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Abstract

Inclusive and student-centered approaches to teaching are crucial for student success in mathematics and statistics courses. However, faculty need ongoing support and education to effectively implement active learning strategies that address issues such as equitable participation, to ensure all students meet their learning objectives. At California State University Monterey Bay, we have implemented a professional development model focusing on regular professional development activities that meet the ongoing needs of our faculty that will help their students succeed. This model supports both new and experienced faculty, drawing on existing campus expertise while building faculty teaching skills and a stronger teaching and learning community over time. In this paper, we discuss the lessons learned from the first year of implementing our professional development model, as well as considerations for other departments that are interested in creating a similar model for professional development aimed at increasing student success, building community in the department, and improving teaching and learning for students and faculty.

Introduction

The immediate effects of the COVID-19 pandemic on college students were widespread and significant. Students and instructors immediately pivoted to online teaching and learning amidst a global pandemic, often without the necessary tools and skills to support their work (Bonsangue and Clinkenbeard, 2021). Upon a return to fully in-person instruction, there were some big questions - what is the "new normal?" What effects from the pandemic will continue to shape the current experiences of students and faculty in higher education? At California State Monterey Bay (CSUMB), the faculty in the Department of Mathematics and Statistics had banded together during the pandemic to learn about, and teach one another, about best practices and practical solutions for teaching and learning during the pandemic. In a peer-led model, one or two faculty members would take ownership of a particular topic requested by their colleagues, research it, prepare a workshop and materials, and facilitate for the larger group. These sessions were well-attended and valued by participants. Post-pandemic, CSUMB mathematics and statistics faculty were in a continued struggle with student engagement. The strategies and pedagogies that had been used pre-pandemic were not as effective at engaging students as they had once been. Indeed, the lived experience of the pandemic continued to have large effects on how students engaged (or did not engage) with mathematical content, with each other, and their communities.

In 2021, the California Learning Lab and Just Equations authored a report titled, "Charting a new course: Investigating barriers on the calculus pathway to STEM." In this report, there were six strategies identified as promising directions for strengthening undergraduate calculus experiences and outcomes. One of these was *deepening professional learning.* The authors of the report write, "Professional development, therefore, is a necessary component of institutional change efforts…since stand-alone workshops rarely show results, professional learning needs to be well integrated into faculty work" (California Education Learning Lab, 2021, pg. 18). This report was released alongside a request for proposals to obtain grant funding to support the implementation of one or more of these strategies.

To address the identified need to engage students more fully in mathematics and statistics courses post-pandemic, CSUMB faculty applied for, and received, an award for $100,000 from the California Learning Lab to facilitate professional development for the purpose of increasing student success through faculty engagement. The goals of the project were to implement a sustainable professional development program for faculty in the Department of Mathematics and Statistics; improve faculty knowledge of and usage of pedagogical practices that enhance student engagement and equitable learning outcomes; and to increase student engagement and student success in mathematics and statistics courses.

This paper describes how CSUMB mathematics and statistics faculty designed an integrated professional development program to address these goals. Relevant conceptual frameworks, including action research and recent literature on student engagement, are presented in Section II. Section III describes the design of the professional development program, including how the process was informed by both initial and ongoing faculty feedback. Section IV describes three key components of the project in detail: regularly scheduled workshops, ongoing faculty learning communities, and the creation of a Canvas page to house resources and workshop materials. Section V includes reflections from students and faculty, as well as ongoing considerations, limitations, and future work. Section VI concludes the paper, which includes considerations for departments that are interested in implementing a similar professional development model.

Literature Review and Conceptual Framework

There are three main topics to be addressed in this literature review. First, there are two landmark publications discussed, regarding how ongoing professional development for college level mathematics and statistics instructors is a promising practice to support student success. Within this context, an action research framework for how to design, implement, and iterate professional development activities is presented. The third topic is exploring factors related to student disengagement. The articles discussed in this second section were also used in the first professional development workshop for instructors to form a common understanding of, and language around, the issues they had observed in their own classrooms.

Professional Development to Support Student Success

In the 2012 report "Engage to Excel: Producing One Million Additional College Graduates with Degrees in

Science, Technology, Engineering, and Mathematics," the first recommendation that the authors make to the US president is to "catalyze widespread adoption of empirically validated teaching practices" (Olson and Riordan, 2012, pg. ii). In this report, the authors describe established faculty training programs that have changed participants' teaching methods, which has in turn had positive effects on student achievement and engagement. They also note that the transition to evidence-based teaching methods requires a significant investment of time and effort. In the "Barriers and Challenges" section, the authors describe that faculty lack knowledge of evidence-based teaching, and that there is a lack of facilitation and rewards for good teaching.

