First-Year Evaluator's Report (2014)

SPARCT: STEM Professional Academy for Reinvigorating the Culture of Teaching

Introduction

Project

This external evaluator's report addresses progress for the STEM Professional Academy for Reinvigorating the Culture of Teaching (SPARCT) at Florida Gulf Coast University. Programming is coordinated by the directors of the Whitaker Center for STEM Education and the Teaching, Learning and Assessment Initiative (TLAI).The FGCU PI team includes Laura Frost, Principal Investigator; and Co-Principal Investigators Tanya Huffman, Brian Johnson, Tanya Kunberger, and Linda Serro. This project includes the three-week, half-day STEM Summer Academy in June 2014, and follow-up faculty development activities including learning community participation, training in peer observation, and participation in a seminar series. This first-year report was prepared during September and October 2014, following a site visit to Florida Gulf Coast University (FGCU) completed September 4 and 5, 2014 by:

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Data Sources

Data sources for this report were on-site interviews of faculty participating in the SPARCT Academy and a project team meeting, two sets of video recordings of faculty presentations about teaching strategies and Scholarship of Teaching and Learning (SoTL) projects for their courses, a review of online materials used during the SPARCT Academy, an expanded group session on the late afternoon of the second day of the site visit, and periodic electronic communications between project participants and the project team regarding meetings and activities. The September 4 and 5, 2014 interactions included conversations with eight of the eleven senior personnel on the project (Laura Frost, Brian Johnson, Tanya Kunberger, Linda Serro, Tanya Huffman, Jackie Greene, Janusz Zalewski, and Elspeth McCulloch). Three were unavailable during this time period (Diane Schmidt, Robert Nichols, and Angela Meyer).

In the first set of five-minute videos completed in June 2014 at the conclusion of the SPARCT Academy, thirteen presentations by fifteen faculty were reviewed, including two sets of paired faculty collaborating on SoTL projects for their respective courses**.** This number represents represents 94% of the 16 faculty participating in the academy (the video for Tanya Kunberger was unavailable for viewing). In the second set of three-minute videos completed in August 2014, fourteen presentations were reviewed in which faculty reported progress on their SoTL projects. These videos included the same two sets of paired faculty in the June set. Only one faculty member who had made a presentation in June did not provide a progress video in August, and one faculty member made an August presentation whose video for June had been unavailable. In sum, the second set of sixteen faculty match the number targeted for the project.

Of the faculty in the video presentations, fourteen also were interviewed during the FGCU on-site visit. These numbers indicate the SPARCT project substantially met its goal of attaining a cohort of 16 STEM faculty participating in the summer academy and follow-up SPARCT project

activities. Periodic video presentations will continue, with the next set to be completed in early October. Disciplines represented included Math, Chemistry, Physics, Marine and Ecological Sciences, Bioengineering, Environmental and Civil Engineering, and Software Engineering.

In preparation for the September 4 and 5, 2014 site visit, notes were made from the June and August videos to focus on the evidence-based practices and outcomes faculty are addressing in their projects. Interviews of the fourteen faculty took place in one-on-one 30-minute sessions, with the exception of one pair of faculty who chose to be interviewed together about the same project on which they were collaborating. One interview was conducted by phone due to personal family circumstances. The remaining Interviews were face-to-face. Interview questions were open-response in which faculty members were asked to explain what evidence-based teaching practices introduced in the SPARCT academy were new concepts for them, if any were practices they already had been using, what was their experience of the academy, and what practices they would be introducing in their courses. During the interviews, some questions were added as appropriate to seek clarification on teaching methodology and anticipated outcomes or to prompt further reflection on alignment of assessments with content and learning activities.

Results

During interviews, faculty members were able to identify and describe the evidence-based teaching practices they had selected for their SoTL projects, the anticipated outcomes and methods for assessment, and were either engaged in or planning for engagement in the IRB application process and peer teaching observations with the Reformed Teaching Observation Protocol (RTOP). The planning team meeting included a review of the status of the peer teaching observations in progress during this phase of the project, results of which were discussed in early October. On the second day of the site visit in September, the external evaluator provided an interactive presentation for project participants with a recap of additional research findings on course and assessment design, effective learning strategies for students, methods of learning analysis, and strategies for student motivation. This event supported the SPARCT program's previous introduction of established methods in course design and evidence-based STEM teaching practices and added the evidence-based methods for student motivation to introduce faculty to practices that can influence students' predispositions to continue learning in STEM fields.

