics in each lesson. Erik said he did not have this problem when recording in Camtasia and uploading to 3Cmedia.

- k) For kits handed out to students, make sure all the components are available and order things well in advance – some of the components turned out to be obsolete when Cheri needed them.

## **6. What kind of interaction has taken place among members of the CALSTEP group?**

Thus far, the interaction has been limited both within the group and in terms of CALSTEP faculty conferring with others interested in or actually using CALSTEP resources. As one example, Tom helped Cheri get lab kits on time, but no official venues have been put into place to connect the CALSTEP course developers with those who replicate their curriculum and other resources. Do we have the capacity to make these connections now and could it be sustained after CALSTEP sunsets?

We also do not yet have in place a process to capture input from testers? For example, Cheri and Albert added new hands-one exercises to Circuits/Intro and Graphics that may be of interest to others, including those who developed the curriculum in the first place. Do we have interest in and capacity to support this kind of input? The idea would be to create a “living curriculum” that can be invigorated and updated as new instructors test it and add their own best ideas to the outline and content.

## **7. What are the next steps?**

A) Team meeting across courses to review this document and identify priorities for the next year. Note – Albert and Cheri expressed interest in attending such a meeting, or part of a meeting.

B) Course-focused meetings (e.g., Circuits mtg) among those developing and testing curriculum