This report had a significant impact on the landscape of professional development in higher education. In 2017, the Mathematical Association of America published an "Instructional Practices Guide," a practical workbook for college and university mathematics faculty describing how effective teaching is supported by classroom practices, assessment practices, and design practices, as well as attending to the cross cutting themes of technology and equity. In the manifesto, the authors write,

> Effective teaching and deep learning require student engagement with content both inside and outside the classroom…Such a sea change will require transforming how mathematics is taught and facing our own individual and collective roles in a system that does not serve all students well….We stand at a crossroads, and we must choose the path of transformation in order to fulfill our professional responsibility to our students (*Instructional Practices Guide*, 2021, pg. 4-5).

This guide has been used as a handbook for professional development since its release. These two key publications give a clear indication that ongoing faculty professional development is crucial for student success and engagement in mathematics and statistics.

Method

Action Research

Action research is an excellent conceptual framework for faculty professional development. Action research is a method tailored for teachers to address issues and enhance their teaching methods within their own classrooms. It encompasses structured observation and data gathering, empowering educators to reflect on findings, make informed decisions, and refine classroom strategies for greater effectiveness (Parsons and Brown, 2002). Action research can provide opportunities for reflection, improvement, and transformation of teaching. While action research often relies primarily upon self-reported data, the results strongly support what the research literature generally asserts about action research: (a) It is beneficial and often transformational for teachers as a professional development tool by allowing them to engage in a focused study of their own practice; (b) When done less formally it becomes more practical; (c) Communicating with others in the field builds confidence in teachers as professionals; (d) It makes teachers more actively reflective and more aware of their teaching and their students' learning; (e) It is effective in understanding and addressing the particular needs of high need students (Segal, 2009).

Practicing teachers are not always able to discuss their research plan with a knowledgeable colleague. But in a faculty-mediated model they do, and they are able to obtain guidance as well. The literature portrays action research as an effective professional development strategy for improving teacher practices. But it is not clear how teachers perceive it when used on a broad scale under the faculty-mediated model. Also, teachers need relevant professional development, and action research potentially offers exactly that. It is not clear what aspects of action research, at least under the faculty-mediated model, teachers find to be most relevant. Action research is portrayed in the literature as very beneficial, and as a useful kind of professional development because of its direct applicability to a teacher's classroom practice.

Allan Feldman provides a definition of action research. "Action research happens when people research their own practice in order to improve it and to come to a better understanding of their practice situations. It is action because they act within the systems that they are trying to improve and understand. It is research because it is systematic, critical inquiry made public" (Feldman, 2002, p. 240). Feldman explains that action research can help to develop a professional community, illuminate the power of relationships in educational situations, and help one recognize their own expertise. In the research literature, it is clear that various models or working definitions of action research exist (Gorski, 2006; Stringer, 1999; Segal, 2009). However, all of them capture the same concept, some have more steps and articulate them more fully, but the essence of learning through action, gathering data, reflecting on the outcomes, and reworking as needed exist throughout. A model for action research that is most consistent with the approach in this project is from Kemmis and McTaggart (1988), which states that you reflect on an issue you want to work on, make a plan, take action on your plan, observe the changes made, reflect on the outcomes and repeat as desired. This is called the Plan - Act - Observe - Reflect cycle, and comes from Kemmis and McTaggart (1988). The image shows phase l and phase ll of the cycles.

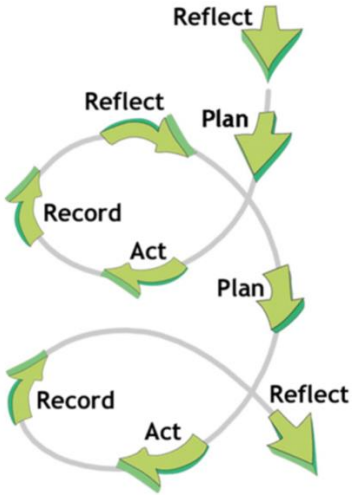

Figure 1. Action Research Framework (Kemmis and McTaggart 1988)

Student Disengagement

Action research is a professional development tool that can serve as a focus for improving student engagement. At CSUMB, faculty members had engaged in a significant amount of professional development pre-pandemic to

learn about and utilize best practices for active learning (Voigt et al., 2020; Unfried, 2019; Goyer et al., 2021; Clinkenbeard, 2021). However, with the return to in-person instruction in Fall 2021, instructors found that their strategies for engaging students were not as effective as they had once been. To better understand this issue, instructors read and discussed articles on factors around student engagement, as summarized below.