Indicators from the faculty videos and interviews align well with the expected outcomes of enhancing SoTL, using evidence-based practices in introductory STEM classrooms, engaging peer-observation strategies for STEM classrooms, and use of strategies to enhance student learning. There was no opportunity to directly observe faculty learning communities (FLCs) during this period of evaluation, or to observe faculty participation in the monthly project meetings. However, the faculty indicated agreement to participate in the FLCs, including reporting on their experiences with the peer teaching observations, and to participating in the SPARCT monthly meetings. In addition, ongoing incidental communication among project participants, the project team, and senior faculty personnel during the site visit indicated an open and vibrant community of practice within which members continually share progress with each other. On-site and electronic queries about schedules and upcoming events also indicated the presence of contact throughout the academic year. In addition, the FGCU president attended the Whitaker Welcome Back Celebration on the second day of the site visit, giving high-level visible support to the progress of the Center.

Across all the interviews, the SPARCT faculty expressed goals to improve student learning, interest, and retention in their STEM courses and to implement the evidence-based teaching practices introduced at the STEM Summer Academy. The faculty described the approaches selected from the academy, and in several instances indicated that even for practices with which they already had some familiarity, they had gained insights from hearing about the personal experiences from faculty who also had used the approach, including their peers. As the faculty accomplish their goals, they begin approaching a related goal of dissemination of best practices. To this end, a couple of opportunities already have arisen. One was the Presentation Boot Camp by the NSF program officer, Rick Tankersley, at FGCU on the weekend of September 27 and 28, 2014 for a grant sponsored by Florida's Center for Ocean Sciences Education Excellence (COSEE Florida). Another is the opportunity to submit a proposal for the Scholarship of Teaching and Learning Commons Conference (SoTL Commons) hosted by the Center for Teaching at Technology at Georgia Southern University where presentations focus on improving student learning outcomes in higher education.

During interviews, some faculty acknowledged the enhanced K-12 community involvement from the speaker whose presentation was on Flipping the Classroom. However, a couple of faculty felt the level of this presentation was elementary as compared with the other evidence-based teaching practices.

The SPARCT academy provided more exposure to different methods of implementing teaching practices, even for those teaching practices that were not new. Specific feedback about the SPARCT academy experience during interviews included the following perspectives from participants.

- Flipped classroom:

  -this approach was not new, too basic, already being used (4 participants);
  -though not new, inspirational because presenters provided practical perspectives on pitfalls and successes of their approaches (1 participant)
  -characteristics of a video provided practical ideas (2 participants);

- Conceptual change model:

  -not applicable (4 participants);
  -teaching strategies within this model already being used (1 participant);
  -has greatest impact on changes in course design and personal teaching practices (1 participant);

- POGIL model:

  -not a new model (4 participants);
  -most relevant model (1 participant);

- Project-based learning:

  -already being used (2 participants);
  -difficult to see relevance (1 participant);
  -a new practice (1 participant);

- Valuable concepts and practices:

  -setting the learning objectives in front of every assignment was valuable (1 participant)

- making learning objectives measurable, expressing what students should be able to do in terms of explicit behaviors rather than simple statements of what students should learn (1 participant);
-importance of reflecting students' levels of learning and thinking in course objectives (1 participant);
- need for analyzing what is taught compared to what students are asked on an exam and to bring these into alignment (1 participant);
-building student morale and more student interactions to produce changes in attitudes (1 participant);
-"just-in-time-teaching" techniques (1 participant);
-using more formative evaluation in the beginning of the course to produce better results in the end was a valuable concept (1 participant);
-the "exam wrapper" (1 participant);
-names for particular configurations of teaching practices already being used (1 participant).

- Generally about evidence-based practices:
  -all provided new ways of thinking about course design, teaching, motivation of students, and assessment and stimulated reconsideration of current teaching practices (1 participant);
  -all were already being used in some measure (7 participants)—one participant noted that it is routine to identify trends in the literature and try out new strategies, and thus, teachers build a repertoire of useful teaching practices;
  -much was a repetition of what also had been presented at the Course Design Academy, the New Faculty Academy, or a discipline-specific workshop (4 participants)
  - evidence based practices in the SPARCT academy do not fit as well as discipline –specific strategies (4 participants, each teaching in different disciplines)
  -even though discipline-specific strategies fit better, ideas from the academy can help to make the course more attractive to students (1 participant)
- What else could have been helpful:

  -strategies, practical examples, and tips for how to make a presentation at a SoTL conference, examples of SoTL papers and presentations, practical guides for how to make a SoTL poster (1 participant)
  -examples of SoTL approved IRB applications (1 participant).