In her April 2022 *Chronicle of Higher Education* article titled, "A Stunning Level of Student Disconnection," author Beth McMurtrie compiles instructors' reports of post-pandemic student engagement. More than 100 people wrote in to "describe a disconcerting level of disconnection among students, using words like 'defeated,' 'exhausted,' and 'overwhelmed'" (McMurtie, 2022, pg. 2). She describes students' pandemic lived experiences, institutional contexts, mental states, and shifting responsibilities as all contributing to these experiences. She writes that a sense of connection, to help students see the larger purpose and value of higher education, may help them to regain their footing. Steven Mintz, writing for *Inside Higher Education*, wrote a companion article titled, "An Epidemic of Student Disengagement," in which he urges empathy and offers eight strategies for re-engaging disconnected students. In a May 2022 *Chronicle of Higher Education* article titled, "How to Solve the Student-Disengagement Crisis" six instructors weighed in with practical advice for dealing with student burnout and the resulting disengagement they observed.

While these articles were written for a general teaching audience and do not necessarily represent generalizable results from research, they ring true. In 2017, Chipcase et al. published a literature review of research on student disengagement in higher education. They conceptualized student disengagement as a combination of intrinsic factors (psychological factors, low motivation, inadequate preparation for higher education, and unmet or unrealistic expectations) and extrinsic (competing demands, institutional structure and processes, teaching quality and online teaching and learning) (Chipchase et al, 2017). Although this paper was published pre-pandemic, the findings certainly resonated with CSUMB math and stats faculty and were echoed by the stories told in the spring 2022 articles.

This, then, was the challenge: to create an ongoing, peer-led professional development program for CSUMB math and statistics faculty for the purpose of re-engaging students. By grounding the design of the program in the literature described above, faculty were able to better understand what they were experiencing in their own classrooms. They were also supported to introduce new ideas, projects, or strategies to address the issues they were experiencing.

Designing Peer-Led Professional Development

This program took place at CSUMB during the 2023-2024 academic year. CSUMB is one of 23 public university campuses in the California State University (CSU). The CSU is the largest four-year public university system in the United States, enrolling more than 450,000 students, employing more than 63,000 faculty and staff, and is consistently recognized for providing degree opportunities and social mobility (CSU Fast Facts, n.d.). CSUMB has about 7500 students, 90% of whom are undergraduates. Forty-five percent of students are Latinx and 53% of students are first-generation, meaning they are the first in their family to earn a college degree (CSUMB Our

Students, n.d.). The Department of Mathematics and Statistics is one of six departments in the College of Science. There are currently 22 faculty members in the Department: 10 tenured or tenure track and 12 lecturer faculty. Mathematics and Statistics is a relatively small department with about 80-100 majors, but enrolls more than 1000 students per year from majors across the university in service courses.

As briefly described in the last section, faculty in the Department of Mathematics and Statistics had engaged in significant professional development (PD) in the past ten years. In 2017, the CSU system eliminated all remedial mathematics courses with Executive Order 1110 (California State University, 2017). CSUMB math and stats faculty redesigned all first-year mathematics and statistics courses in response to this executive order, created co-requisite options, and invested considerable time and effort in adapting Complex Instruction and Reading Apprenticeship pedagogies in their classes. In Summer 2020, Department faculty came together for a peer-led professional development workshop centered around quickly learning and applying best practices for online teaching. The Summer 2020 experience greatly informed the design of the current PD. Nearly all department faculty participated in the Summer 2020 PD. In a survey, 47% of respondents said that they preferred Math/Stat faculty-led PD and the other 53% said that they preferred a combination of faculty-led and external facilitator-led PD. No one responded that they preferred to solely have external facilitators, which is often the approach for PD for faculty. In addition, the Summer 2020 workshops were a combination of synchronous meeting time via Zoom and asynchronous tasks. Participants were compensated for both of these tasks.

As previously described, the professional development program was funded by the California Learning Lab. A team of four instructors led the design of the professional development. After interviewing Department faculty members about their professional development needs and personal "wish lists," the team developed the model below for the current PD.