Faculty SoTL Profiles

Self-reports in the video presentations in June and August, 2014, and interviews on September 4 and 5, 2014 produced the following profiles of faculty projects. These profiles include two projects, each reported by paired faculty, making sixteen as the total number of faculty reporting. The profiles described below reflect the following major teaching strategies:

- project-based learning (2 profiles);
- project-based and flipping (1 profile);
- project-based, POGIL, flipping, and role-playing (1 profile);
- POGIL and flipping (1 profile);
- project-based with near-peer mentoring (1 profile);
- project-based and conceptual change model (2 profiles);
- conceptual change model (1 profile);
- conceptual change model with flipping (2 profiles)

- project-based, inquiry-based, POGIL, and flipping (1 profile);
- challenge-based teaching and Follow Accomplishments of Student Teams (1 profile);
- rolling trio (similar to scaffolding, 1 profile).

Profile 1: Application of *project-based learning* in group mini-projects to improve students' critical thinking. Inclusion of pre-and-post survey questions to support qualitative and quantitative assessment of impact. Primary goal is improved comprehension and retention of knowledge, but will examine changes in student attitudes with a Likert-type scale. One class without any of the new teaching methods will be compared to one in which the teaching methods are applied. (CITI training will be next step.)

Profile 2: Application of *project-based learning* to improve relevance of content to the students. The primary goal is enhanced student interest in learning with anticipated improvements in exam scores, attendance, and retention. Student projects will include use of real data and constructivist learning activities in which students use course concepts to create specific products and make predictions. (CITI training is completed. Next step is to pilot some of these strategies.)

Profile 3: Application of *project-based teaching* with a variation of a *flipped classroom*. Teaching will include *talk-aloud* reasoning about effective and ineffective problem solving strategies in progressive individual and group assignments with peer instruction (tutoring) and demonstrations. Assessment includes worksheets, quizzes, surveys, and student reflections to evaluate impact on problem solving strategies, higher order thinking, change in retention, and outside-of-class workload for students. One goal is to improve student attitudes toward learning in this course.

Profile 4: Application of *project based learning, POGIL, flipping,* and *role playing* in selected portions of the course with triangulation of qualitative and quantitative, and formative and summative assessments in individual and group modalities to evaluate learning outcomes. Students will complete quizzes before class to allow class time to focus on application activities, which will include integration of technology like iPhones and iPads. Pre and post-assessments will indicate changes in student attitudes toward science, such as self-efficacy—the goal is for non-science majors to become excited about studying science. Measures will include items from two science survey instruments, periodic probes such as a "muddiest points" query, and results on a semester-long project. (CITI training completed. IRB and consent form in revision stages.)

Profile 5: Engage students in information literacy and critical thinking, parallel to the Quality Enhancement Plan (QEP) at FGCU. The focus will be *project-based learning* with *near-peer mentoring* from upper-level students in roles similar to a blend of mentors and teaching assistants. Students will receive feedback from the near-peers, team members, and instructor. Changes align with developing student skills of ctitical thinking, information literacy, and technical writing. Projects will include current issues. Goals include improving self-efficacy and retention. Measures include rubrics, assessment of self-efficacy, and Student Assessment of Learning Gains (SALG).(Completing CITI training as pre-requisite to PI status.)

Profile 6: Application of *project-based teaching* with aspects of the *conceptual change model*. Course redesign will include the addition of *quizzes* as follow up to homework assignments. Focus is efficacy of homework for the class and measurement includes comparing homework scores with test scores in a section with quizzes over the homework added v. a section without such quizzes. The goal is to motivate students to understand concepts in the homework, not just submit homework. (IRB application accepted—using de-identified data.)

Profile 7: Application of the *conceptual change model* as a mini-project focused on a particular complex concept. Measurement of impact with answers to questions on a standardized exam which addresses the same concept. (Working on IRB application.)