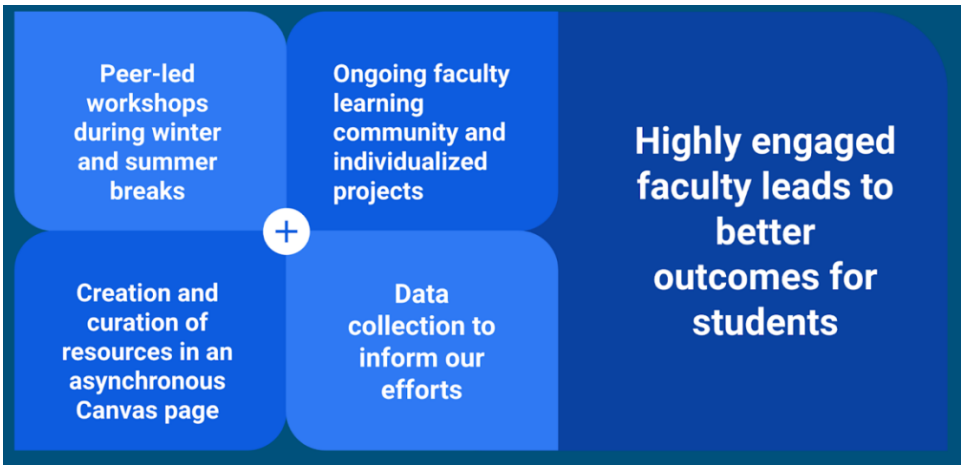

Figure 2. Design of Current Professional Development Program

Key design elements were taken from the Summer 2020 PD and from participants' responses in interviews: a combination of in-person, online, and asynchronous work for workshops; a Canvas page to house resources that could continue to be accessed after the completion of the grant-funded year; giving faculty the opportunity to work on their own projects in smaller groups around common interests or courses; and to regularly survey both

students and faculty about their experiences in their classes. In the next section, we describe the workshops, faculty learning community, and Canvas page as three components to a multifaceted approach to peer-led PD.

Results: A Multifaceted Approach to Peer-Led PD

Workshops

Workshops took place during summer and winter breaks. These workshops were an opportunity for the department to come together around a single topic as a large group. For each workshop, participants were asked to prepare material for discussion, attend the workshops, and then complete a follow up activity. This combination of in-person and asynchronous tasks was an important component to the workshop design. Participants also discussed and indicated what topics they wanted to address in the workshops.

Session 1: Reflections and professional development needs

In this session, participants met after the conclusion of the spring semester and engaged in a discussion about the articles in the literature review. The focus of the session was to identify common challenges that participants had experienced during the academic year that had just concluded, and to begin to identify solutions. Figure 3 below shows a group's boardwork from the session: first identifying challenges at the beginning of the day (in blue) and proposed solutions and strategies to those challenges at the end of the day (in red).

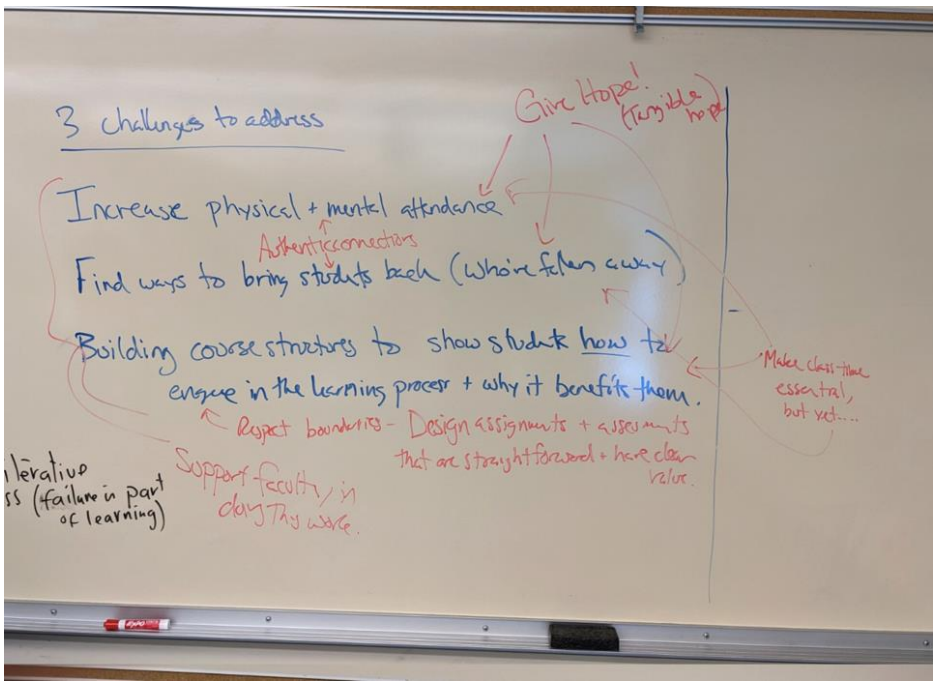

Figure 3. Identifying Common Challenges and Proposed Solutions

Session 2: Action Plan for Student Engagement

This session took place just before the start of the fall semester. In this session, participants each created an

individual action plan for student engagement. They identified a special project that they would carry out during the next semester. Sample projects are described in more detail in the next section, "Faculty Learning Community."

Session 3: Sharing Materials and Practices to Re-Engage Students

This session took place during the winter break, after the semester of Faculty Learning Community projects described below. In this session, participants reflected on their experiences from the past semester and shared new instructional materials that they had created. They also described the future of their projects, including planned changes for the upcoming semester and longer term goals.

Session 4 (Planned)

A fourth and final session is planned for the end of the 2024 academic year. In this session, participants will reflect on their overall takeaways from participating in the professional development and how they have grown as instructors. They will also discuss a plan to sustain professional development over time, even after the conclusion of the grant funding.

Faculty Learning Community

During the academic year, the Department held small group learning communities in place of workshops. The goal was to give structured time and community to work on a particular course intervention, with the flexibility of scheduling for a smaller group. There were two small groups that were each aligned to a common theme: Metacognition/Reflection in the Classroom and Designing/Refining Student-Centered Activities. We selected four faculty projects from the Fall 2023 semester to highlight. Each of these projects was designed and carried out with the overall goal of improving student engagement and academic outcomes in a particular class.

Instructor A: Senior Level College Statistics Class for Statistics Majors

The issue being addressed was the transfer of knowledge. The instructor chose to implement standards based grading as a mechanism to encourage students to continue refining their skills over time. The initial focus was to specially review notation and mathematical foundations needed for success in the course. Additionally, a project that connects the theoretical material of the class to the applied material from previous semesters was implemented. Students in the class were also asked to improve communication about what a thoughtful answer looks like. Asking for deeper reflections on the preparatory topics encouraged students to engage with the material on a more conceptual level. Consistently, students focus on small issues and miss the bigger concepts we are teaching them in the course. The instructor chose to implement more reflection questions and asked students to identify patterns of similarities and dissimilarities between old and new material to help support their transfer of knowledge from one topic and course to another.

The results showed that students reported they learned the material better than they would have because the standards based approach required them to revisit their mistakes. The instructor observed that the final grades based on this approach were very representative of the level of student understanding of the material and that specifically students in the C-range, who most likely would have not passed the course based on first-exam attempts, were able to work up to a C-level understanding of the material by the end of the semester. Consistently, 82-85% of respondents said they were benefiting from how the in-class time was structured (compared to 58% indicating that the preparation assignments helped them learn the material). The instructor identified an additional goal as a result of this feedback: to find a way for students to value and engage in the preparation material.

Instructor B: Freshman Level College Math Class for General Education

The issue being addressed was students' so-called "soft skills" necessary to be successful in any college course, with a special focus on specific skills needed for college math. By having students be really clear on the scope of the work they were to do and where to go to do it, the instructor hoped to see more success from students. Overall, the instructor wanted to practice what she is asking students to do and model the behavior, including showing how to do it. The aim was to improve student success and engagement while fostering a positive feeling about the class and students' progress.

The results showed it was a great semester with many improved outcomes. In Sporing 2023 the pass rate was 66% (most similar curriculum) and in Fall 2022 the pass rate was 89% (most similar for student comparison). During the Fall 2023 semester, when this intervention took place, the pass rate was 91%. The main changes to the course were assigning six quizzes instead of three tests, and having a module on finance instead of on probability. Overall, results from an anonymous survey showed that students valued the reading assignments (class homework) and the activities (class time) the most. Overall, students enjoyed the problem solving and finance topics the most. This was great feedback since finance was a new topic for the course, and confirmed that it is worth keeping. The instructor also made the final exam from the online homework problems (in part to emphasize doing the homework). This meant students could review the homework in a testing-like setting as practice and also review the problems by looking them over online. The final exam average was 78%. Some students feedback from an anonymous survey was:

- "My most memorable experience has been realizing how good I can be at math and how fun it can be when I understand it."
- "I see myself using a lot of the problem solving skills."
- "I have more confidence in my problem solving abilities."
- "I 100% see myself using the skills developed after completing this class, especially finance."
- "There were skills I learned aside from the math, I learned that it's okay to ask for help, going to the CLC [tutoring center] & that professors aren't as intimidating."

Overall, this instructor's careful consideration of adjusting many different aspects of the course, as well as explicitly teaching them the skills needed to be successful, ultimately resulted in a better course experience for students.