Profile 8: Initially, application of *project based learning* in several group projects with rubric-based scoring, then after reflection, a shift to *conceptual change model.* Strategies include more group activities, probing to uncover student misconceptions, and strategies based on a literature review of how the conceptual change model has been defined and applied in math courses. Part of the class will include a "flipped" teaching strategy. Targeted outcomes include shifting student attitudes toward learning the subject with increased relevance to majors, increased student responsibility for learning, and higher retention. Active participation will be a indicator of student motivation; results on a survey will indicate shifts in attitudes. Other measures will include changes in retention and shifts in grades.(Working on IRB application.)

Profile 9: Application of *project-based learning* and *inquiry-based learning* techniques, including *POGIL* with some *flipping* applied to different parts of the course. The interest is in student perceptions of the value of the teaching methods as well as improvement in conceptual learning. The focus will be to examine the value added by the application of these teaching practices. Measures will include pre- and post-tests. (Working on IRB application.)

Profile 10: Application of the *conceptual change model* and *project-based learning* in multiple courses. Measurement of impact includes a concept inventory.

Profile 11: Application of *POGIL* and the *flipped classroom* methodology. Use of validated instruments for measuring changes in students' attitudes, hoping for more positive attitudes toward math. Planning to pilot strategies in Fall 2014. (CITI training completed.)

Profile 12: Application of the *flipped classroom*, with anticipation of increasing problem-solving exercises, reflection-on-learning questions, formative assessments, technology applications, opportunities for student questions, and a few *conceptual change model* exercises. Flipping is expected to allow more room for more complex problem solving in class. Goals include entry-level skills building, correction of misconceptions, deeper thinking, lower cognitive load, and lower DFW rates. Measures will include exam scores and a concept inventory. (Focus now is on improving content for Fall 2014 session. IRB will come after this.)

Profile 13: Initially, consideration of *project-based learning* and *conceptual change model* with a focus on *challenge-based instruction*. Upon reflection, two methods were clarified: *challenge based instruction* in which students derive how to design and construct something (constructivist learning model); and the Follow Accomplishments of Student Teams (FAST) strategy. FAST reflects the strategy for having students from advanced courses visit the introductory course to reveal the projects they have completed, in hopes of motivating the introductory students. The primary goal is to advance student knowledge and skills as well as enhance student motivation and retention. Anticipated measurements included pre-and-post tests and measures of changes in student perceptions and interest of the non-STEM majors in staying in the STEM field.

Profile 14: Front-loading of *learning outcomes* for clarity of these to students and relevance to learning activities. Application of a *rolling trio* methodology for progressive individual and group work on problems with progressively increasing complexity or difficulty. The focus of interest is in the shift of student preferences for learning methods. Measurement will include a pre- and post-survey of attitudes, scores on homework, and tests of comprehension. (Focus for

Fall 2014 is piloting the teaching strategies. Working on the CITI modules. IRB will come after this.)

SPARCT Academy Content

The SPARCT Academy content was revealed in three forms. First, the content was viewable in the presentations made by the faculty in June 2014, including flipcharts from discussions and comments from participants and project personnel. Second, detailed content was posted at a CANVAS web site. Third, selective content was expressed during the September 4 and 5, 2014 interviews.

Topics include expectations for the college classroom and ways of working with college students, issues of recruitment and retention of students, student motivation, study skills for students, methods of active learning, issues of cultural differences, course design with learning outcomes as the springboard for course organization, methods of assessment, and selected evidence-based teaching practices. These teaching practices included the Process Oriented Guided Inquiry Learning (POGIL) model, the process of inquiry-based learning, approaches to flipping the STEM classroom, methods of problem-based learning with applications to case studies and team-based projects, and strategies for managing large classes, and making use of technology and multi-media. Professional development and peer-mentoring related to the topics of the SPARCT academy continue with the FLCs, monthly project meetings, and RTOP teaching observation schedule and experiences.

Supportive techniques for teaching models also were presented. These included (1) analysis of types of students and examples of misconceptions; (2) the use of exam wrappers which allow students to compare exam performance with their preparation for an exam; (3) an integrated course design framework with emphasis on alignment of outcomes, activities, and assessments; (4) concept maps and the particular method of learning analysis in which one uses sheets of paper, like "sticky-notes" to lay out and organize relationships, parallel to using a concept map to analyze and organize course content and activities; (5) a map of "Bloom's Verbs and Matching Assessment Types;" (6) the effect of video production on student learning; (7) types of assessments and evaluations, including classroom assessment techniques, and (8) the Quality Matters™ Rubric's dimensions and elements for effective course design. In addition, the academy materials included a form for setting up the instructors' courses in Banner.