Instructor C: Sophomore Level College Statistics Class for Science Majors

The issue addressed in this project was giving feedback to students. The instructors wanted a way to give meaningful written feedback that would be easily accessible for students to view. The instructors revised the homework assignments to make them simpler to grade but keeping the content challenging for students. This meant that instructors could provide feedback in a more timely way. Feedback was clear and accessible since Canvas (learning management system) was not working well for written assignments. Further, class lesson plans were designed to be more rigorous providing additional resources for students to keep. The results were better attendance throughout the semester, increased exam scores on the first exam, and similar exam scores on the second exam. The number of WUs (withdrawals) improved over previous semesters. Further, class discussion was more fruitful and more time was available for group work.

Instructor D: Freshman Level College Math Class for Business Majors

The fourth and final instructor identified an issue in her classes where students were getting extremely overwhelmed when it came to working through problems on the in-class activities. She chose to intentionally scaffold these in-class tasks into smaller pieces. The instructor began to ask students to work one activity section at a time and then have a class discussion and check-in regarding the work and questions they had before moving on to the next part of the problem. The results from breaking down the activities into smaller components with more frequent check-ins was that students were more willing to ask questions to seek clarification when circulating through the classroom groups to check-in. Overall, the themes that emerged from these four projects (and other projects not discussed in this paper) were increased student engagement and more reflection and willingness to try new things on the part of faculty. By structuring time for faculty to meet regularly to discuss progress and struggles along the way, new iterations in the research cycle were sometimes designed during the semester. This is common in action research. Because faculty were held accountable to collect student data too, this helped inform the action research plans. If a design was still showing student disengagement, then the group discussed new ideas to try that might prove beneficial.

Canvas Course

The third and final component of the PD intervention was the creation of a Canvas page housing professional development resources so that participants could reference them anytime. Canvas is CSUMB's Learning Management system. In addition to the workshop and Faculty Learning Community materials, the facilitators created asynchronous modules around several topics, such as facilitating small group work and Reading Apprenticeship pedagogy. These topics were requested via survey by participants so that they could learn about the topics as they needed them by reviewing the materials and videos on demand. Figure 4 shows the home page view. The first table houses all of the resources associated with summer and winter workshops, as well as the academic year professional development communities. Each link points to a module with the slide decks, reports, resources, and discussion board conversations from that workshop or group. The facilitators have continued to create new modules in response to participants' requests.

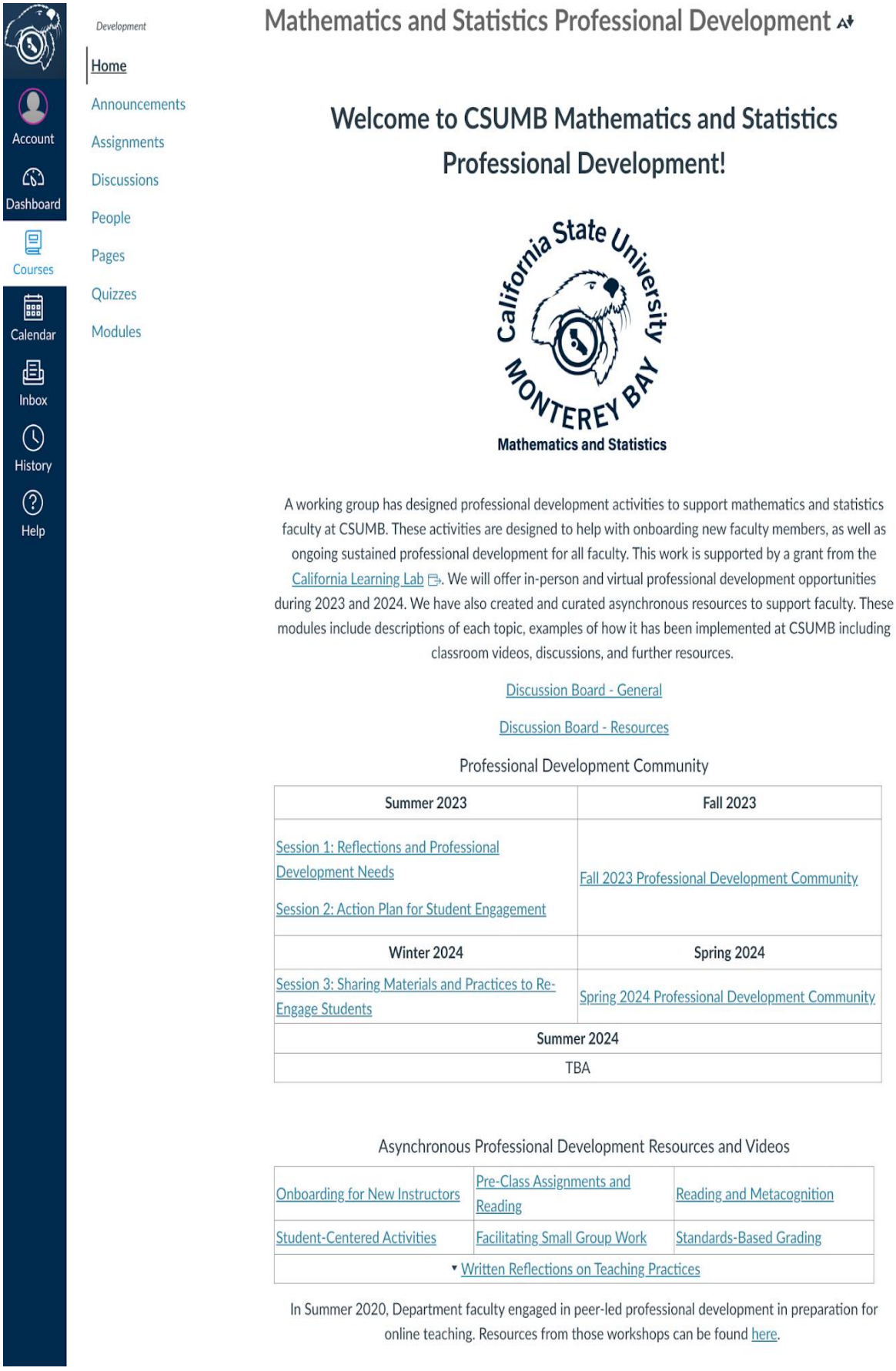

Figure 4. Front Page View of Canvas Course

The second table includes modules for topics that were requested by participants. Each of these modules is an asynchronous mini-course, including an overview, readings, discussions, videos, and "next steps." The videos are of CSUMB math and statistics faculty during the Spring 2022 semester. They are examples, not exemplars, of the ways in which Department faculty are utilizing these pedagogies and approaches in their own classes. A sample module is described below.

Figure 5 is a screenshot of a module on facilitating small group work from the Canvas course. One of the ways that faculty were wanting to better engage students was through small group work. This module includes readings about the principles of Complex Instruction (CI), which is a framework to guide small-group interactions. CI emphasizes the importance of creating and observing norms in a classroom. Several resources, including sample norms, student activities, and group worthy tasks to establish them are provided. There are also three videos of CSUMB faculty effectively facilitating small group work in different contexts: in a large introductory statistics class; students working on an active task in a quantitative literacy course; and students writing proofs at a whiteboard and doing a "galley walk" in an upper division math class.