For each day of the academy, a survey was posted that used a Likert-type scale response from Strongly Agree to Disagree for a common set of items, as follows.

- The module met my expectations.
- The materials were appropriate.
- The directions were clear and easy to understand.
- What is the most important thing that you learned in this module?
- What other comments or suggestions do you have for the module?

A separate feedback Post-Evaluation of the academy elicited information about logistics of participation in the academy and reflections for the future questions. For logistics questions, most ratings were favorable at the top levels of 4 and 5 of a Likert-type scale for the following items, with exceptions noted in parentheses.

- The application process was a smooth one. (Two participants gave a rating of 3.)
- The handout materials were useful. (One participant gave a rating of 3.)

- The venue was comfortable. (One participant gave a rating of 3.)
- Three weeks of half-days was the right amount of time for this Academy. (Two participants gave a rating of 3.)

For reflections for the future questions, ratings were favorable at the top levels of 4 and 5 of a Likert-type scale for the following items, with exceptions noted in parentheses. These same items had been posted on the pre-academy survey in which participants expressed generally the same ratings, though lower for flipping the classroom and guided inquiry. A separate Y1 project report indicates a significant gain in knowledge on flipping the classroom.

- I know how to flip my classroom.
- I am prepared to write a guided inquiry activity. (Two participants gave a rating of 3.)
- I am comfortable facilitating group work.
- I can write learning outcomes.
- I know how to work with college students. (One participant gave a rating of 3.)
- I can design my coursework effectively.
- I am looking forward to our faculty learning community this academic year.
- I am looking forward to observing other faculty classrooms. (Two participants gave a rating of 3.)
- I am looking forward to having my classroom observed. (Two participants gave a rating of 3.)
- I am well versed in the learning management system and what I can do with it. (Four participants gave a rating of 3.)
- I am looking forward to producing scholarly work as a result of my teaching.

Formative evaluation comments were provided for the following issues.

Were expectations met?

Most participants responded with "Yes" with some elaborations, such as "I increased my faculty network" (9 participants). One could not recall earlier expectations, but stated "I felt m time was well spent." Two expressed reservations, one reporting "Yes for the most part," "Despite being more knowledgeable, I do not feel strong in my ability to successfully implement most of these methods," and "I had hoped to build with other faculty did not really happen." Another reported "Yes and no. We didn't discuss how to get students to overcome fear of complex problems…" One had an N/A response.

The top three beneficial parts of this STEM Academy:

- Interacting with colleagues (6 participants).
- Learning how to flip a classroom (5 participants).
- Assessments, outcomes, concept maps, exam wrappers, surveys (formative and summative assessments) (4 participants).
- How to design a SoTL project and its evaluation (3 participants).
- Use of customized videos for a flipped classroom (3 participants).
- Learning theory, pedagogy, and teaching techniques (3 participants).
- Course design (3 participants).
- Mental Model Building/Conceptual change models (1 participant).
- POGIL (1 participant).
- Writing better student learning outcomes (1 participant).
- Students side of the expectation (1 participant).
- Presentations by peers (1 participant).
- The tech tips…Canvas (1 participant).
- Outside Speakers (1 participant).
- Daily quizzes (surveys)…More specific questions would be even better (1 participant).

- The 45 second speech "homework" during which I clarified and solidified my understanding of the three evidence based practices (1 participant).
- Week 2 (1 participant).

Least beneficial parts of this STEM Academy:

- None or nothing seemed bad (3 participants).
- Group and team-building exercises (2 participants). One cited facilitator disposition to favor pre-determined educational concepts and theory, thereby squelching open discussion. One would have preferred time to practice designing an actual sample activity and then to share with peers.
- Flipped classroom (2 participants). One commented that the problem was the presentation style which tended to express flipping as the only way to teach.
- Lack of notes to return to for review of activities (1 participant). SUGGESTION: A 1-page summary of each topic.
- Conceptual change model, mental model building Day 1 (1 participant).
- Lego activity (1 participant).
- Day 1 (1 participant). SUGGESTION: Pack less into this first day.
- Week 1, except the part on assessments (1 participant).
- Two guest speakers on flipping (1 participant).
- Redundant topics to Course Design Academy (1 participant).
- Lectures on robotics lab (1 participant).