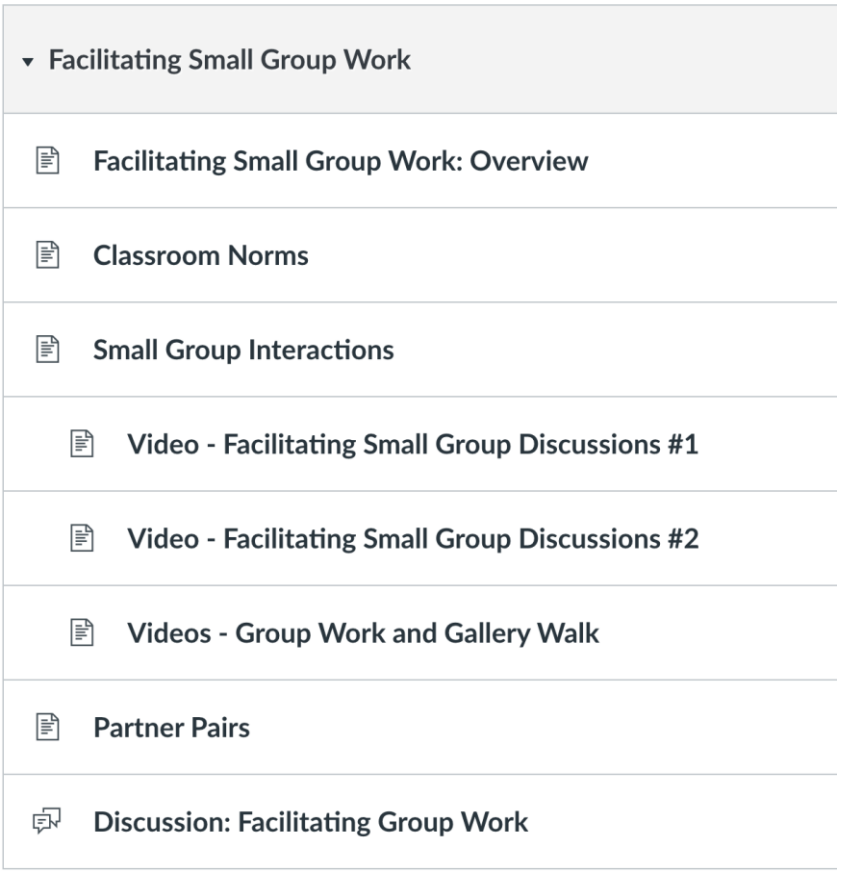

Figure 5. Screenshot of a Module from the Canvas Course

Figure 6 is a screenshot of the whiteboard groups. This Canvas course is an important part of the sustainable approach to professional development. Although it may not be feasible to continue the workshops and professional learning communities without securing additional funding, the course will continue to be available. Participants

may access it any time to revisit the topics and learning experiences from the workshops and learning communities. They can also work through the asynchronous modules at their own pace and in response to identifying challenges or new goals in their own classes.

Figure 6. Screenshot from the "Group Work and Gallery Walk" Video from the Module

Reflections, Challenges, and Future Work

In our department of 23 people, 20 of our instructors (87%) participated in this professional development program. At the end of Fall 2023 semester we gave a survey asking questions to the participants including:

What expectations did you have for participating in the PD? Has it met your expectations so far? What has been most valuable to you so far? What suggestions do you have for next semester? What is working and what could be done differently?

A sample of the feedback we received in response was:

- "Good discussion on metacognition and its relevance to learning."
- "To have the opportunity to focus some time and energy on a research project in my class."
- "This opportunity allowed me to observe and learn from my colleagues, whose methods in fostering student engagement and development I greatly admire."
- "I think that our conversations were generally productive, and that we were able to think about some of the logistics and nitty-gritty of building a course. Many PD discussions focus on fun theoretical ideas but aren't always as focused on the nuts and bolts."
- "I think the discussions themselves are helpful overall, so I like that aspect. Smaller groups might be necessary for everyone to have a chance to share and for scheduling."

Overall, the feedback indicates that instructors have found the opportunity to participate in paid professional development valuable to their own classes. From an action research perspective, the instructors were able to

engage in the reflect, plan, and record aspects much more so than if they had not been supported to do so.

Throughout the process of designing, implementing, and iterating peer-led professional development, there have been ongoing challenges. Schedules and faculty bandwidth to complete work on top of their assigned teaching loads are always difficult to navigate. The facilitators kept these challenges in mind as part of the design process. Participants could choose which parts of the PD to work on and to attend as much or as little as their schedules and contexts allowed. They also met in smaller groups during the academic year when schedule conflicts are more of an issue. The challenges with student engagement and varied student needs that initially prompted the professional development program also continued. While the reflections above suggest that the PD activities were valuable to both instructors and students, meeting the varied needs of students and supporting them to fully engage in their coursework is a constant challenge. A final challenge will be to truly make the PD model sustainable after the conclusion of the financial support from the grant.

There are several planned components for future work on this project. The action research framework of "Reflect - Plan - Act - Record" demonstrates that the cycle will continue over time. It will also be important to analyze student outcomes data as part of the "record" phase. Each semester, the Department collects survey data on student experiences in first-year courses (Voigt et al., 2020). As previously described, faculty participating in the PD also solicited informal feedback from their students during the Fall 2023 semester. Analyzing these data, together with academic outcomes data, will be an important part of understanding if the interventions in the classroom contributed to better student academic and experience outcomes. We also plan to survey participating faculty to better understand what their experiences were during the year of grant-supported PD activities, and to solicit their input about how they want ongoing professional development within the department to continue.

Conclusions

We believe that there is increased student and faculty engagement as a result of this program. Key components of the design include: compensation of participants for synchronous and asynchronous work time; flexibility for colleagues; faculty buy-in and input; and collecting resources that are then easily accessible by all. To this last part, we plan to use the Canvas page as a way to house ongoing PD resources in the department after the conclusion of the grant funding support. We also envision this Canvas page as an important part of the sustainable, ongoing effort for PD within the department over time. By sharing our approach, we hope that other departments, colleges, and institutions may "adapt and adopt" any components that are useful to support engagement of their own colleagues and students.

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