Aspect anticipating most in upcoming introductory STEM courses:

- Implementing some/several new teaching methods and techniques (4 participants).
- Making major changes/use many of the class activities we did in SPARCT/flipping/PBL (4 participants).
- Question was confusing (2 participants).
- Designing the course (2 participants).
- Be a more effective teacher (1 participant).
- Provide students with clearer SLOs (1 participant).
- Reevaluate assessments (1 participant).
- Use more capabilities of Canvas (1 participant).

Aspect most apprehensive about in upcoming introductory STEM courses:

- Failing to implement new strategies well/making big changes, losing homogeneity of course/trying larger projects like POGIL, CCM, or any of the others/PBL may be too challenging, students may simply give up/changes may be too challenging (7 participants).
- Fear students will not learn, will be bored, get turned off, and change their major/student reaction to increased workload/will not succeed (2 participants)
- Course logistics for new methods and materials (1 participant).
- Creating the videos for flipping (time to produce) (1 participant).
- Mental Modeling (1 participant).
- Peer observation (1 participant).

SUGGESTION: Incorporate more "homework" for practice in designing activities based on teaching models and then sharing with peers in the academy.

To improve the academy:

- Have potential participants apply to the Academy in pairs or as a team of three (1 participant).
- Restructure week 1 to make it more organized and focused, to make it more like Weeks 2 and 3 (1 participant).-IRB/add visit from IRB representative (2 participants)

- Add content:

  -how to find good SoTL articles (1 participant)
  -learning theory and meta concepts for STEM teachers/examples of learning strategies applied to more disciplines (2 participants)
  -participants' comments different topics of the workshop and explanations of what they are already doing, want to do, success and pitfalls (2 participants)

- Give more opportunities for participants to apply knowledge in class and homework such as creating a sample activity for each strategy/model (3 participants)
- Select speakers such as:

  -speakers with substantial experience in implementing effective evidence-based teaching method in UNIVERSITY/COLLEGE level (not K-12) STEM courses (1 participant)
  -colleagues like Dr. Barreto (1 participant)
  - experts to share their pedagogies and challenges they faced (1 participant)

- Spend less time on:

  -PBL (1 participant)
  -lectures (1 participant)

- Improve the discipline specific course meetings.
- Make schedule and space adjustments:

  -Longer days to allow shorter number of days (1 participant)
  -More comfortable chairs (1 participant)
  -More room at the tables (1 participant)
  -Advance notice to participants about when laptops will be and will not be needed (1 participant)

Recommendations

- Continue with the strategies now in place for reporting, the Faculty Learning Communities, and peer observations. They appear to be building a strong community of practice among the SPARCT faculty cohort members and project personnel.
- Add a *Models and Research* web site or make this a section within the existing web site. Within this site or section, add a *Models* folder and a *Recent Research* folder for each of the teaching models included in the SoTL projects. In the *Models* folder, add one excellent recap of the features of the model. In the *Recent Research* folder, add a few excellent research articles and an representative sample presentation for each teaching model and related strategies. Folders might include POGIL, Scientific Inquiry, Flipped Classrooms, Project Based Learning, Challenge Based Learning, Peer Mentoring, or the Trio Model or Scaffolding, and Constructivism. SPARCT participants can be contributors as well as project personnel.
- Add a *SPARCT Project Showcase* site where instructor's can post materials for their SoTL projects now under way, or plan a day for the participants to share their progress, successes, pitfalls, with each other and receive feedback and suggestions from peers. Perhaps this could be scheduled in 20-minute sessions.
- At the Spring 2015 semester, in addition to SPARCT faculty reporting results for their introductory STEM classrooms and SoTL projects, invite their recommendations for the teaching practices they think should be included in a future faculty development academy for STEM disciplines, and for speakers.
- Throughout, follow participant recommendations for active engagement opportunities that allow

them to share more with each other about practices they use and are thinking of using related to the teaching models and homework activities that invite them to apply models to the design of activities for their courses, then in-class to receive feedback from peers.

- Follow participant recommendations for more speakers (colleagues or outside speakers) with deeper expertise in application of the models to higher education across a variety of STEM disciplines.
- Include an IRB representative after SoTL project concepts to allow participants to ask questions. An alternative to an IRB representative would be to assemble a panel of colleagues who have successfully implemented such projects with IRB approval.
- Redesign Week 1 to make it more like Weeks 2 and 3.